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ABSTRACT BOOK

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TUBERCULOSIS CASE FINDING AMONG VULNERABLE POPULATIONS

Combining passive and active case finding strategies to increase case detection in urban slums

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Introduction: In the last few years, the National program has achieved the 70/85 targets, through effective public private partnership. In urban areas, the program faced challenges of delivering accessible TB care to certain population groups including inhabitants of slum areas. The two-pronged program strategy to improve case detection in urban slums has been to strengthen the network of facilities (public and private) for delivering quality TB care as well as mobilizing the communities to utilize the services made available.
Objectives: To develop and implement a set of interventions for enhanced case detection (active and passive) in urban slums.
Method: Through a consultative process the intervention was designed for enhanced case detection in urban slums. The implementation of the intervention in selected sites was through public-private partnership. In the urban slum areas, groups of 'advocates' were identified and enabled for identifying and referring TB 'suspects' to the nearest health facility. The advocates included mainly the lady health workers and school-teachers. The routine facility data has been used to monitor the case finding and holding at the respective facilities.
Result: Early implementation experiences indicate feasibility as well as effectiveness of enhancing case detection in urban slums through enabled advocates.
Conclusion: The approach is being further refined for scaling-up in other parts of the country.

Improving diagnosis of TB in HIV-infected persons: evidence from a large study in South East Asia

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Background: Routine screening for TB disease is recommended for all people with HIV to facilitate early TB diagnosis and safe initiation of antiretroviral therapy (ART) and isoniazid preventive therapy (IPT). No internationally-accepted, evidence-based guideline currently addresses how to do this.
Methods: We enrolled people with HIV from 8 outpatient clinics in Cambodia, Thailand, and Vietnam. Patients were enrolled regardless of signs or symptoms. Enrolled patients provided three sputum, one urine, one stool, one blood, and one lymph node aspirate (for patients with lymphadenopathy) specimen for mycobacterial culture. We compared characteristics of patients with TB (at least one specimen culture-positive for *Mycobacterium tuberculosis*) to those of patients without TB to derive an algorithm for TB screening and diagnosis.
Results: TB was diagnosed in 267 (15%) of 1748 patients. The median CD4 was 242 (interquartile range, 82–396). Cough $\geq$2–3 weeks, a commonly used single symptom for TB screening, had 22–33% sensitivity. A combination of any cough, any fever, or night sweats lasting $\geq$21 days in the past 4 weeks was 93% sensitive and 36% specific. In patients with any of these three symptoms, a combination of sputum smears, chest radiography, and CD4 testing helped exclude TB, but could only diagnose TB for the few with positive sputum smears; TB culture is required for most of the remaining patients. This approach minimized false negatives and diagnostic tests performed compared with commonly used algorithms.
Conclusions: In persons with HIV, symptom screening based on chronic cough alone should be abandoned in favor of screening based on a combination of symptoms, such as those reported here. It appears that ART and IPT can be safely started in people who screen negative, while most patients screening positive will require TB culture.

This work was conducted by the ID-TB-HIV Study Team.

Strategies to improve case detection among those with limited access: a FIDELIS summary

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Setting: Tuberculosis control activities worldwide.
Objective: To review case finding results from the FIDELIS initiative and specific strategies employed within FIDELIS projects.
Design: FIDELIS was a multi-project fund to increase case detection through local and innovative initiatives with a focus on patients with limited access to care. FIDELIS was supported by the Government of Canada through the Canadian International Development Agency and implemented by the International Union Against Tuberculosis and Lung Disease.
Results: Between 2003 and 2008, a total of 53 phase I projects were initiated out of 167 proposals received over six application rounds. The 51 phase projects completing their activities detected a total of 273 239 new smear positive (NSP) cases during their one year of case-finding activities (average yield of 5358 NSP

cases per project). This represented an additional 85 267 NSP cases detected in 51 FIDELIS projects (average yield of 1672 additional NSP cases per project). Of these 51 projects, 28 implemented IEC activities, 13 implemented PPM activities, 7 implemented innovative microscopy activities, 11 implemented active/semi-active case finding, 20 implemented health system strengthening and 21 projects utilized incentives in their project.

Conclusions: A wide range of strategies were employed in FIDELIS projects over the five year initiative. While overall case finding figures are impressive, attribution to the FIDELIS intervention is limited by the routine program environment where these activities took place. The small project numbers also limit the conclusions that can be drawn with respect to individual interventions.

A framework to enhance case detection with a focus on vulnerable populations

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Background: With the expansion of the DOTS strategy the target for treatment success of 85% has now been reached globally among notified cases. However, great variations exist, and many countries report treatment success rates far from the target. Furthermore, a large number of TB patients (around 40%) are still not notified and are treated with poor treatment outcomes.

Aim: To identify where TB patients, and particularly vulnerable groups, are seeking care and what the DOTS strategy offers. To conceptualize the path of a person who presents symptoms of TB and identify major determinants that facilitate or restrain the diagnosis and treatment of TB in this person according to quality standards.

Results: What DOTS is and what it is not. A conceptual framework to help countries to identify determinants for improved case detection and notification, particularly in vulnerable populations. To identify strategies to improve early case detection.

Conclusion: The DOTS strategy remains the basic principles for quality TB care (also described in ISTC). What is needed is to identify bottlenecks and constraints that limit identification of TB in vulnarable populations and optimal treatment. In most countries there is a need to improve treatment and case management practices across the whole health system.

HOT TOPICS IN HIV, TB AND MDR-TB IN HIGH HIV PREVALENCE SETTINGS

Understanding MDR and XDR in Namibia: results of a medical epidemiological investigation

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Background: Namibia's National TB Control Program estimates that the case load of drug-resistant tuberculosis (DR TB) has been increasing since 2007, with 250 to 300 cases annually. DR TB is associated with high morbidity and mortality, especially among HIV-infected patients. In March 2009, we conducted the first epidemiological investigation to determine the characteristics of multidrug-resistant tuberculosis (MDR-TB) in Namibia.

Methods: We reviewed medical records and interviewed patients with a laboratory-confirmed diagnosis of MDR-TB and patients who were presumed to have drug-susceptible TB (DS TB) based on treatment with first-line drugs (FLDs). Inpatients and outpatients diagnosed between January 2007 and March 2009 at 9 regional sites were included. The standard World Health Organization case definition of MDR-TB was used.

Results: We enrolled 117 confirmed MDR-TB and 251 presumed DS TB patients. The two groups were similar in terms of male sex (55%, 55%), mean age (37 yrs, 36 yrs) and being married or living together (28%, 25%). 97% of patients with confirmed MDR-TB had a history of previous TB treatment compared to 46% of patients with presumed DS-TB ($P < 0.0001$). Patients whose most recent treatment with FLDs failed (OR = 35.2 [95%CI 10.7–113.1]) or were transferred to a different treatment facility (OR = 30.2 [95%CI 3.3–274.1]) were significantly more likely to have confirmed MDR-TB. HIV-infected patients were significantly less likely to have confirmed MDR-TB (OR = 0.5 [95%CI 0.3–0.8]).

Conclusions: Being previously treated for TB was significantly associated with having confirmed MDR-TB and appeared to be driven by treatment failure and lack of continuity in care. HIV-infection was negatively associated with MDR-TB, which might be due to a higher death rate among HIV-infected patients. Strengthening basic TB control practices, such as directly observed therapy, to ensure uninterrupted treatment is critical to the prevention of MDR-TB.

Integrated approach to primary health care to strengthen HIV-TB services

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Integrated service delivery provides an opportunity to strengthen the health system within the context of a district network, with a systematic approach to building the capacity of health workers to provide comprehensive primary health care. Service integration emphasizes integration of case management and improved communication between all levels of health service delivery. The WHO Integrated Management of Adolescent and Adult Illness (IMAI) focuses on health system strengthening at three levels: by building clinical teams at the district hospital and health centre and by strengthening community delivery of services; by supporting strong programme management and logistics; and by empowering patient self-management and community involvement. The IMAI Acute Care guideline module prepares health workers to suspect TB and HIV infection, based on a syndromic approach to the most common adult illnesses; this supports improved TB case detection by assessing and classifying cough or difficult breathing, undernutrition, lymphadenopathy, and persistent fever in all adults seeking care at health centre level. Tools for chronic or long term care at primary care level in compatible approach and format support are the WHO IMAI-IMCI Chronic HIV Care with ART and Prevention (which supports checking TB status on every visit), TB-Care with TB-HIV Co-Management guideline module and accompanying short training course(developed jointly by WHO HIV and Stop TB Departments), and Management of MDR-TB: A field guide. Their common approach provides efficiencies in both training health workers and supporting patients with several conditions at primary care level. The Operations Manual for delivery of HIV Prevention, Care and Treatment at Primary Health Centres in High-Prevalence, Resource-Constrained Settings provide management and logistic support for TB-HIV at primary health centres.

The trend of resistance to anti-tuberculosis drugs in Botswana: results from the 4th national anti-tuberculosis drug resistance survey

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Background: The World Health Organization (WHO) estimates that 500 000 new cases of multidrug-resistant tuberculosis (MDR-TB), defined as TB resistant to at least isoniazid (INH) and rifampicin (RIF), occur each year. In 2002, 0.8% of new TB patients in Botswana had MDR-TB, up from 0.2% and 0.5% in 1995–1996 and 1999 surveys, respectively. We conducted the 4th national survey of anti-tuberculosis drug resistance during 2007–2008 to determine current levels of resistance and to assess trends over time. **Methods:** During September 2007–May 2008, sputum specimens for all new patients in Botswana with sputum-smear positive TB and sputum specimens for TB suspects previously treated for TB, regardless of smear result, were referred to Botswana National TB Reference Laboratory (NTRL). NTRL performed culture for *Mycobacterium tuberculosis* and drug susceptibility testing (DST) on one specimen per patient using standard methods on solid culture media. De-identified aliquots of specimens were also tested for HIV using the OraQuick rapid HIV test. **Preliminary results:** Of 933 new TB patients with DST results, 84 (9.0%) had any INH resistance, 44 (4.7%) had any RIF resistance, 28 (3.0%) had any ethambutol (EMB) resistance, and 32 (3.4%) had MDR-TB. Of 145 patients with previous TB treatment with DST results, 24 (16.6%) had any INH resistance, 30 (20.7%) had any RIF resistance, 18 (12.4%) had any EMB resistance, and 19 (13.1%) had MDR-TB. Among all enrolled in DRS, 58% were HIV-positive by anonymous OraQuick testing of sputum specimens. **Conclusions:** There is an increasing trend in anti-TB drug resistance in Botswana among 1st-line anti-tuberculosis drugs, including more than 4-fold increase in MDR-TB prevalence among new TB patients. HIV prevalence among persons with TB remains high. More routine use of DST may be needed for TB patients in Botswana. Efforts to scale up MDR-TB treatment and prevention (including improved general TB control and TB infection control) are needed.

TB, HIV AND DRUG USE IN PRISONS

Tuberculosis in drug users: a walk through the evidence in time

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With the increasing appreciation that Social Determinants are related to incidence of Tuberculosis (TB), attention has been appropriately directed at identification of these social determinants and characterization of the roles of comorbidities. One of the first described, aside from poverty, race, and immunosuppression, was drug dependence. In 1979, prior to the HIV/AIDS epidemic, Reichman, Felton and Edsall, published a little noted study in an acute care hospital in a very high TB incidence area (Harlem, New York City) that revealed TB prevalence was more than six times greater in drug dependent individuals compared to non drug dependent. This relationship

was confirmed in other similar high risk populations in the same area. The conclusion of the paper was that drug dependence was a possible new risk factor for TB and perhaps these individuals could benefit from various directed interventions including Isoniazid Preventive Therapy (IPT). The reason for the elevated disease rate, at the time was unclear: 'It might be said that drug dependency itself is not a risk factor because the entire mode of living of the drug dependent person encompasses a number of likely risk factors (alcoholism, close contact, possible drug resistance). However, drug dependence is a definable label, apart from persons who may live in a high density, low income area and who may be unemployed or alcoholic. Moreover the diagnosis of drug dependency provides a possible avenue of intervention . . .' This label might provide a framework for intervention such as targeted testing for latent TB infection, IPT or other programs, perhaps reinforcing the characterization of Social Determinants as a useful tool for TB Prevention.

Partnership of NTP and civil society in TB control in the penal system in the Philippines

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Background: Philippines has reached the standards of CDR (>70%) and TSR (>85%) but should still reach-out to high-risk populations where TB poses a big threat. Detainees are at risk due to poor health conditions of their environ. NTP addressed this through partnerships that include other Government, local and international organizations.

Method: The Comprehensive and Unified Policy to Control TB (CUP), an Executive Order issued by the President was a high-level policy instrument used for advocacy to key government partners. Those in-charge of country's penal system, Bureau of Jail Management and Penology and Bureau of Corrections, were successfully engaged for the purpose. A TB-focused NGO, Philippine TB Society, Inc. (PTSI) was engaged for a prevalence study in selected jails. Roundtable discussions were conducted to strengthen their engagement. Analysis was yet to be finalized. International bodies, WHO and ICRC, were partners that provided technical assistance and some operational support.

Results: Above stakeholders met to define a strategy in addressing TB in prisons. A Memorandum of Understanding (MOU) was signed that strengthened existing TB policies with focus on detention. DOH issued the Technical Guidelines for Implementing DOTS Strategy in Jails and Prisons (Administrative Order No. 2009-0003) that served as basis for respective Operational Guidelines within government partners. DOTS remained as the overarching strategy and NTP standards provided guidance in formulat-

ing their implementing procedures. Partnerships amongst other Government offices were facilitated through the CUP.

Conclusion: For challenging situations like TB in prisons both public-to-public and public-to-private partnerships strongly support the NTP on aspects of policy development and conduct of operational researches. Their engagement is initiated by NTP as early as the inception phase and is sustained throughout, to obtain the desired outputs.

Poverty and TB-HIV in prisons and community response: the case of South Africa

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Introduction: Correctional facilities are believed to have higher TB and HIV prevalence compared to the general populations. Provision of HIV-TB management services and antiretrovirals within these environments is difficult to implement. We describe the process of facility preparation and the results of implementation of antiretroviral delivery within three prisons in South Africa.

Intervention: A public-private partnership was formed in October 2006. Clinic equipment, health personnel and training were provided by Aurum Institute funded through PEPFAR. The first site was accredited for antiretroviral therapy provision by the South African Department of Health in March 2007. A further two clinics have been accredited by July 2009. A TB-HIV integration project, which included TB education and TB screening on enrollment to the prison, was commenced in 2008. Education activities included provision of education material, TB training academies for peer educators and TB talks to offenders.

Results and lessons learnt: By July 2009, two clinics had enrolled 984 offenders on the HIV programme and 503 patients were started on antiretroviral drugs. 452 (90%) have remained in care. A highly successful TB campaign was run in June 2009 which culminated with over 3500 offenders participating in a TB screening project launch. The highly structured and disciplined environment of the correctional services allowed for a rapid implementation of the programme. Difficulties encountered were procurement of drugs (lack of clarity on responsibility), delivery of equipment and installation of data management systems (security issues) and appointment of staff (security concerns).

Conclusions: Establishing HIV and TB services within a correctional centre environment is feasible and acceptable. Programmes targeted at TB prevention and TB-HIV integration proved to be very popular and are well suited to this environment.

Access to HIV and TB services for drug users in prison settings

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Injecting drug users in prisons: Myths and realities
Each year, more than 30 million people enter prison and most of them eventually return to their community. HIV prevalence in prisons always higher than in the general population. In regions of the world were injecting drug use is prevalent, HIV prevalence in prisons can be up to 50 times higher than in the community. Injecting drug users can represent up to 80% of the prison population. Ongoing injecting drug use involving the sharing of injecting materials, as well as unprotected sex among prisoners, makes prisons high-risk places for the spread of HIV among inmates. Much higher levels of active TB disease, up to 100 times more, are reported in prisoner populations compared to the general population. There is an estimate 16 million injecting drug users (IDU) in the world. Who are responsible for 30% of the HIV infections outside Africa. The incarceration of the IDU is particularly high and many IDUs will go to prison at least once in their life, often several times. HIV prevalence among IDU range from 1–2% up to 80%. TB may is a particular problem for some people using drugs in prisons because: 1) before entering prisons due to the social and material conditions in which they live they and risk behaviours, they are at higher risk for both HIV and TB ; 2) because of co-infection of TB and HIV; 3) because of the prison environment including overcrowding, poor living conditions and low access to health care. (Injecting) drug users are often denied access treatment for HIV and/or for tuberculosis because of 1) legal environment; 2) ignorance and misconception; The treatment of drug users for TB is a right, is a public health problem concerning the entire society, and is effective despite the possible challenges such as co-morbidities (e.g. HIV, viral hepatitis, alcohol dependence, mental illness), drug interactions (in case of injecting drug users) and continuity of care.

Guidelines and advocacy, linking HIV-TB, prisons, drug use and poverty reduction

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This presentation will review the links between TB-HIV prisons, drug use and poverty and explore the advocacy and policy opportunities to jointly address these interlinked problems through an integrated partnership approach.

CONTRIBUTION OF MICROBIOLOGY TO THE THERAPEUTIC MANAGEMENT OF TUBERCULOSIS

Contribution of microbiology to the therapeutic management of tuberculosis in Rwanda

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In Rwanda, no national survey on the prevalence of resistance to antituberculosis drug or any study on the molecular epidemiologic typing of *Mycobacterium tuberculosis* strains had been undertaken prior to this work. In this research, two prospective investigations were carried out on the profiles of resistance to antituberculosis drugs in Rwanda: the first involved sampling from four provinces in Rwanda and the second by a representative sampling at national level according to the IUATLD/WHO standards. In total, 644 and 701 isolates of *Mycobacterium tuberculosis* were respectively isolated, identified and tested for their sensitivity to antituberculosis drug by the traditional bacteriological methods. At national level, acquired multidrug resistance appeared to be significantly higher than primary resistance (9.4% vs 3.9%). These high rates of resistance to first line antituberculosis drugs underline the need for improving the campaign for the fight against TB in Rwanda. The study conducted at national level also permitted the determination of the frequency of resistance to fluoroquinolones, antibiotics which are reserved for the treatment of TB due to multidrug resistant bacilli (MDR-TB). Our results show a low rate of resistance to ofloxacin (0.6%). Using molecular markers [spoligotyping and MIRU-VNTR (Mycobacterial Interspersed Repetitive Units-Variable Number of Tandem Repeats)], we could document nosocomial transmission of multiresistant TB within patients being followed up in healthcare institutions in Rwanda. In a cohort of 710 tuberculosis patients followed-up during a period of 3 years the use of these techniques allowed us to determine that, in the event of treatment failure, recurrent TB episodes were more frequently ascribable to reactivation or chronicity of an initial infection rather than to reinfection with new TB strains.

Different uses of MODS in medically underserved populations in Peru

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The simple availability within a national tuberculosis control programme (NTP) of any of the new generation of rapid, highly sensitive diagnostic tests for TB detection and drug susceptibility testing (DST) is of itself an insufficient condition for improved clinical care. The pathway to enhanced treatment outcomes and epidemiological impact is also dependent upon:

1 effective laboratory quality assurance—the health-care system must utilise the test appropriately and the test must deliver reliable results;
2 laboratory capacity—the limits of logistical, man-power, spatial and financial capacity must be recognised and optimally exploited;
3 appropriate utilisation by healthcare workers—the right samples must be taken from the right patients and handled correctly;
4 the population must access testing at point of delivery—patients need knowledge of test avail-ability and access to sample collection sites.

The MODS assay is a non-proprietary liquid cul-ture and direct DST assay which delivers sensitive and reliable detection of TB and MDR-TB from spu-tum samples in a median time of 1 week for less than \$3. Even at this low unit cost however, it would cur-rently be unfeasible to offer MODS testing (or indeed any other currently available new diagnostic) to every TB suspect in Peru (1.5 million tested p.a.) for reasons of laboratory capacity and total cost. In operational research within the Peruvian NTP we are evaluating the cost-effectiveness and epidemiological impact of four different MODS implementation strategies with the aim of guiding policy for future scale-up. The implementation process (including the four necessary conditions outlined above) and the strategies currently being tested in Peru will be described, and available preliminary data will be presented.

The development of an efficient AFB microscopy network: the Pakistan experience

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Setting: National TB Control Programme (NTP) Pak-istan revived in 2001 and DOTS strategy launched expanded to reach 100% coverage by 2005 using AFB smear microscopy as a basic diagnostic and treatment follow-up tool. Microscopy Centers increased from less than 50 to over 900 within this period without addressing most of the existing gaps in laboratories. Ensuring efficient microscopy services posed a chal-lenge as concept of quality-assured diagnosis, tier structure of laboratory network and supervisors did not exist in public health system.

Objective: To establish an efficient quality-assured AFB microscopy network.
Design: To improve efficiency of microscopy services, district health systems was reviewed, human resource development reinforced, intermediate laboratories and supervisors assigned at district level, baseline need assessment conducted, gaps filled, and tools for regular laboratory data collection applied. Guideline for quality assured diagnosis drafted and EQA model piloted. A system for blinded rechecking was imple-mented in 312 centers (2006) and gradually expanded in phases to cover 940 centers (2009). Indicators for microscopy performance and case finding were mon-itored regularly to assess improvement in the labora-tory quality and its impact on case notification.
Results: With the onset of EQA activities in 2006, improvement in laboratory indicators including pro-portion of positive suspect and follow up was evi-dent. Parallel with improvement in laboratory ser-vices significant increase in case detection of smear positive cases (37% in 2005 to 74% in 2008) as well as gradual improvement in proportion of smear posi-tive case (41 to 48%) was reported.
Conclusion: Allocation of adequate financial re-sources, strengthened physical and functional ca-pacity of the microscopy laboratory network of NTP contributed to a great extent in sharp increase in case-detection within a short period of time with enhanced quality of diagnosis and treatment follow-up.
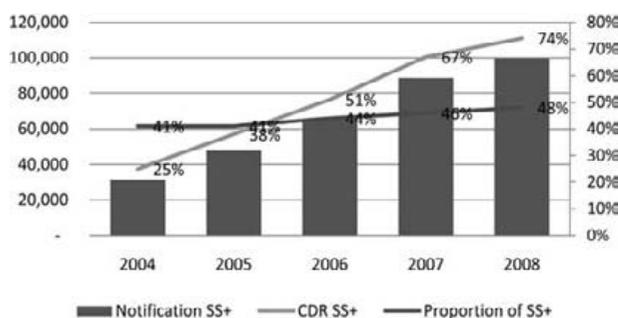
Figure   SS+ve case notification.

Comparison of rapid phenotypic methods of TB drug susceptibility testing

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Introduction: Susceptibility testing of Mycobacterium tuberculosis with the conventional indirect methods is too slow to influence patient management in case of multi drug resistant tuberculosis (MDR-TB). Di-rect tests that involve inoculation of drug containing

media with smear positive samples offer an opportunity for rapid susceptibility results.

Objective: To compare the sensitivity, specificity and time to results of four direct phenotypic susceptibility tests for MDR-TB. The tests included—Nitrate Reductase Assay (NRA), Microscopic Observation Drug Susceptibility (MODS), Manual mycobacterium growth indicator tube, and the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT).

Design: A meta-analysis of fourteen direct susceptibility study reports: NRA—4, MODS—6, manual MGIT—2, and MTT—2 was performed. The Meta-Disc software was used for data analysis.

Results: Rifampicin. Sensitivity and specificity for detection of resistance was 99% and 100% for NRA, 96% and 96% for MODS, 91 and 94% for manual MGIT, and 93 and 100% for MTT, respectively. Isoniazid. Sensitivity and specificity was 94% and 100% for NRA, 92% and 96% for MODS, and 100% and 97% for manual MGIT, respectively. Isoniazid was not studied with the direct MTT. The mean time to 100% of DST results was 15 days for the manual MGIT, 21 days for MTT, 23 days for MODS tests, and 28 days for NRA.

Conclusions: Direct susceptibility testing with the NRA and MODS tests was highly sensitive and specific, and allows rapid detection of MDR-TB.

IMPLEMENTING AND EVALUATING BEST PRACTICE FOR PATIENT CARE IN LOW-INCOME COUNTRIES

Assessing the quality of care from a patient's perspective

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Introduction:
* Quality of care as seen through the eyes of the patient hinges on concepts based on patient satisfaction, value expectation, patient empowerment and promotion of patient perspective.
* Quality of care as seen through the eyes of the patient for tuberculosis consists of two questions:-
* One aims at measuring the performance of services delivered in TB facilities from the perspective of patients, the other rates the importance of quality dimensions of TB services. The combination of the two gives a quality impact of the performance as seen through the eyes of the patient.

Setting: 6 outpatient departments (OPD) of 3 hospitals and 2 health centers in Lilongwe.

Objective: To assess the existing health worker practice in providing care to patients with respiratory symptoms in the OPD.

Methods: Between 1 and 31 July 2002 exit interviews were conducted with patients from OPD consultation rooms and possessing a prescription for respiratory diseases. Verbal confirmation of the patients' complaints was done, patients' OPD notes were reviewed and a questionnaire was completed. Data was collected for patients aged 5 and above.

Results: 3001 patients with median age of 27 years were enrolled in the study. 1203 (40%) were male. 80% had made several visits to the OPD with the same symptom. In some cases verbal reports of main symptoms did not match with those recorded on OPD notes. 511 (17%) patients reported that a clinician listened to their chest. Antibiotics were prescribed to 2501 (83.3%) patients for various respiratory complaints. Similarly analgesics were prescribed to 2671 (89%) patients. Steroids were prescribed to 185 (6.2%) patients. Only 56 (2%) patients were referred to another level of care.

Conclusion: Management of patients with respiratory symptoms in Lilongwe is characterized by increased usage of antibiotics, analgesics and inability of health workers to examine the patients chests. Referral to other care facilities is also uncommon.

Electronic and paper-based tools for the implementation of best practice for patient care

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While there have been many improvements in TB control, there remains an urgent need to increase case detection and address the ongoing emergence of drug resistance. A better understanding and implementation of patient-centred care will make a significant contribution to the effort to control TB. An essential step towards a global approach to implementing patient-centred care was taken with the publication of 'Best Practice for the Care of Patients with Tuberculosis—a Guide for Low-Income Countries' published by the Union in 2007. Contributors to the guide defined best practice for patient care, from diagnosis to the end of treatment, in the context of the StopTB Strategy and in settings with a high burden of TB. The guide is designed to be used as a basis for developing practice and improving care by setting quality standards and using clinical audit to evaluate changes. It allows health care workers to assess their situation and practice, identify areas which need attention, plan and make the relevant changes and evaluate the outcome. The tools which have been developed subsequently enable health care workers to take the necessary practical steps to implement best practice as described in the guide and evaluate the impact this has on the care patients receive as well as on TB control efforts as a whole. The tools have been developed and tested in a variety of settings including international workshops and country-level training

courses. They are routinely used as part of the ICN TB/MDR-TB project in the training of nurse trainers and, in this context, have led to a variety of service improvements which will be presented.

Using a best practice approach to roll out the MDR-TB programme in the Philippines

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Setting: In Metro Manila (MM), Philippines, patients with multi drug-resistant tuberculosis (MDR-TB) are managed by three public and two public Treatment Centers (TCs), facilities that offer comprehensive management.

Objectives:
- To assess patients' basic knowledge on TB/MDR-TB during their initial visit in MDR-TB TCs.
- To determine the effectiveness of the provision of information to patients by measuring changes in basic knowledge on TB/MDR-TB.

Method: Prior to performing routine screening for drug-resistant TB, the TC staff will administer a completion type of pre-test about TB/MDR-TB to the patient. The screening procedure which includes the provision of information about MDR-TB using a flip chart will then be performed. A post-test similar to the pre-test will be administered. The results of both tests will be used to determine patients' level of knowledge on the nature, diagnosis and treatment of TB and MDR-TB before and after the provision of information. Patients' companions, if present, will also be included in the study as respondents to the same pre- and post-tests. The pilot phase of this project will be done at a selected TC in MM for at least 2 months. Other TCs in MM will be included thereafter in a phased manner. Data collected during the pilot phase will be analyzed by the end of 2009.

The Best Practice Guide as a basis for training at a college of nursing in Siberia

T Fedotkina. Tomsk Regional TB Dispensary, Tomsk, Russian Federation

All over the world, nurses have to deal with TB patients in their everyday work. The Best Practice Guide is used in Tomsk region to train students at the Tomsk College of Nursing in the basics of TB control. Since the Guide is more of a practical tool, our students do not simply learn general facts about TB. They learn how a TB nurse should deliver professional care to TB patients. The students are taught how to implement the best practice standards in the field of TB care, i.e., how to organise standardised patient-centered care taking into account the unique circumstances of each patient. They are taught how to maximise the patient's ability to adhere to treatment by identifying an appropriate treatment unit, offering convenient times

for follow-up visits, providing social support when needed. Our students learn to understand the importance of psychological support to patients and their families: they are taught to create a welcoming environment, address the patient's fears about TB, build trust and treat the patient with respect, show concern, answer questions and provide information in a professional manner. Thanks to the implementation of the best practices TB patients complete their treatment, do not feel stigmatized by the disease, their families are actively involved in the care and they remain sensitive to TB drugs.

Conclusions:
1 Our students learn the importance of a nurse in TB care.
2 Patients' ability to adhere to treatment is maximised.
3 Higher levels of treatment adherence help to prevent the spread of drug resistant TB.
4 The implementation of the Guide improves TB control programmes.

MEASURING TB BURDEN AND ASSESSING IMPACT OF CONTROL

Overview on the progress of the Global Task Force on TB Measurement

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The main objective of WHO's Global Task Force on TB Impact Measurement is to systematically address global and national impact measurement issues to obtain, by 2015, the evidence base to inform the Stop TB Partnership on the attainment of the TB-related MDG's. The Task Force developed a three-pronged approach, consisting of 1) an innovative approach to strengthen national TB surveillance systems through (self-) certification, 2) TB disease prevalence surveys in at least 21 selected high prevalence countries and 3) a systematic review and regular update of existing estimates of TB incidence, prevalence and mortality. The presentation will review the rationale of the Task Force's approach and will provide the audience with an update on the current status of work in each area.

Progress in the global implementation of prevalence surveys and lessons learned

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The TB disease prevalence survey sub-group of the WHO Global Task Force of TB Impact Measurement was established in December, 2007. After the assessments of several factors such as countries' TB epidemiological situations, quality of surveillance, needs

and presence of previous studies, 21 countries were originally designated as global focus countries to carry out TB prevalence surveys twice by 2015 or around. Since then, the task force members have been working with countries to provide technical guidance through training workshops, documents review, country visits and distant communications. As of August 2009, the task force is working with 23 countries. Philippines (2007), Vietnam (2007) and Bangladesh (2008–2009) have completed a national survey, and it launched in Myanmar in June 2009. Although experiences began to be accumulated from Asian countries, no national scale survey was carried out in African countries except one in Eritrea (2005) in this 30 years. However, among 16 countries that are preparing to implement a national survey in two years, 12 are African countries, and sub-national surveys were carried out recently in Kenya, South Africa and Zambia by research projects. Lessons from recent surveys and survey preparations will be discussed to identify and solve technical and managerial bottlenecks.

Predicting the course of MDR and XDR epidemics

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The growing number of reports of antibiotic resistance worldwide has led to fears that some lethal human pathogens, such as *Mycobacterium tuberculosis*, will soon become untreatable. Here we argue that, while this is possible, it is not inevitable. The World Health Organization has recently reported more cases of multidrug resistant TB than ever before, but epidemiological analysis shows that the spread of MDR-TB can be reversed by good treatment practices, and that MDR-TB can be set on a path—albeit a slow path—to elimination. A positive and rapid response to the April 2009 'Call for Action' on tuberculosis control and patient care, already supported in principle by health ministers of the most-affected countries, could turn the tide against drug resistant TB.

THE COLLIDING EPIDEMICS OF TOBACCO SMOKING, TUBERCULOSIS, HIV AND COPD

Colliding epidemics of TB, smoking, HIV and COPD: an overview

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In many developing countries, tuberculosis (TB), HIV, tobacco smoking, and COPD are ever-increasing epidemics. Although the link between TB and HIV is well established, less well recognised is the important link between tobacco smoking and TB. This association is of substantial relevance to public health as well as disease outcomes in individuals with tuberculosis. It is now also clear that TB, like tobacco smoke, is an important risk factor for COPD, which increases susceptibility to respiratory tract infections in developing countries. Tobacco smoking, a modifiable risk factor, is also associated with worse outcomes in HIV-associated opportunistic infections, of which TB is the commonest in developing countries. Furthermore, the under recognised effects of environmental and indoor air pollution contribute significantly to both COPD and potentially the risk of TB. There is thus a four way interaction between TB, HIV, tobacco smoking and COPD deleteriously affecting lung health in a significant proportion of the world's population. These interactions deserve urgent attention and have major implications for policy recommendations and co-ordinated public health planning in the developing world. Further work is required to assess the impact of current strategies, such as smoking cessation, upon these interactions and the relative contributions of other interventions that address the environmental and host factors involved. Specifically, further mechanistic and epidemiological studies, are required to clarify the role of tobacco smoke on the progress of TB and HIV infections and their combined effects on the lung.

Smoking cessation interventions in resource-poor settings: what can we achieve?

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While tobacco prevention comprises a comprehensive approach with broad engagement at political, social and personal level, in the end, there must be some provision for helping those who wish to stop smoking to do so. Among all groups of smokers, there is a subset that is prepared and wishes to stop smoking. What can we do for them in resource-poor settings? The Union, coordinated by Dr Karen Slama and her colleagues in Khartoum, has demonstrated the feasibility of brief advice to assist tuberculosis patients to stop smoking during the time that they are under treatment. This approach has been further extended as part of a comprehensive approach for lung health to other sites in Sudan, in Cotonou, Benin and in Anhui, China. In all locations, this intervention has been demonstrated to be feasible within the existing health services. The key to this success has been the fact that it is simple and does not depend on any form of external support, including the supply of nicotine replacement therapy, an addition that could make the intervention less sustainable. Tuberculosis patients have been demonstrated to be particularly susceptible to brief advice. However, tuberculosis patients are a

relatively small proportion of all those who seek care at health facilities. This intervention needs to be extended progressively to other vulnerable groups (for example, the families of asthma patients and of children with acute respiratory illness) and subsequently throughout the whole health system, if the intervention is to achieve everything that it should be able to do. At the same time, key health care workers must be engaged in broader tobacco prevention activities such as smoke-free institutions, advocating for policies to promote tobacco prevention and health education to the general community.

COPD in resource-poor settings: epidemiology and impact of infectious diseases

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COPD has become a blanket term for lung disease characterised by airway narrowing resulting in chronic breathlessness. In practice it probably has a number or aetiologies of which the most important globally is tobacco smoke. The diagnosis is based on the history and simple lung function testing of which the most important is FEV_1 (forced expiratory volume in one second). The condition is relatively irreversible. In this sense it can be differentiated from asthma which may be reversible either spontaneously, by removing the causative agent, with appropriate therapy or a combination of these factors. Clinical studies of acute exacerbations of COPD are difficult because of the varied nature of COPD. Symptoms can vary spontaneously, and there are difficulties in defining clinical response both in the short and long term. The role of bacterial infection, and thus use of antibiotics, in COPD is controversial. The available evidence shows that bacterial infection has a significant role in acute exacerbations, but its role in disease progression is less certain. Data from resource-poor settings is relatively limited in comparison from richer parts of the world. However, it is likely that the impact of lung infections will have a similar outcome in terms of lung damage whether the patient is in a poor or rich setting. Tuberculosis is the commonest chronic lung condition afflicting resource poor settings. The pathophysiology leading to air-flow obstruction in TB is multifactor. Endobronchial involvement may result in local or generalised bronchial obstruction, fibrosis and increased airway resistance. Parenchymal lung destruction may also result in airway collapse with air trapping. There may also be a reduction of perfusion due to vascular damage resulting in decreased gas exchange.

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Coordinating TB and smoking interventions

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Smoking particularly, bidi smoking shows a strong association with occurrence of tuberculosis as well as death from tuberculosis. In a large cross-sectional survey, the risk of self reported tuberculosis was 3.77 (95%CI 2.93–4.85) among smokers. In the subset of bidi smokers, the risk was even higher—4.18 (95%CI 3.01–5.80) with a strong dose response relationship. In a 5-year follow-up of a large cohort the RR for tuberculosis deaths any smoker was 2.12 (95%CI 1.70–2.66). The risk was again higher in bidi smoking—2.60 (95%CI 2.02–3.33) with a strong dose response relationship. Similar results were reported from several case-control studies in India including a large nationally representative one. In a study of a cohort of treated tuberculosis patients in Brazil, smoking was strongly associated with relapse (OR 2.53, 95%CI 1.23–5.21). There is an urgent need for a strong emphasis on smoking cessation in tuberculosis control programmes.

IMPROVING THE DIAGNOSIS OF CHILDHOOD TUBERCULOSIS IN RESOURCE-LIMITED SETTINGS

Use of IGRAs to diagnose active and latent tuberculosis in children: ready for use in resource-limited settings?

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The diagnosis of tuberculosis (TB) in children remains particularly challenging. Recently, interferon-gamma (IFN-γ) release assays (IGRA) based on the T-cell responses to defined *Mycobacterium tuberculosis*-specific antigens have been developed and are commercially available (QuantiFERON-TB Gold (QFT-G), QuantiFERON-TB Gold In Tube (QFT-GIT) and T-SPOT.*TB*). Each test measures IFN-γ released from *M. tuberculosis*-specific T-cells but uses a different combination of antigens and detection methods. A considerable body of evidence supports the use of an IGRA for improved detection of TB in adults, but data in children are less convincing. The number of studies that have assessed the role and performance of IGRA in children remains relatively small. Furthermore, data on the use of an IGRA for the diagnosis of TB in HIV-infected children are even more limited. In contrast to adults, children frequently have discordant results between the tuberculin skin test (TST) and IGRA. The sensitivity of IGRA in children

has been questioned and the performance of the assays appears compromised in young children. Current versions of the tests are unable to clearly discriminate between individuals with latent TB infection or active TB disease questioning applicability to resource-limited highly TB endemic settings. The cost and laboratory requirements are also not insignificant and have limited the widespread routine use of the assays in resource-poor countries. The latest data regarding the use of an IGRA for the detection of TB in children will be reviewed, the specific challenges of applying the tests to resource poor settings discussed and an insight into the future of immunoassays provided.

Evaluating childhood contacts of drug-resistant tuberculosis cases and the diagnosis of drug-resistant tuberculosis in children: improved culture techniques and the promise of MODS

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Isoniazid prevents the development of tuberculosis disease in contacts of drug sensitive tuberculosis index patients within the household. However isoniazid is ineffective in treating multidrug-resistant tuberculosis (MDR-TB). The World Health Organization recommends that childhood contacts of multi-drug resistant tuberculosis patients should receive close clinical follow up for 2 years. This talk will discuss ongoing research that aims to establish the relative incidence of drug susceptible/drug-resistant disease among household contacts of MDR-TB and thus the role of first- or second-line chemoprophylaxis in household contacts of MDR-TB. Predicting concordance of the drug susceptibility profile of the index and contacts will allow chemoprophylaxis to be targeted to contacts in whom it is likely to be effective. Diagnosis of tuberculosis in children remains challenging. Novel diagnostic strategies are emerging that may help to diagnose children with tuberculosis disease more quickly and more accurately. Novel diagnostic strategies will be discussed including the Microscopic Observed Drug Susceptibility (MODS) assay.

ADVANCES IN DIAGNOSTIC TESTS FOR TUBERCULOSIS

Overview of the TB diagnostics pipeline

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The value chain, or pipeline, for new tuberculosis diagnostic tests begins with discovery research to identify mycobacterial products that might be used for direct detection assays and assessment of host immune response to mycobacterial infection. Promising compounds then enter early development leading to proof of concept and feasibility studies. Tests that appear to be feasible are then rigorously evaluated in laboratory-based studies with test performance (sensitivity, specificity and accuracy) compared to an accepted reference standard. Those that meet predetermined performance characteristics are next demonstrated in large-scale programmatic studies intended to assess implementation feasibility, patient and public-health impact, and cost-effectiveness. For tests that perform well and have a demonstrated advantage over established TB diagnostics, WHO has established a process for independent expert review and issuance of guidance on the appropriate use of the tests. Following WHO approval, successful new tests are introduced into program settings aimed at global scale-up. Examples of diagnostic tests that have come through this process include automated liquid culture and phenotypic drug-susceptibility testing (DST) systems and molecular line-probe assays for detection of multidrug-resistant tuberculosis. Rapid, non-commercial culture and DST assays, e.g., MODS, are now undergoing WHO review. Each of these tests require significant laboratory infrastructure and are not suitable for decentralization to lower levels of the health service. However, promising new tests, such as LED fluorescent microscopy and easy to perform molecular tests for case detection and MDR-TB screening are entering demonstration and are expected to be endorsed by WHO in the near future. Much work is now being devoted to the development of a true point-of-care test that requires virtually no infrastructure or training and will have the greatest impact on tuberculosis control.

Line probe assays for the rapid diagnosis of MDR-TB: practical issues for implementation

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Setting: TB laboratories need to have fast and reliable methods to detect MDR tuberculosis.
Objective: To establish a line probe assay for the rapid detection of MDR-TB.
Design: Survey of buildings and lab sites. Determination of necessary changes for room separation and work flow. Hands on training for technicians and laboratory staff.
Results: After 3 days of necessary theoretical and technical training the laboratory can perform line probe assays by themselves. A recent meta analysis of Ling et al. (Eur Respir J 2008; 32: 1165–1174) for line probe assays showed a sensitivity for rifampin and isoniazid of 98.1% and 84.3%, respectively. The specificity was 98.7% and 99.5%, respectively.

Conclusions: Implementation of molecular techniques in several laboratories is possible even with little or no molecular background of the staff. Work flow and room separations are easy to obtain with support from the lab administration. Besides the introduction of molecular techniques the improvement of existing facilities like BSCs, air flow or questions of maintenance are discussed.

Progress on simplified NAATs for TB case detection

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Nucleic acid amplification tests (NAAT) for the detection and identification of *M. tuberculosis* complex bacteria in clinical specimens have high specificity and positive predictive value, but modest and variable sensitivity, for the laboratory confirmation of TB. Performance is more reliable with AFB-smear positive respiratory specimens and more variable with AFB-smear-negative and non-respiratory specimens. For example, one meta-analysis found that the pooled sensitivity of the commercially available NAATs was 0.85 (range 0.36–1.00) and the pooled specificity was 0.97 (range 0.54–1.00) for detection of *M. tuberculosis* complex bacteria in respiratory specimens. Although reliable and specific, the commercially available NAATs have drawbacks such as complexity, cost, amount of hands-on time required, and susceptibility to end-product contamination. An ideal test would be affordable, have a turnaround time of <2 hours; be automatable; require minimal specimen processing; employ a closed system to minimize end-product contamination concerns; include internal controls for inhibitors and test performance; and have a lower limit of detection; and increased clinical sensitivity for detecting active TB than currently available tests. Progress is being made towards achieving the ideal test. A loop-mediated isothermal amplification assay (MTB-LAMP, Eiken Chemical) has been developed that can generate results within 30 minutes using a closed system. However, this assay requires somewhat complex specimen processing steps, which will need to be simplified to meet the desired requirements. An automated PCR-based system has been developed by Cepheid that detects and identifies *M. tuberculosis* bacteria and assays rifampin resistance. This closed system has many of the aspects of the ideal test including biosafety, minimal hands-on time, minimal specimen processing, rapid turnaround times. The system is entering clinical trials.

Point-of-care tests for TB: how close are we?

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Effective and rapid diagnosis of tuberculosis is critical for the overall control of this disease and to ensuring proper treatment of individual patients. However, a universally applied rapid point-of-care diagnostic that is based on modern technologies has not emerged. Thus, physical evaluation of patients along with medical history, including contact to other tuberculosis patients, is still the most widely used point-of-care diagnostic for tuberculosis. This presentation will address the current point-of-care diagnostic platforms applied to infectious diseases, the current status of point-of-care diagnostics being developed for tuberculosis, limitations to the application of selected technologies, and the development of new approaches that could potentially overcome these limitations. Additionally, the variability in disease state among tuberculosis patients will be addressed and whether a single diagnostic test for all forms of tuberculosis and stages of disease is feasible with current methodologies and platforms.

Ensuring equity and access for new TB diagnostics

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Setting: India is the highest tuberculosis (TB) burden country accounting for one fifth of the global incidence. Within country the prevalence of TB is higher among the people living in low standard of living condition and socially disadvantaged groups.

Objective: To evaluate the access and equity of TB diagnosis and treatment facilities among different socio-economic segment of the population.

Design: Information on inequalities of TB and access of TB services were collected form different secondary sources. Equity was assessed in terms of prevalence of TB and access was analyzed through detection by active and passive, delay in diagnosis, distance to diagnostic facility and utilization.

Result: Under RNTCP passive case detection at health facilities (HF) was (508/719) 71% and the missed cases was high among elderly (36%), illiterates (38%), males (32%), employed (34%), living in poor house (39%), living in single room (41%), alcoholics 37%). TB symptomatics (TS) approach HF after 4-weeks of start of symptoms, because of difficulty in accessing government HF [60% of TS traveled >5 km to diagnosis] and didn't consider their illness to be serious enough to seek care. Due to proximity 43% of TS first consulted private, resulted delay in diagnosis [47 vs 82 days]. The main reasons for TS not taking action were lack of awareness (40%) and poor socio-economic condition (36%).

Conclusion: These evidences through light on inequity of TB prevalence and access of diagnostic services. There is a need to identify new strategy to this hard-to-reach population.

DIFFERENCES BETWEEN TUBERCULOSIS IN RICH AND POOR COUNTRIES: BACTERIA, GENETICS OR ENVIRONMENT?

The clinical and epidemiological relevance of the genetic diversity of lineages of *M. tuberculosis*

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One of the aims in the molecular epidemiology of tuberculosis is to find correlations between the genotype of the causative agent *Mycobacterium tuberculosis* and disease phenotypes. In the last 4 years, about half of the 2500 MDR/XDR-TB cases in Europe were related to transmission. Most of these transmissions were caused by Beijing strains. A young Dutch woman contracted XDR-TB caused by a Beijing strain in South-Africa and was diagnosed in the Netherlands. The underlying reason for the association of Beijing strains and resistance is unclear. In a recent study in Indonesia, however, treatment failures were significantly more frequently caused by Beijing strains, independent from resistance. This may indicate a higher ability to withstand treatment and may be related to differences in the post antibiotic effect. In the Netherlands, DNA fingerprint clusters have grown to over a hundred cases and this is normally attributed to patient risk factors for transmission. We, however, found that the number of positive contacts caused by individual cases is correlated with the size of the cluster they represent. This implies there is a strong bacteriological factor in transmission of TB. In 2009, VNTR typing has replaced RFLP typing to support contact tracing. In total 81% of the typing results of about 2500 cases were in agreement regarding clustering. For the discrepant cases we investigated the correlation with the findings in contact tracing; the VNTR typing scored much better than RFLP typing in this respect, although a higher mode of change in VNTR patterns may also obscure finding the true epidemiological links in a minor part of the cases. Recently, we started with whole genome sequencing of *M. tuberculosis* to distinguish transmission chains in large RFLP and VNTR clusters. The results indicate that minor mutations in the genome can be used to separate transmission from primairy, secundary, tertiary, etc. index cases in clusters.

The clinical importance of the genetic diversity of the human host

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Assessment of the contribution of genetics of host resistance to human tuberculosis is a long standing challenge of human genetics research. Evidence of genetic factors has come primarily from twin studies and risks to first-degree relatives of cases. In addition, inferences of strong genetic influences have come from anecdotal accounts of socially prominent families, population variation in TB incidence and susceptibility to infection, and secular changes in TB severity, incidence and mortality inferred from historical information of contact between different populations, as well as accidental inoculation of vaccinees with *Mycobacterium tuberculosis*. More recently, a number of host genetic factors have been directly implicated in tuberculosis susceptibility. For example, a major tuberculosis susceptibility locus has been mapped to the long arm of human chromosome 8. One of the best replicated tuberculosis susceptibility genes is NRAMP1. Several studies have demonstrated the importance of the joint effect of environment and NRAMP1 alleles. Most of the human genetics studies in tuberculosis have focused on the identification of genetic variants that impact on progression from infection to disease. By contrast, there are few studies that aim at the identification of genes that impact on resistance to infection with *M. tuberculosis* or genes that control the extent of anti-mycobacterial immunity. Yet, there is clear evidence for an important role in tuberculosis control of such genes and recent experiments addressing this problem will be discussed.

The impact of the environment on the immunology of tuberculosis

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In developing countries, most individuals have immune responses to *Mycobacterium tuberculosis* derived from contact with environmental mycobacteria or with *M. tuberculosis* itself. This provides partial immunity that can often protect from low dose challenge, but not from the high dose challenge that occurs in poverty and in crowded living conditions. BCG may provide similar partial immunity, as demonstrated in the subset of citizens in India who were mycobacterially naïve at entry into the trial (Indian J Med Res (1999) 110:56–69). In rich countries, where challenge doses are usually low, the immunity to low dose challenge provided by BCG is often sufficient to manifest itself as overall protective efficacy in clinical trials. Animal models illustrate the differing consequences of low dose (100–200 cfu) versus high dose ($\sim10^5$) challenge. The Th1-induced plateau in cfu seen at 3 weeks in mice following low dose challenge might be a model of one form of latent human TB. By contrast, when mice are challenged with $>10^5$ organisms (into the lungs or i.v.) the plateau at 3 weeks is followed by further bacterial proliferation that is

largely dependent upon Th2 cytokines. This might represent a model of the human disease following high dose challenge in developing countries where TB cases with the highest levels of IL-4 and TGF-β are seen. In addition to other obvious factors such as malnutrition, smoking, poverty and stress in developing countries, there is also a greater tendency to develop regulatory cell responses, because helminth infections (and other microorganisms) act as 'Treg adjuvants' (Correale and Farez, Ann Neurol 2007;61: 97–108). In conclusion, both in man and mouse, TB caused by high dose challenge of partially immune individuals in developing countries is immunologically different from sporadic TB following low dose challenge in the immunologically naïve. There are major consequences for management and vaccine design.

CONTROVERSIES IN HIV

Annual HIV testing and immediate ART for all HIV-infected persons: pro

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In a recently published mathematical model study, Granich and colleagues demonstrated that providing annual universal HIV testing combined with antiretroviral therapy (ART) for HIV-infected individuals will result in major reduction in HIV-related mortality and HIV transmission. There are more evidences from both developed and developing world showing that starting ART at higher CD4 count results in better survival. On the other hand evidences of the impact of ART on HIV transmission are just emerging but not yet definitive. While recognizing that the practical implementation of the 'test' and 'treat' will be challenging, we have to recognize that this model offers the opportunity to address the issue related to enrolling and retaining HIV-infected patients in care. Studies are showing a big delay between the time when HIV-infected patients are first diagnosed and when they are accessing HIV care services. Many of them will be lost through the process of determining their eligibility to start HIV treatment and will come back when they are severely immune-compromised, thus limiting their chance for longer survival. Some will die before accessing HIV treatment services. With the 'test' and 'treat' model patients will immediately access care without waiting for eligibility criteria. Strategies for retaining patients in care would need to be developed. The 'test' and 'treat' model is worth being studied to determine its feasibility. TB clinics could be one of the sites to consider given that the concept is somewhat already being implemented for TB, with both HIV-infected and uninfected individuals already enrolled in care.

Annual HIV testing and immediate ART for all HIV-infected persons: con

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Problem: Burden of TB-HIV co-infection: magnitude of morbidity and mortality among these patients. **Questions:** i) Public health approach X human rights approach. Who has the right to decide about peoples' treatment? ii) Right to health: a duty of the State? Does every State guarantee? iii) Legal aspects: If the State decides to suppress individual rights, what does it guarantees? Who can monitor this? iv) HIV testing: a tool to protect patients and control the pandemic or a tool to discriminate and isolate? v) Immediate ART treatment: is it universally recommended, without any controversy? Is every case the same case? Is access guaranteed for every patient on a permanent basis? **Conclusion:** The controversies of HIV diagnostics and treatment have to be openly discussed to guarantee the Human and Civil Rights of patients and guarantee balance with the proper Public Health approach in regard to treatment guidelines. TB-HIV co-infection will be controlled once programs are synchronized, health systems work and rights are guaranteed.

TB treatment for all patients starting ART in high HIV-TB burden countries: pro

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The diagnosis of TB in patients starting ART is extremely difficult. In high burden settings most patients are infected with TB and many have active disease. The resulting diagnostic delay and missed cases leads to increased morbidity and mortality, and the inability to rule out TB prior to TB preventive therapy leads to TB reactivation at a later date. By offering TB treatment to all individuals, those with active disease will be treated and those with latent infection will receive good prophylaxis against active disease. I will therefore be supporting the motion that all individuals starting ART should be offered TB treatment.

HIV-TB TREATMENT. ONE PATIENT, TWO DISEASES, TWO TREATMENTS: MONITORING SYSTEMS TO SUPPORT SCALE-UP

Pharmacovigilance in the context of ART scale-up

M Diepart. World Health Organization, Geneva, Switzerland

Objective: To present the WHO pharmacovigilance (PV) initiative; discuss interest, challenges and methods

proposed for integrating pharmacovigilance in the management of treatment of TB-HIV co-infected patients.

Scope: More than 70% of 40 million HIV+ people worldwide live in sub-Saharan Africa, 12–14 million of them are infected with tuberculosis, the leading cause of morbidity and mortality in people living with HIV in low income settings. ART reduces the incidence of HIV-1-associated-tuberculosis by more than 80% in some studies, however, ART regimen may considerably be affected by pharmacokinetics changes and toxicities linked with antiretroviral and TB medicines. The WHO PV initiative aims at improving patients safety and treatment outcome, inform treatment norms and standards, increase programme effectiveness, through improved policies, management and procurement.

Questions: When to start ART in patients with TB-HIV? What to start? How best could we manage adverse events and paradoxical TB-associated IRIS be managed in resource limited settings?

Methods: By leading systematic review and evaluation of evidence of co treatment toxicities in the general population, in children, women, pregnant women, in XDR and MDR affected HIV; By proposing recommendations for the management and prevention of adverse events of co-treatment and by convening experts to define best practices; by proposing a research agenda.

Results: Data and recommendations will be presented in resume.

Discussion: Developing PV in two different treatment programmes is complex: TB is a disease prevented and treated with well known products for which pre and post marketing studies are not of interest. TB treatment is time limited, while ART is lifelong, with multiple new drugs of unknown toxicity. MDR- and XDR-TB requires the use of new and possibly highly toxic drugs for which PV is urgently needed.

THE ROLE OF THE WORKPLACE IN EXPANDING EQUITABLE ACCESS TO TB AND TB-HIV SERVICES

Experience of engaging business in TB and TB-HIV service delivery: business coalition perspective

S Puri. World Economic Forum, Geneva, Switzerland

Objective: To highlight the significance of a business coalition in engaging business in TB and TB-HIV service delivery through showcasing the India Business Alliance (IBA).

Design: The IBA was developed by the Global Health Initiative of the World Economic Forum to stimulate business sector engagement in TB care and control in India through advocacy, technical support for developing policies and programmes and delivering TB preventive and treatment services through partnerships. Premier Indian companies joined forces with the Revised National TB Control Program (RNTCP) of the Indian Ministry of Health, the Confederation of Indian Industry (CII), the World Health Organization, the Global Stop TB Partnership and local NGO partners. The key principle behind the IBA is simple: each of the member companies and partners focuses on its strengths and collaborates in its area of expertise to effective and sustainable partnerships.

Results: Several of the member companies are implementing TB care and control activities; some have scaled up to address TB-HIV co-infections either in their workplaces and/or at community level, in partnership with the Indian Ministry of Health and others. More than 4.5 million people, including the workforce, their dependents and community, were estimated to be covered by the member companies of the IBA through different interventions towards TB care and control, according to an evaluation done in 2006–2007. Many others are engaged in Research and Development of new diagnostics and drugs. A wealth of tools to help companies plan and implement workplace and community-based TB and TB-HIV control programmes have been developed with contributions from the IBA members and partners.

Conclusions: The IBA has impacted not only on the disease areas but also on the role of businesses in TB and TB-HIV care and control. It serves as a model for similar initiatives around the world and opportunities for re-application.
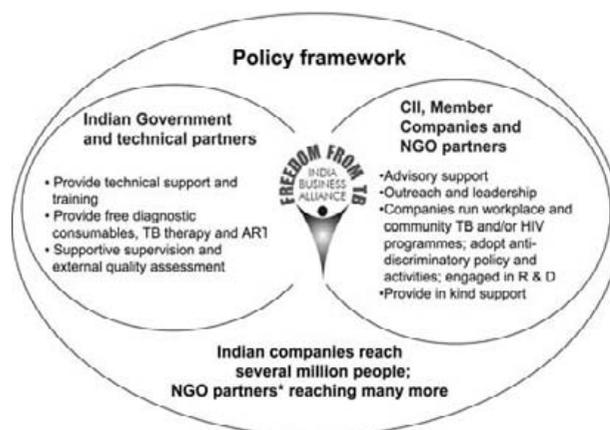
Figure India Business Alliance.

Engaging small and medium businesses in delivering TB-HIV services

K Amekudzi, S Kisting. ILO/AIDS, International Labour Organization, Geneva, Switzerland

Integrating TB into existing HIV/AIDS Workplace programmes and policies through tripartite structures.

Background/issues: For many years, efforts to tackle HIV and TB have been largely separate despite the overlapping epidemiology of both diseases. Improved collaboration between TB and HIV programmes will lead to more effective control of TB among people living with HIV and better control of HIV among TB patients. A joint TB-HIV programmatic approach should contribute better towards achieving public health goals for both diseases in a cost effective manner. The workplace has been used in many countries as an entry point for HIV and AIDS behaviour change programmes. The International Labour Organization (ILO) is currently providing technical assistance to its constituents (i.e., Ministries of Labour, Employers' organizations and Workers' organization) in over 50 countries in all regions to implement comprehensive HIV/AIDS workplace programmes and policies. Such workplace programmes include the formulation of non-discriminatory workplace policies based on the principles of the ILO code of practice on HIV/AIDS and the world of work and direct action at the enterprise level through working with management and workers' representatives (bipartite action). Existing HIV/AIDS workplace programmes provide a solid foundation for the integration of TB in many countries.

Focus of presentation: This presentation focuses on a step by step process of integrating TB into existing HIV/AIDS workplace programmes. It identifies all possibly entry points for the integration of TB and highlights lessons learned in this process.

SOCIAL AND ENVIRONMENTAL DETERMINANTS OF TB AND HIV

Societal hierarchy: its role in access to TB-HIV care and treatment

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Setting: At a collective level, social hierarchy plays a major role in shaping individual health, risk behaviors, environmental exposures and access to resources.
Objective: To assess the role of social hierarchy in accessing TB-HIV care in India.
Design: Data were collected from 1) National Family Health Survey 2005–06 (NFHS-3), and 2) TB prevalence survey and TB-HIV studies conducted by Tuberculosis Research Centre, Chennai. Different social hierarchies such as wealth index-WI (combining information on assets, housing, ownership of durables, dwelling, water facility, electricity), standard of living index (SLI), social status, region and gender were related to TB-HIV care.
Result: NFHS-3 covered 6344 households, Low WI

was observed among rural (19%) and socially disadvantaged (78%). The prevalence of HIV was 0.34%; it was high in rural (0.44%) and women (0.39%). Comprehensive knowledge on HIV was significantly less in low WI (men 17%; women 2%). Prevalence of TB was significantly higher among people living below the poverty line (242/100 000 population); socially disadvantaged (265) and low SLI (343). Case notification to prevalence was 1.1:1 in low, 0.27:1 in high SLI; 1.7:1 in socially disadvantaged. The profile of clients (17 000) attending Integrated voluntary Counseling and Testing Centres (ICTCs) was 65.5% males, 0.1% transgender, median age 30 years; 27% illiterates and 17% unemployed; 17% of TB suspects referred to TB diagnosis from ICTCs did not attend/complete diagnosis.
Conclusion: These findings clearly show that there is an inequality of HIV-TB prevalence and care in different social hierarchies and health planners need to give attention to these issues.

Social networking associated with alcohol and substance uses: its impact on TB-HIV care

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TB and HIV are infections that impact both at an individual level as well as at a societal level. TB, an airborne disease can be transmitted in closed spaces and congregate settings—such as bars, clubs, or places where people congregate and use alcohol and illicit drugs. HIV transmission can occur with exchange of body fluids, including blood and semen, and can occur with unprotected sexual activity under the influence of alcohol or illicit drugs in sex clubs, bathhouses or private sex parties, or by sharing needles or other drug paraphernalia. Thus, TB and HIV are transmitted by different methods and levels of social networking. These social networks are comprised of nodes—individual TB-HIV patient and their ties—links or relationships with other human beings. Social networks of an individual patient can influence negatively the course of the TB-HIV disease management by competing with the patients' ties to the health care provider. For example a patient with alcohol and substance use may prioritize on obtaining easy cash to meet physical and chemical dependence needs, or prioritize on seeking venues to buy the drug of choice for addiction, instead of taking TB-HIV medicines or meeting with health care provider. However, social networks can also be developed to positively influence TB-HIV care, by providing the individual patient with support, such as the 'accompagnateur' community-based treatment model or the model of Alcoholics Anonymous. Other options for positive social networks can include peer support models and developing internet sites and chat rooms for emotional

support, as opposed to internet sites for meeting partners for risky sexual activities. Social networks can assist in early diagnosis of TB-HIV in this marginalized population. Thus, TB and HIV programs can explore existing social networks of their patients/clients with alcohol and substance use disorders to foster a supportive psycho-social environment to facilitate successful TB-HIV care.

Continuing TB care in a post-election crisis

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TB and HIV care in resource-poor settings relies heavily on patients'accessibility to services and treatment. While some progress has been made in improving the quality of care for TB and HIV patients in some of the worlds' poorest countries, in many situations, the political atmosphere is strife with tension and turmoil. In the past few recent years, several incidents of post-election violence in the developing world have jeopardized public services and have had a direct impact on those most in need of health care, most notably the post-election incident in Kenya. TB patients are particularly vulnerable as they require close monitoring, follow-up and, most importantly, uninterrupted access to medication. These patients can face a multitude of problems while seeking care during such mayhem. These include displacement to other parts of the country or neighbouring countries, health workers fleeing, disruption in drug procurement and supply chains, loss of employment and source of income and lack of food security. Public disorder and chaos after elections can sometimes be predicted, and in these situations, comprehensive protective measures should be taken by governments and other stakeholders. These aim to ensure that emergency and preparedness measures are taken to minimize the impact of post-election violence on health care services. Many lessons have been learned, particularly from the events in Kenya, and these could be used to guide strategies and interventions for other countries.

TB INFECTION CONTROL: FROM POLICY TO IMPLEMENTATION

Global policy adaptation at country level

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Background: Tuberculosis infection control (TB-IC) has in recent times become a global concern with the upsurge in multi and extensively drug resistant tuberculosis. The new global policy recommends national level involvement in TB-IC. In Ghana, TB-IC had been limited to TB diagnostic laboratories with little emphasis in clinical settings. This presentation shows implementation of TB IC in an integrated health system at country level.

Intervention: National TB Advisory Board identified TB-IC as a priority. TB-IC was put on the agenda of Ghana Health Service Division responsible for infection prevention and control (IPC). The IPC focal person was empowered by making TB-IC resources available for use as part of health system strengthening. A TB-IC focal point was identified in the Central TB Unit. Advocacy was targeted at high-level managers and health workers were sensitized on TB-IC at all levels. NTP led the revision of the existing IPC policy with technical support from stakeholders.

Results: A functional IPC programme management unit is established with active participation in TB-IC by health service. Focal persons highlight TB-IC issues in all forums. Facility managers are supporting TB-IC implementation according to revised policy and guidelines with on-going dissemination. An architect and health workers have been trained and conducting facility assessments with full collaboration. Facility initiatives are increasing the prescence TB-IC in facilities.

Conclusions: TB-IC services offered as part of routine healthcare service delivery due to lead role and partial resourcing by NTP. Ownership of TB-IC is by institutions but TB-IC activities are monitored by the NTP.

Role of advocacy in implementing tuberculosis infection control interventions at country level

M D Richardson. PATH, Seattle, Washington, USA

WHO has recently issued a new TB infection control policy in response to the growing need to protect health workers, health care facility users (including those who are especially vulnerable, such as PLHA and young children) and the community from TB transmission. The policy document is a critical first step toward making health care facilities and the community safe places to work and live for frontline health care providers, health care clients, and their families and friends. But how do we get from policy to protection? In the context of a global economic slowdown, how do we convince governments and programs to spend scarce resources on TB IC? This presentation will discuss the role of advocacy in moving from policy to protection, what we can learn from other successful advocacy efforts, what approaches may be useful, and with whom we can work at country level to build effective advocacy for TB IC.

MDR and infection control: experience from Russia

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Assessment of nosocomial TB transmission in Russian primary health care and TB facilities shows that

significant effort is needed to adequately implement internationally recognized TB IC approaches. Main obstacles to decrease the risk of TB infection in staff, patients and visitors include the lack up-to-date airborne IC knowledge, organization, discipline, and resources. In addition, the tradition of long-term hospitalization and relying on disinfection of surfaces and objects is a challenge. One of the few examples of successfully implemented TB IC programs in former Soviet Union and other countries of Eastern Europe is Vladimir TB IC project supported by WHO, CTRI and CDC, with significant USAID funding, and Vladimir TB Dispensary became a Center of Excellence for TB IC in 2008. The first Russian National TB IC guidelines were harmonized with WHO TB IC and other international guidelines. New national TB IC policies are underway to be officially approved in 2009. This document will contribute to the international airborne IC body of knowledge by its inclusion of valuable cold and moderate climate considerations.

INCLUDING CHILDREN IN TB TRIALS. WHAT IS THE NEED? WHAT ARE THE BARRIERS? WHAT ARE THE SOLUTIONS?

Introduction (disease burden, neglect in trials, preventable), improved regimens

M F Cotton. Children's Infectious Diseases Clinical Research Unit, Stellenbosch University, Tygerberg, South Africa

Childhood TB has been neglected on many levels, both through programs and in research. TB exposure to source cases is often poorly documented, resulting in an enormous preventable disease burden in children. Until recently, only smear positive TB was reported by national TB programs, contributing to the under-recognition. Pivotal treatment trials were done on adults and both regimens and drug dosages were extrapolated for children. That children were being underdosed was only recognized within the last 2 to 3 years. Young children have enhanced clearance of many drugs in the first 2 years of life; Therefore age-appropriate dosages need to be better defined. Pulmonary TB has always been difficult to confirm in children who are too young to cough on demand, and response to treatment can usually also not be confirmed through sputum smears or culture. Nevertheless, there are many simple strategies to support the diagnosis. HIV has complicated TB diagnosis and management in children. HIV lung disease is common and hard to distinguish from underlying TB. In regions where TB and HIV are common, they combine to produce excessive morbidity and mortality. Interactions between therapy for TB and HIV are well defined in adults but also in need of more attention.

Insights from P1041: an isoniazid prophylaxis study in HIV-exposed infected and non-infected infants

C Mitchell, G McSherry, A Violari, M Cotton, S Nachman, P Jean-Phillipe, S Kim, S Madhi. IMPAACT, Bethesda, Maryland, USA

The dual epidemic of HIV-TB has resulted in marked increases in childhood mortality in southern Africa. P1041 was a phase II/III, randomized, double-blind placebo-controlled study to determine the efficacy of pre-exposure isoniazid (INH) prophylaxis to prevent tuberculosis (TB) and latent TB infection (LTBI) among HIV-1 perinatally-exposed infants (both infected and uninfected) in southern Africa. Three month old, BCG vaccinated, HIV-1 perinatally infected and exposed but uninfected infants without prior TB exposure were randomized to daily INH (10–20 mg/kg/day) or placebo for 96 weeks; after which they were to be followed for another 96 weeks off INH/Placebo. The primary objective was to determine whether INH increases TB Disease/TB infection-free survival from randomization to 96 weeks. Between Dec 2004 and March 2008, 452 HIV infected and 804 perinatally exposed but uninfected infants were enrolled (median F/U: 36 weeks, and 104 weeks respectively). The rate of LTFU in the infected and the uninfected groups was 7% and 17.2%, but there was no difference in the LTFU rate in the two treatment groups. There was also no difference in the degree of compliance with study drug (self-reported 73–89%) across all treatment groups. The incidence of TB infection, TB disease, or all cause mortality was no different between the INH and the Placebo Groups among both infected and uninfected children; and INH was not associated with an increase in TB disease/TB infection free survival in any group. Overall cumulative incidence of TB in the HIV infected children was high (22.2%; 95%CI 15.7–31.0). Population pharmacokinetics of INH in these infants using 10–20 mg/kg/d were similar to those in older children confirming that a therapeutic level had been achieved. INH resistance was documented in 5 MTB isolates (27.8%; 95%CI 12.2–51.2) (4 MDR, 1 INH monoresistant) but there was no association with treatment group.

Integrating children into adult TB trials: feedback from meeting

W Burman. Denver Public Health, Denver, Colorado, USA

Even though there are approximately 1 million pediatric TB cases per year, children were left out of the drug development effort that led to current short-course therapy. As a result, there is a paucity of child-friendly formulations drugs, and there are fundamental gaps in our knowledge of how to treat TB in children. We are now engaged a renewed effort to improve TB treatment, both by optimizing existing

drugs and developing new drugs. It is essential that children be included in this effort. We must assure that child-friendly formulations of old and new drugs are developed, that age and developmental stage-specific pharmacokinetic studies are done, and that safety and tolerability of new drugs be evaluated among children. Under the sponsorship of the Stop TB Working Group on New Drugs and the US National Institutes of Health and Food and Drug Administration, a workshop is being held to develop guidelines on how to involve children in TB drug development. I will report on the deliberations of that workshop. The eventual goal is a set of published standards for the field of TB drug development that can provide guidance to sponsors and metrics for monitoring progress.

SYMPOSIA: SUNDAY
6 DECEMBER 2009

NOVEL STRATEGIES AND TECHNOLOGIES TO HASTEN THE INTRODUCTION OF NEW TB VACCINES

Economic impact and cost-effectiveness of vaccines

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Setting and objective: Despite implementation of the DOTS strategy, tuberculosis (TB) control in many countries remains a major challenge. As a case study, we estimated potential costs and impacts of a novel TB vaccine introduced in Zambia (population ~11.5 million), relative to current conditions.

Design: Using decision analysis based on multiple Markov processes, we compared two vaccine strategies against the status quo DOTS and BCG strategy. We projected costs, TB morbidity, and TB mortality over a 30-year period, for persons born in Zambia in year 1. Initial development costs for single vaccination and prime-boost strategies were estimated at $141 million and $194 million, respectively, and prorated to the Zambian share (0.398%) of global BCG vaccine coverage for newborns. The analysis was conducted from a societal perspective, with a 3% discount rate and all costs expressed in 2007 US$.

Results: Relative to the status quo strategy, a BCG replacement vaccine administered at birth, with 70% efficacy in preventing rapid progression to TB disease after initial infection, was estimated to avert 932 TB cases and 422 TB-related deaths, resulting in estimated net savings of $3.6 million over 30 years for 468 073 Zambians born in year 1. The addition of a booster at age 10 would result in estimated savings of $5.6 million, averting 1863 TB cases and 1011 TB-related deaths. With vaccination at birth alone, net savings would be realized within 1 year, whereas the prime-boost strategy would require an additional 5 years to realize savings.

Conclusions: Investment in an improved TB vaccine may result in cost savings, as well as reductions in morbidity and mortality in high-incidence countries. For a vaccine with waning efficacy, a prime-boost strategy appears more cost-effective in the long term. Other key issues in predicting the relative cost and effectiveness of vaccine interventions will be reviewed.

Impact of vaccination strategies on TB incidence and mortality

M E Halloran,[1,2] L Abu-Raddad,[1,3] L Sabatelli,[1] J T Achterberg,[1,4] J D Sugimoto,[1,5] C Dye,[6] I M Longini.[1,2] [1]Center for Statistics and Quantitative Infectious Diseases, Hutchinson Research Center, Seattle, Washington, [2]Department of Biostatistics, University of Washington, Seattle, Washington, USA; [3]Public Health, Weill Cornell Medical College, Cornell University, Doha, Qatar; [4]Department of Anthropology, University of Washington, Seattle, Washington, [5]Department of Epidemiology, University of Washington, Seattle, Washington, USA; [6]Office of HIV/AIDS, Tuberculosis, Malaria, and Neglected Tropical Diseases, World Health Organization, Geneva, Switzerland

Vaccine development aims to replace vaccination of newborns with a vaccine more effective in preventing active TB disease than BCG. The aim of this study was to investigate how introducing a new effective vaccine for TB would decrease incidence and mortality. We developed an age-structured mathematical model of TB natural history and transmission. Once infected, people become either fast or slow progessors. We modeled a pre-exposure vaccine with the assumptions that it would not prevent infection, but that it would decrease the probability of becoming a fast progressor if a person became infected. We examined the strategies of vaccinating newborns, of mass vaccination, and of vaccinating newborns combined with a short catch-up mass vaccination program. We also modeled a post-exposure vaccine that reduces the lifetime probability of an infected person developing active TB disease. Focusing on the WHO Southeast Asia region, vaccinating newborns with the pre-exposure vaccine achieved a 39% reduction in TB incidence at 2050 compared with 2015, the year of assumed introduction, whereas mass vaccination achieved a rapid 80% reduction in annual incidence. Mortality was reduced similarly. The combination of newborn vaccination with a short mass catch-up program also achieved a rapid decrease in annual cases. Mass vaccination of latently infected people achieved a rapid but modest reduction in annual incidence. Strategies combining the pre-exposure vaccine and the post-exposure vaccine resulted in a synergistic reduction in incidence at the population level. Short mass vaccination catch-up programs with a pre-exposure vaccine could be considered to augment vaccination of newborns to achieve a more rapid reduction in incidence and mortality.

Tuberculosis vaccines in development

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Background: The first vaccine against TB (BCG) was given in 1921. Although this vaccine showed protec-

tion against severe forms of TB in children, it has shown variable or no efficacy against pulmonary TB. However, very little was done to develop a better vaccine until recently.

TB vaccines in development: About 9 million people get TB every year of whom 1.8 million die. There is a global strategy to control TB devised by the World Health Organization and the Stop TB partnership. One element of this strategy is the development of a more effective TB vaccine. Recently, a number of new TB vaccine candidates have been developed and currently, 10 of them have reached clinical trials. They can be categorised as preventive or therapeutic, booster or replacement, live vectored or protein/ adjuvant based. A key issue for all new TB vaccines is safety and efficacy in HIV positive persons. The South African TB Vaccine Initiative (SATVI) has a TB vaccine trial site 100 kilometres from Cape Town. Four new TB vaccines have undergone safety testing at this site in adults, infants, TB-infected and HIV-positive individuals. The first efficacy trial in infants of a new TB vaccine was started there in June 2009.

Conclusion: A number of new TB vaccines are in development and promising safety results have been shown thus far. The TB world can currently look forward with optimism towards a more effective TB vaccine over the next 5–10 years.

New approaches to TB vaccine development and delivery

J Sadoff. Aeras Global TB Vaccine Foundation, Rockville, Maryland, USA

Overview: Substantial research is being done to develop new tuberculosis vaccines. However, there are several challenges to developing and delivering a new vaccine in resource-limited settings, including cost, cold chain requirements, and delivery methods. A successful approach will require increased global manufacturing capacity, new methods that address vaccine delivery challenges, and sustained access to vaccines at a reasonable cost for use throughout the developing world.

Methods: Innovative technologies for manufacturing and delivering vaccines to address these challenges are being explored, and partnerships and collaborations are being formed to ensure access and availability in countries that need new vaccines most.

Outcome: Spray-drying live vaccines produces a stable dried powder and reduces the need for cold chain during vaccine introduction, thus lowering the cost of introduction by simplifying the processes necessary to make the vaccines available and accessible everywhere. Other delivery systems, such as an oral nucleocapsid, could offer ease of construction and yield a maximized capacity for production at very low costs. Oral and aerosol vaccines could make delivery simpler and may be more effective than vaccination

with standard injection methods. Pre-clinical models have shown that pulmonary immunization can produce a greater immune response than subcutaneous or intradermal immunization, and further studies are being conducted. Manufacturing capacity and partnerships are being established to ensure uniformity of quality and minimize lag time between licensure and distribution. A novel fermentation process has been developed to reduce the cost and time to manufacture and deliver new TB vaccines.

Conclusion: While there are many challenges for vaccine development and introduction, new approaches and technologies could make new TB vaccines simpler, cheaper, more efficient, more effective, and easier to administer.

Community-based research for tuberculosis vaccines

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Background: The Uganda TB Vaccine Study is part of an international network of sites working together to prepare sites for testing novel TB vaccines in phase II/III clinical trials. This is a community-based observational study being implemented in a rural/peri-urban setting about 120 km from the capital city. With the participation of the community, 2500 infants and 7000 adolescents are being recruited and will be followed up for a period of 2 years.

Objective: To share experiences regarding the strategies the study employed to engage and reach out to the community.

Methods: Review of the process of community sensitization, infant participant recruitment and enrolment, and study follow-up.

Results: Sensitization meetings with the community and their leadership were used to raise community awareness about the study. Targeted talks to mothers of potential study participants at health facilities and traditional birth attendants; identification and selection of village scouts (volunteers) have been the main strategies for infant participant recruitment and follow up. In addition, fulfillment of promises made by the study to the community has enhanced their participation. Challenges have largely resulted from misconceptions by the community of the study intents and benefits. Maintaining ongoing contact with participants for study retention and mortality reduction is another challenge. Opportunities arising out of the community engagement process have mainly accrued to study staff in form of acquiring community engagement skills.

Conclusions: To gain community participation in research, efforts need to be focused on carefully explaining the study as well as addressing community fears and expectations. Study implementation and participant retention process needs to be sensitive to cultural concerns.

A WORLD FREE OF TB REQUIRES FREE TB DIAGNOSIS

Embedding the principle of free TB diagnosis in the International Standards of Tuberculosis Care

P Hopewell. Francis J. Curry National Tuberculosis Center, San Francisco, California, USA

The International Standards for Tuberculosis Care emphasize the importance of appropriate diagnostic evaluation, with the first six standards focused on diagnosis. Prompt and accurate diagnosis of tuberculosis, together with treatment until cure is achieved, are the essential elements of tuberculosis care and control. Commonly, treatment is offered free of charge, once a diagnosis is established, but the diagnostic tests themselves may not be free. Consequently, the costs of diagnosis may be a barrier to both the care of individual patients with tuberculosis and to tuberculosis control. However, in addition to the actual costs of diagnostic tests, there are costs associated with simply accessing diagnostic services which in some analyses were of substantial importance even when the diagnostic tests were free. This suggests that, in addition to having free diagnostic testing widely available, service delivery systems should be structured to facilitate access, particularly by the poor. This may include having more decentralized microscopy centers with operating hours geared to the patient, rather than the staff, and authorizing non-program providers (private clinicians, traditional healers, pharmacists, and other providers) to submit specimens to laboratories. In addition, strategies to minimize the number of visits required for sputum collection, such as 'front-loaded' microscopy (2 specimens collected on the same day), using more sensitive staining methods with immediate examination of smears, and sputum concentration should be utilized.

Which countries already provide free TB diagnosis and how?

D Weil. Stop TB Department, World Health Organization, Geneva, GE, Switzerland

The presentation will provide an overview on the status of ongoing work to document national practices related to fees charged or prohibited for TB-related

services. This work aims to inform guidance for reducing and/or eliminating costs associated with the TB diagnostic process, especially for the most vulnerable. It also aims to identify strategies of programmes, financing authorities and other partners to achieve financing for universal health coverage. Patients, providers, programmes and partners need to be enabled to engage in initiatives that serve objectives across the health MDGs. This will help increase efficiency, credibility, attractiveness to financing sources and sustainability. Many efforts necessarily overlap with approaches to improve early TB case detection. While first-line TB treatment has been, by policy, free of charge in most countries for decades, policies for free diagnosis have often been less explicit. Where they exist, they often include only bacteriological examination. Consults and other tests often are prohibitively expensive, excessive and/or cause catastrophic direct and indirect costs for patients. The analysis will look at some countries which explicitly and proactively assert free bacteriological services, those that actively decentralize case detection and reduce the indirect costs (transport, lost wages etc) of seeking care, and also those that attempt to regulate-reduce costs of radiology and/or general ambulatory consults. Improved service design, decentralization and targeted outreach, as well as improved financing policies, could make a significant difference. Policy action is needed urgently across these areas.

Why free TB diagnosis is necessary, but not sufficient, to meet the needs of the poor

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The global target is to detect and treat 70 percent of all people suffering from tuberculosis. Despite huge progress in scaling up WHO DOTS strategy and some countries reaching target in case detection there is evidence that an estimated 39% of the estimated 9 million tuberculosis (TB) cases annually are missed by national health systems and traditional TB services. The majority of people missed out of diagnosis and treatment come from the poor and vulnerable groups. Why the poor are still missed when access to diagnosis and treatment in most developing countries is free? Although diagnosis and treatment is free, developing countries are facing challenges of weak health system, inadequate human resources and infrastructure to enhance access to services. It is also well documented that patients incur both financial and opportunity costs to access TB services. Provision of the free diagnosis is just a first step towards promotion of universal access to TB diagnosis and treatment. Addressing health system related factors that impede the free diagnosis will enable countries

achieve the global targets across all gender and socio-economic spectrum. Improvement and establishment of systems that enhance quick and hassle free access to TB diagnosis are urgently required. Where interventions to bring diagnosis closer to communities have been implemented, increase in case notification among the poorest populations has been observed. This has been achieved through engaging the informal providers to refer people suspected to have TB to diagnosis centres and establishment of community based specimen collection and transportation systems.

HARMONISATION OF TB-HIV INDICATORS AND GLOBAL PROGRESS TO DATE

Global indicators for collaborative TB-HIV activities and progress within PEPFAR countries

W L Coggin, M A Sherlock. Office of the US Global AIDS Coordinator, Washington, DC, USA

Aim: The PEPFAR TB-HIV technical working group (TWG) partnered with WHO and UNAIDS to review experiences with TB-HIV indicators developed in 2004 and to collectively agree on harmonized revised TB-HIV indicators. This project was aligned with the PEPFAR Next Generation Indicators (NGI) development process which was undertaken to increase country ownership of HIV/AIDS efforts and ensure that host countries are at the center of decision-making, leadership, and management of their HIV/AIDS programs. Key concepts included increased integration of PEPFAR reporting and target setting into national level processes and monitoring and evaluation (M&E) systems.

Methods: A series of consultations between the PEPFAR TB-HIV TWG and WHO and UNAIDS were conducted. Upon achieving consensus on revised indicators, the TWG advocated for their inclusion in the PEPFAR NGI.

Results: The following revised indicators were agreed upon:

1 Per cent of HIV-positive patients who were screened for TB in HIV care or treatment settings
2 Per cent of HIV-positive patients in HIV care or treatment (pre-ART or ART) who started TB treatment (PEPFAR)
3 Number of eligible HIV positive patients starting Isoniazid Preventive Therapy (IPT)
4 Per cent of TB patients who had an HIV test result recorded in the TB register
5 Per cent of estimated HIV-positive incident TB cases that received treatment for TB and HIV (national)

Conclusions: The collaboration between PEPFAR, WHO and UNAIDS to review experiences with early TB-HIV indicators resulted in a set of revised, harmo-

nized indicators that have increased programmatic relevance for M&E of TB-HIV collaborative activities. This will facilitate increased data quality and reporting of national-level data.

Progress in implementing WHO integrated HIV care and treatment M&E system

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The first edition of the patient monitoring guidelines for HIV care and ART was initially drafted in 2004 and published in 2006. More than 29 countries use adaptations of this system to support HIV service provision, with core indicators increasingly available from routine, harmonized, national systems. The revised 3 interlinked patient monitoring systems include expanded minimum data set with definitions and illustrative tools for HIV care/ART, MCH/ PMTCT including malaria prevention in pregnancy and TB-HIV. An electronic version of the original patient monitoring system is available in Open MRS and the revised systems will be available soon in this format. Efforts are also ongoing to produce a simple set of integrated electronic registers. Series of global, regional and multiple country level trainings and adaptation meeting targeting program managers, monitoring and evaluation (M&E) specialist and clinical team will be conducted to assist the adaptation and implementation of the new system.

Results and lessons learnt: The 3 interlinked patient monitoring systems build and improve on the original 2006 patient monitoring tools by supporting integrated service provision and collection of key internationally agreed upon indicators for HIV care/ART, HIV drug resistance early warning, reproductive health, PMTCT, malaria during pregnancy and TB-HIV. Data for routine program monitoring and evaluation is also generated from the patient monitoring system. It also facilitates generation of harmonized data that are important for planning at the different levels of the health care delivery system.

Conclusion: An integrated system for longitudinal patient records for the provision of care for HIV, TB, pregnancy and newborns will eliminate duplication, improve patient follow-up and ease facility staff burden to facilitate patient care and to concentrate on key harmonized indicators for both national reporting and local quality improvement.

Harmonisation of global TB-HIV indicators WHO, UNAIDS, UNGASS and PEPFAR, process and outcome

A Reid. UNAIDS, Geneva, Switzerland

This presentation will describe the process of harmonisation of global TB-HIV indicators between WHO, UNAIDS, UNGASS and PEPFAR and outline the need for further work to ensure data quality and to minimize the reporting burden on programmes

IMPLEMENTING AND EVALUATING PATIENT AND PROVIDER EDUCATION: SUCCESSFUL MODELS AND LESSONS LEARNT

Developing MDR training manuals in China

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Setting: China is one of the multidrug-resistant tuberculosis (MDR-TB) high-burden countries. Currently, there are several prefecture pilots for the programmatic management of drug-resistant tuberculosis (PMDRT); however, there are no standard MDR-TB training materials for the country.

Objective: Develop training materials specific for health care workers in China that address the challenges of the epidemiology of MDR-TB and meet the training needs of the health workers responsible for providing MDR-TB program services.

Design: The first step in developing MDR training materials for China included the review of existing training materials from other programs and discussion regarding the adaptability to the China program; second, review of the Green Light Proposal for MDR-TB project and identification of high priority training needs for persons involved in MDR-TB projects; third, development of draft MDR-TB training modules. Trainees, including all related health workers and the manager of the MDR-TB project, were selected to pilot test these modules; based on the feedback from the trainees, the training modules were modified and finalized.

Results: Priority modules developed for China included: 1) Overview of MDR-TB Project and Training; 2) detect cases of MDR-TB; 3) treat cases of MDR-TB; 4) inform patients about MDR-TB; 5) ensure continuation of MDR-TB treatment; 6) infectiousness and infection control.

Conclusion: To develop effective training materials, it is necessary to assess the current country situation for MDR-TB and identify the training needs of health workers; once developed, the training materials should

be pilot tested with the target staff to appropriately modify the materials.

Effective health communication strategies: effect of an intervention in Lithuania, Latvia and Arkhangelsk

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To communicate well with patients is an essential skill for health personnel. It is impossible to assess a patient adequately or giver proper care and treatment if health personnel do not have the skills to communicate effectively. Available data indicate that the quality of the health provider-patient communication has a significant impact on patient satisfaction and medical outcomes.

Intervention: Process training was implemented over a period of one year with health staff in TB hospitals in Lithuania, Latvia and Arkhangelsk, Russia. The training addressed lack of constructive communication among health staff and patients, based on thorough needs assessments. Main aspects of the training were self-assessment, contents of teaching being directly related to stated needs, use of experience based learning and participatory methods, and addressing emotional aspects of health staff as well as patients.

Methods:
- Observation tasks to raise awareness about communication habits
- Baseline survey to assess initial learning needs
- Skills training courses
- Training of trainers courses
- Survey questionnaire with patients

Results indicate that staff at the TB hospitals did not earlier assess their own emotional needs to cope with fear, anger and conflicts, nor did they assess patients social and emotional needs. During process training awareness was created about lacking skills to communicate effectively with patients and colleagues. Training was tailored to their expressed needs and results indicate that use of effective communication skills facilitates patients to open up and deal with emotional aspects connected with the disease in addition to improved treatment completion rates.

Materials for migrant TB patients on the USA–Mexico border

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Background: The Government of the USA and Mexico signed an agreement to develop 'a sustainable and effective capacity to diagnose, control and monitor tuberculosis' (2002). Links Media approached the task to complete an IEC Strategy.

Methods: Pilot states in Mexico used a monitoring and evaluation (M&E) approach. Validated instruments were applied. Populations included: indigenous, diabetics, HIV/aids, imprisoned and migrants.

Objectives: Three objectives were identified: 1) increase public's knowledge; 2) increase TB patients' knowledge of MDR-TB; 3) reduce stigma by increasing knowledge of TB risk factors.

M&E and lessons learned: The approach to M&E was simple, economical, quick, robust, and replicable. Instruments were: existing data, in-depth interviews, short questionnaires, panels, a 'most significant changes' technique, and controlled 'laboratory' tests. Interventions and materials were designed/produced using a professional approach. The impact of the interventions was positive and large. The general public learned more of the basic core TB facts, patients learned more about drug resistance, and providers learned more about risk factors.

Conclusions: It is difficult to reach migrants with TB information. Despite their vulnerability to TB, most migrants are more concerned with other problems. They know little about TB but can learn the basic information quickly in a 'captive' environment, such as a temporary residence for migrants. Nevertheless, the great majorities of migrants move around frequently and avoid contact with government officials or programs. Even if they are exposed to TB information (ex. radio), few will be able to take the recommended measures or change their behavior.

Training course for increasing ART uptake among HIV-infected TB patients in Thailand

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Background: In Thailand, HIV-infected TB patients frequently die during TB treatment. Data from the Thailand TB Active Surveillance Network show most HIV-infected TB patients have a CD4 count below 250 cells/μL, but many do not receive anti-retroviral therapy (ART) during TB treatment.

Method: We interviewed staff to guide the content and logistics of training materials. An extensive literature review was conducted to document the benefits of early ART initiation among HIV-infected TB patients. A three-pronged evaluation was conducted after training: 1) follow up questionnaire for participating

health care workers (HCW); 2) a 'lessons learned' meeting for HCWs and health officers from the national, regional, and provincial levels; and 3) evaluation of ART prescribing rates in participating sites (ongoing).

Results: A comprehensive set of curriculum materials were developed, including posters, pocket guides, fact sheets, and a participant training manual. Topics included epidemiology, benefits of ART in HIV-infected TB patients, Thai national guidelines, case studies, and patient/provider/systems issues. Following a training of trainers (TOT) for 10 staff, over 270 HCW including physicians, nurses, and pharmacists were trained in 5 sites. Evaluation showed sites made changes in work flow to reduce barriers to rapid ART initiation. The national TB program will adapt the curriculum for nationwide use.

Conclusions: Training provided an opportunity for HCWs to address health care systems issues, including provision of one-stop service, standing orders, and development of care referral flowcharts. The training and its evaluation influenced national policy and guidelines on prescribing ART to HIV-infected TB patients.

Training community workers in DOT for MDR-TB

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We previously reported the detection of multidrug resistant tuberculosis (MDR-TB) in the Tuberculosis Wards at the Mulago Hospital in Kampala, Uganda. We subsequently implemented a treatment program with second-line drugs to assess the feasibility of treating MDR-TB in this resource-limited setting. Patients were initially admitted for treatment and the period of admission was determined by the time taken to convert to negative culture and the period on the intramuscular amikacin. Thereafter patients continued to take their oral medication at a local health unit nearest to their residence observed by a health worker trained and supervised by our team of medical officers and nurse. Patients were selected for treatment on the basis of ability to comply with directly-observed therapy and with follow-up in our clinic. All patients were treated with an individualized regimen guided by drug-susceptibility testing using BACTEC cultures. All received levofloxacin orally and amikacin intramuscularly as well as other first and second line drugs. Two patients were HIV-positive and one was treated with anti-retroviral medication. All patients completed 24 months of therapy except for one patient who died from non-TB causes after sputum culture conversion. The mean time to culture conversion was 2.67 months. There were no relapses

identified at follow-up 24 months after completion of treatment. Conclusion. Treatment of MDR-TB in this resource-limited setting is feasible anand relatively well-tolerated. Treatment outcomes after two years are good in spite of the presence of cavitary disease and the lack of access to surgical resections. Health workers in already existing private and government health units respond well if well trained and motivated to carrying out the daily DOT.

MODELS FOR COMMUNITY ENGAGEMENT: USING INFORMATION TECHNOLOGY, COMMUNITY MOBILISATION AND COMMUNITY

Building support for community advocacy to address TB, MDR-TB and TB-HIV in Uganda

A Kuteesa. Health Rights Action Group (HAG), Kampala, Uganda

Background: Uganda is 16th of the high burden Tuberculosis (TB) countries. Ministry of Health estimates 80 000 new cases annually. It attributes 50% of deaths of People Living with HIV/AIDS (PHA) to TB resulting from low level of community awareness, weak community mobilization for TB control, poor access to diagnostic services and rampant stock outs of TB medicines in health facilities caused by poor distribution supply chain.

Methods: Building capacity of communities to demand for the right to health.

Description: Working with selected districts, HAG empowers communities with TB-HIV information and intensified case finding (ICF) to reduce TB-HIV associated stigma, advocating for strengthening HIV/AIDS and TB management in health centers at the districts to ensure effectiveness of TB-HIV prevention, care and treatment.

Objective: To reduce the burden on TB among PHA.

Results: Increased community participation in TB issues, PHA conduct advocacy.

Key lesson: Increasing awareness of TB among PHA and community mobilisation lead to increased demand for TB-HIV services. Community mobilization is critical.

Target audience: National TB-HIV Managers, heads of TB-HIV units in health centers and PHA.

Conclusion: ICF and access to quality diagnosis and treatment of TB in accordance with national guidelines is essential for improving the quality and quantity of life of PHA.

FIDELIS INITIATIVE: RESULTS AND LESSONS LEARNT

FIDELIS and case finding interventions: a quantitative analysis

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Setting: Tuberculosis control activities worldwide funded by the FIDELIS initiative.

Objective: To compare the effect of 6 strategies of intervention on case finding of new smear positive TB cases (NSP).

Design/methods: We assessed intervention strategies in FIDELIS projects by comparing additional new smear positive (NSP) cases, defined as the number of NSP cases detected during project year subtracting the number in the previous year. Interventions were categorized into 6 strategies by external monitors after completion of the projects. Each of the 6 strategies was compared with all projects not employing that intervention, using Mann-Whitney U-test.

Results: A total of 85 267 additional NSP cases with a median of 1207 additional NSP were detected by 51 FIDELIS projects, in which 2 detected less cases than the previous year. 13 projects had 1 strategy, 13 had 2 strategies, 16 had 3 strategies, 2 had 4 strategies, 1 had 5 strategies, and 6 projects expanded routine DOTS services without an innovative intervention. Projects employing health system strengthening had a median of 2463 NSP cases detected and projects without had a median of 659. Projects employing incentives had a median of 2510 additional NSP cases and projects without had a median of 717. Projects applying other strategies did not detect more additional NSP cases as compared with projects not employing them. Projects not employing any innovative interventions had a median of 494 additional NSP cases detected compared to 1722 additional NSP in projects using one or more interventions.

Conclusions: Health system strengthening and use of incentives were associated with increased case finding.

Table   Additional case finding in 51 FIDELIS projects, by strategy employed

Intervention strategy	n	Median additional case finding	Mann-Whitney test
All projects	51	1207	
IEC	28	1737	P = 0.161
No IEC	23	659	
Involve private sector	13	775	P = 0.057
Not involve private	38	1677	
Innovative microscopy services	7	1752	P = 0.397
Not innovative microscopy services	44	1201	
Semi-active case finding	11	1265	P = 0.492
Not semi-active case finding	40	1125	
Health system strengthening	20	2463	P < 0.001
No health system strengthening	31	659	
Incentives	21	2510	P < 0.001
No incentives	30	717	
No intervention	6	494	P = 0.043
Any intervention	45	1722	

FIDELIS in China: impact on case detection

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Setting: 15 Fidelis projects implemented in 1006 counties of 13 provinces with population of 487 million in China.

Objective: To increase the number of new smear positive cases detected.

Methods: The major interventions are mainly of those community-based interventions adapted to their own situations with innovative local approaches.

Results: There were total of 118 554 health personnel trained in the Fidelis projects, including 190 provincial health professionals, 3879 prefecture and county health professionals, 99 448 township and village health workers and 12 997 school teachers trained respectively. There were 143 374 and 140 543 new smear positive pulmonary tuberculosis cases registered by the end one and two phase of the project year, a increase of 155.9% and 112.8% against the baseline of one year before project, respectively (Table). A cure rates of 92.4% and 92.2% were achieved in phase one and two of Fidelis projects respectively based on the cohort analysis.

Conclusion: New case detection rate was significantly improved and increased by the Fidelis projects implemented in China.

Table   Comparison of new smear-positive cases detected at end of Fidelis project year and that one year before

	No. of new smear-positive cases detected		
Fidelis project	One year before project	Year achieved	Percentage increase
Phase one	91 946	143 374	155.9%
Phase two	124 637	140 543	112.8%
Total	216 583	283 917	131.1%

Limited access to care analysis in Bangladesh

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Background: BRAC an NGO is providing support to National Tuberculosis Program (NTP) covering two third of Bangladesh. BRAC undertook two FIDELIS-supported projects in 2004 and 2005 covering

23.7 million population. This analysis is based on limited access forms used routinely in the project to examine accessibility and other factors.

Objective: To determine median treatment delays (total, patient and health system delays) and determine proportion of cases with excessive treatment delay and association with other factors.

Method: The study included all new smear positive tuberculosis cases registered in FIDELIS supported BRAC areas from April, 2004 to September, 2005. Data was collected routinely in 'limited access' format during treatment initiation as a part of routine activities.

Results: Among 7028 NSP cases, median total delay was 12 weeks. Median patient and health system delay was 4 and 8 weeks, respectively. Of all patients, 57.2% and 86.6% had excess delay of 12 weeks or more and 8 weeks or more, respectively. Younger patients demonstrated less treatment delays, though there was no association between gender and delay. Total median delay was lower in urban areas. Majority of the patients visited non-qualified practitioners during initial care-seeking visit. Those whose initial visit was to a provider other than a public health center demonstrated greater treatment delay.

Conclusion: Although Bangladesh has achieved 99% DOTS coverage and increased case detection, treatment delays are still high. Efforts to educate community, especially older age groups, and to include providers outside of the public sector should be strengthened.

FIDELIS experience in Anhui, China

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Setting: Anhui Province, China, 2004–2007.

Objectives: To increase case-finding of tuberculosis, especially among the poor and in rural areas in Anhui, China.

Methods: A survey card was designed for elementary and secondary school students to identify tuberculosis suspects in their family. Teachers provided health education on tuberculosis before giving the survey card to students and collected the card within a week. Survey cards with identified tuberculosis suspects by township doctor were given to village doctors, who visited suspects to collect sputum for examinations. Patients were diagnosed and started on treatment at county level.

Results: From May 2004 through April 2005 in Phase I, a total of 23 079 tuberculosis suspects were identified from the cards, among them 2307 (10.3%)

were diagnosed with tuberculosis. Of the 12 075 tuberculosis patients at 24 counties clinic, 5462 were smear positive, an increase of 281% compared with the number of new smear positive TB patients (1432) registered during the same period prior to the project. From November 2005 through October 2006 in Phase II, a total of 20 272 new smear positive tuberculosis patients were identified, an increase of 26% compared with the number of smear positive patients registered during the same period prior to the project.

Conclusions: It is feasible to massively mobilize students through collaboration between health care system and education system to increase tuberculosis case finding.

FIDELIS and policy uptake: lessons learnt in China

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Aim: To document 'lessons learnt' and changes in policy, practice and perceptions as reported by those involved at local, county, provincial and national levels in FIDELIS projects in two provinces in China (Anhui and Shaanxi).

Design: A qualitative study within the overall evaluation of FIDELIS.

Methods: Findings are based on analysis of 36 interviews, most of which were semi-structured, in-depth interviews, carried out in 2008 by two social scientists contracted by The Union. Key informants were selected from those involved in Anhui and Shaanxi FIDELIS projects in China and internationally.

Results: Several changes in policy and practice at national and/or provincial levels were directly influenced by these two FIDELIS projects:

1 Establishment of microscopy centres at township levels. Provincial variation: also funding equipment and technician.
2 Recommendations about strengthening health promotion
3 Financial incentives for health personnel to detect, trace and refer patients
4 Transport subsidies for patients
5 Working with Women's Committees

Valuable lessons learned from their FIDELIS projects emerged through interviews. The FIDELIS process and their projects provided an opportunity to better understand or address:

• Local ownership and commitment
• Political commitment for TB
• Innovative thinking
• Strengthening DOTS and public health approaches
• Limited access
• Training, supervision and monitoring

- Use of data and information systems
- Institutional links and collaborations
- Management of finances and projects
- Communications
- Research needs and recommendations for funding

Conclusion: Qualitative evaluation captured a wide variety of lessons learned and some significant changes. Such evaluation complements quantitative analyses of case-detection and costs.

FIDELIS five years later: looking back at lessons learnt

I D Rusen. International Union Against Tuberculosis and Lung DIsease, Paris, France

Setting: Tuberculosis control activities worldwide.
Objective: To review lessons learnt within the FIDELIS initiative to provide direction for future initiatives.
Design: FIDELIS was a multi-project fund to increase case detection through local and innovative approaches with a focus on patients with limited access to care. FIDELIS was supported by the Government of Canada through the Canadian International Development Agency and implemented by the International Union Against Tuberculosis and Lung Disease (The Union).
Results: Several unique and innovative features were developed and employed within FIDELIS. Most of these components resulted in clear benefits for the initiative. However, several components also presented challenges for FIDELIS as a whole, as well as for individual projects. Project criteria limiting the size of projects to smaller efforts likely made FIDELIS accessible to smaller, local organizations. However, this also likely decreased the overall efficiency of FIDELIS. A reporting system unique to FIDELIS allowed for more timely and careful review of the case finding results. At the same time, the monthly reporting system created an additional burden for many projects. The limited access form provided valuable information for projects and for national programs, though also increased the workload for already overburdened health workers.
Conclusions: A wide range of unique and FIDELIS-specific components were developed and introduced within FIDELIS. While many of these efforts successfully strengthened FIDELIS, some also created challenges. A critical review of FIDELIS may result in stronger, future multi-project initiatives addressing tuberculosis or other public health problems.

MASS MEDIA IN LOW- AND MIDDLE-INCOME COUNTRIES: EVIDENCE FROM WORLD LUNG FOUNDATION CAMPAIGNS

Testing mass media messages for tobacco control campaigns in low- and middle-income countries: a report from the Bloomberg Initiative to Reduce Tobacco Use

S Mullin. World Lung Foundation, New York, New York, USA

Tobacco is the largest cause of preventable death in the world, causing one in 10 deaths worldwide. If current trends continue, it is projected that 10 million deaths will occur annually by 2030, of which 70% will have occurred in low and middle income countries. The Bloomberg Initiative focuses on tobacco control activities primarily in 15 developing countries where more than two thirds of the world's smokers live. Mass Media is one of the key strategies being employed by the Initiative. World Lung Foundation sought to assess the comprehension, acceptability, and potential effectiveness of graphic anti-smoking television advertisements in Bloomberg priority countries. This presentation will show the results of the message testing effort thus far and discuss how the research is being used to inform and support mass media campaigns in countries as well as broaden international understanding of tobacco control media campaigns across cultures.

Tobacco control mass media campaigns in China

Y Chang. World Lung Foundation, New York, New York, USA

Mass media can be an effective stand-alone tobacco control intervention. When properly planned, executed, and sustained, evidence shows that targeted mass media campaigns can effectively motivate quit behaviour, raise public awareness of tobacco health harms, and build support for tobacco control policy measures. This session tracks the evolution and progress of tobacco control mass media campaigns in China, where roughly one-third of the world's smokers reside.

Communication strategies for smoke-free Turkey

S Hamill. World Lung Foundation, New York, New York, USA

Mass media plays a key role in supporting smoke free jurisdictions by building public awareness of the legislation, educating about the dangers of second hand smoke and demonstrating government resolve to enforce smoke free. In July 2009, Turkey enacted a comprehensive smoke-free legislation, a year-long implementation that started in offices and public areas and

culminated in the hospitality sector such as restaurants, nightclubs and tea houses. This session will examine some of the communications strategies used to build support and compliance for the Turkish legislation, including both 'paid media', such as mass media advertising and 'earned media', or working with journalists.

Supporting pack warnings with mass media advertizing in Egypt

M Elghamrawy. World Lung Foundation, New York, New York, USA

Smoking is well-established in Egyptian culture; Egypt is one of the 15 Bloomberg Initiative priority countries, where two-thirds of the world's smokers live. The Egyptian government has become more serious about facing the dangers of smoking and the intervention of health warnings on cigarette packs. To help build support for graphic pack warnings, WLF in collaboration with Egypt's MoH launch the 'Save Yourself' mass media campaign in August 2009. 'Save Yourself' aims to inform millions of Egyptian smokers about the serious health effects of tobacco and to motivate them to quit before they become sick, thus confirming the health warning messages on cigarette packs. The campaign used hard-hitting, graphic TV ads that had already been proven effective in other countries. These ads were first message-tested with local audiences, then adapted for use in Egyptian media. Pre- and post-evaluation assessments were conducted before and during the campaign to measure its effect, including measures of ad recall and audience size. The campaign aired for six weeks.

ZOONOTIC TB: PUBLIC HEALTH AND SOCIO-ECONOMIC CHALLENGES

The genetic diversity of *M. bovis* in Tanzania human and animal sources—a fifteen year experience

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Spoligotyping was performed on 56 *Mycobacterium bovis* isolates in order to evaluate the genetic biodiversity of *M. bovis* strains identified in Tanzania in the spanning period from 1993 to 2008. An apparently high level of heterogeneity was observed. In total, eleven spoligotypes were identified. The genetic relatedness of the spoligotypes indicated a high degree of relatedness (95%) and the lowest was 11%. Comparison of the spoligotypes with the *M. bovis* International spoligotyping database showed that one among the main spoligotypes was identical to the major cluster of *M. bovis* strains present in Uganda and Ethiopia and another in South Africa, suggesting that bovine tuberculosis may be traced to ancestral clones in those neighbouring countries. The remaining 10 spoligotypes were orphan and 9 absent in the *M. bovis* spoligotyping database. Interestingly, majority of the spoligotypes frequently observed in Southern Highlands of Usangu plains were also observed in Eastern and Northern Zones of Tanzania where big cities of Dar-es-Salaam and Arusha respectively are located. This finding shows that the spread of *M. bovis* is due to extensive movements of cattle belonging to pastoralists for selling and in search of good grazing areas and water. Time wise, dominant spoligotype were time specific for the first five years of this study as compared to the last 10 years where Spoligotypes sp3 and sp10 were common. This report gives an insight into the global *M. bovis* genetic diversity in Tanzania and the impact on the disease transmission.

Reverse zoonosis of TB: a devastating threat for cattle and non-human primates in Bangladesh

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Background: Bangladesh is endemic for human tuberculosis (TB). Various initiatives are in progress to control human TB. But, data related to TB of animals, and non-human primates are rare.
Objectives: To a) isolate, and identify mycobacteria from the vital organs of dead cattle, and non-human primates, b) perform drug susceptibility testing, and c) genotyping of isolates.
Methods: After post-mortem, granulated vital organs (lung, liver, and kidney) were studied to assess TB infection by histopathological test, and culture. Mycobacterial colonies were confirmed by conventional and molecular tests. Standard technique was followed for susceptibility testing, and spoligotyping.
Results: TB of these animals was confirmed by histopathological report (presence of granuloma, caesation necrosis, and calcification). *Mycobacterium* spp. failed to grow from lung tissue samples of 4 cows. Spoligotyping performed from the paraffin-embedded lung tissue samples confirmed acid-fast bacilli as *M. tuberculosis* complex (MTBC) with spoligo-pattern similar to stains isolated from oryx. Based on single nucleotide polymorphism of gyrB gene and RD deletion,

the infecting MTBC organisms were identified as *M. africanum* subtype 1. Monkey isolates were identified as *M. bovis* by nested-PCR. *gyr*A gene sequence of these two isolates was different but the spoligo-patterns were similar to *M. africanum* subtype 1. Monkey strains were sensitive to all first-line anti-tuberculosis drugs.

Conclusion: Cattle and monkeys were possibly infected with *M. tuberculosis* and *M. africanum*-infected caretaker(s) and subsequently transmitted to other mammals. These results indicate that reverse zoonosis is taking place in a TB-endemic country like Bangladesh. These results also indicate that human TB is a threat for the cattle and non-human primates living in close association with humans. Detailed studies must be conducted to understand the mode of transmission and subsequent control.

Molecular epidemiology of human cases of TB due to *Mycobacterium bovis* in Mexico

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The purpose of this study was to evaluate the role of *M. bovis* in human tuberculosis in a high prevalence area of TB in cattle. Sputum, urine and 'other tissue' samples were obtained from three population groups: TB symptomatic patients, dairy farms workers and workers from an abattoir. Macroscopic TB-lesion samples were also taken from cattle at slaughter. All samples were first analyzed by the BAAR test and then both, cultured in Stonebrink and Löwenstein-Jensen media and analyzed by a nested PCR MPB70 to amplify *M. tuberculosis* complex bacillus DNA. Spoligotyping was accomplished in isolates or amplified DNA. A total of 566 samples were collected: 255 from symtomatic patients, 218 from farm workers and 93 from abattoir workers: 369 samples were sputum, 272 urine and 18 other tissue (gastric juice and pleural liquid). Seventy-one samples were positive to at least one of the diagnostic tests: 46 to BAAR, 26 to culture and 124 to nested PCR. From sputum samples, 18 were positive to culture; 6 of them showed *M. bovis* fingerprint, 80 were positive to PCR; 12 of which were *M. bovis*. From the urine samples, 5 were positive to culture; 4 showed *M. bovis* fingerprint, 41 were PCR positive; 10 had *M. bovis* fingerprint. Finally, from the 18 'other tissue' samples, 2 were culture positive, both were *M. bovis*. In summary, 34 (6%) samples showed *M. bovis* spoligotype. In symptomatic patients, 20 (7.8%) of the strains were *M. bovis*, similar to the proportion in farm workers. Only one sample from the abattoir workers was positive to culture, the spoligotype was *M. tuberculosis*. Spoligotypes were compared to 45 *M. bovis* fingerprints

from cattle from the same study area. Eight fingerprints from samples in cattle showed identical fingerprint to five fingerprint samples from humans. Two other spoligotipes from humans had only one spacer different to the eight fingerprints from cattle. Our study shows that *M. bovis* plays an important role in the epidemiology of TB in humans in Mexico.

CONTACT INVESTIGATION IN THE HOUSEHOLDS OF ACTIVE TUBERCULOSIS PATIENTS IN LOW-RESOURCE SETTINGS

TB-HIV contact investigation study in Cambodia

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Background: Investigating household contacts of TB patients can reduce transmission of TB disease and facilitate early TB diagnosis and treatment. HIV testing is recommended for TB suspects, including household contacts of TB patients. Due to resource constraints, contacts are not routinely evaluated in most high-burden settings, including Cambodia. Data on feasibility and impact are needed to inform implementation. **Methods:** We enrolled newly registered patients with TB in three Cambodian provinces from January–May 2009. Household contacts were enrolled during home visits and evaluated at the nearest referral hospital for TB disease, including medical history, physical examination and chest radiography. All contacts ≥18 years, plus those contacts <18 years with HIV risk factors were offered HIV testing. Tuberculin skin testing (TST) was used for contacts <5 years and contacts with HIV. We collected sputum specimens for smear microscopy from contacts with abnormal signs, symptoms, or chest radiographs. **Results:** We enrolled 561 index patients with TB and 2639 household contacts of these patients, including 320 children <5 years. Sputum specimens were collected from 675 contacts (26%) susected of TB disease; 192 (7%) contacts were diagnosed with TB disease. Of those, 16 (8%) had smear-positive and 81 (42%) smear-negative pulmonary TB, 95 (50%) extrapulmonary TB. Of the 561 index patients, 39 (7%) were HIV infected; 1417 contacts were tested for HIV; 23 (2%) had HIV infection. Of 341 contacts with TST, 68 (20%) had an induration of ≥10 mm. **Conclusions:** TB disease and latent TB infection among household contacts of TB patients in Cambodia is high. TST is a useful adjunct to identify contacts for chemoprophylaxis. HIV infection among

household contacts was relatively low (albeit higher than in the general population). In Cambodia, contact investigations would increase TB case detection rates, resulting in earlier TB diagnosis and treatment.

Contact screening and chemoprophylaxis in the Indian TB control programme: a situational analysis

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Background: The Indian Revised National Tuberculosis Control Programme (RNTCP) recommends that all household contacts of smear-positive pulmonary tuberculosis (PTB) cases, be screened for tuberculosis (TB) disease and 6-months isoniazid preventive therapy (IPT) administered for asymptomatic children <6 years of age.
Objective: To assess the implementation of child contact screening and IPT administration under RNTCP.
Methodology: This cross-sectional study was conducted in 2 randomly selected TB Units (TU) each of urban (Chennai city) and rural (Vellore district) sites in Tamil Nadu, South India from July to September 2008. The study involved perusal of TB treatment cards of source cases (new or re-treatment smear-positive PTB patients started on treatment), interview of source cases, and focus group discussions (FGD) among health care workers.
Results: Interviews of 253 PTB patients revealed that; of the 220 contacts aged <14 years, only 31 (14%) had been screened for TB; and of the 84 household children <6 years, only 16 (19%) had been initiated on IPT. The treatment cards of source cases lacked documentation of contact details. FGDs revealed higher awareness among urban health care workers but a lack of detailed procedures for child contact management.
Conclusion: Provision for documentation by using a separate IPT card and focused training may help to improve implementation of child contact management in the RNTCP.

NTP AND NAP: THE CHALLENGES OF COLLABORATION IN TB-HIV ACTIVITIES

Scale-up of the Three Is: how far have we come in 2009?

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Rio de Janeiro is pursuing the 3 I's in its HIV and TB clinics, the collaboration between the two programs has scaled up the identification of latent TB and initi-ation of IPT. More than 1500 patients have been started on IPT with approximately 85% of completion rate. IPT has been included in the revision of both the NAT and NTP guidelines and INH is now distributed and monitored in the same system as the antiretrovirals, meaning that all HIV clinics will have INH for their patients regardless of the presence of a TB program. Among HIV patients with positive TST, the screening for TB, as part of IPT, has found 9% of TB cases in 29 HIV clinics in Rio de Janeiro city. Doctors and nurses have been trained to engage in infection control activities and administrative measurers like outdoor waiting areas for TB patients have been implemented.

Creating demand for integrated HIV care at community level: how to mobilise people at grassroots level

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Problem: Integration of TB and HIV services in health care units is not a reality in most part of the globe. Programs worldwide recommend and do not implement comprehensive care for TB-HIV co-infected patients.
Development: Evidence of lack of treatment information and rights by patients (people affected in general) is quite well documented and acknowledged. Programs often justify their non-compliance for collaborative activities implementation with excuses: drug management limitations, counseling requirements, specialist supervision needs, and lack of qualified personnel. Sensitizing community based organizations dealing with vulnerable populations for TB and HIV/AIDS seems to be the most effective way to provide needed information to those affected. Moreover, information and education is the elementary requirement to provoke advocates for the cause of TB-HIV collaboration activities.
Conclusion: TB and HIV/AIDS activists have a great opportunity to demonstrate advantages in treatment compliancy, adherence both to TB and HIV treatments, and cost effectiveness of collaborative activities. Simple assessment and operational research are indicated tools to fundament advocacy on this behalf.

EXPERIENCES AND STUDY RESULTS FROM TB VACCINE TRIALS SITE DEVELOPMENT

Overview of vaccine trial sites and the TBVACSIN network

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Several promising new TB vaccines have advanced to phase II trials and are ready for phase IIb trials. Phase III trials will likely involve tens of thousands of participants and will have to be multi-site trials. Until recently only one site—established near Cape Town by the South African Tuberculosis Vaccine Initiative (SATVI) and AERAS—had the basic capacity to conduct such a trial. Sites in India, Kenya and Uganda have started cohort studies in similar populations to obtain epidemiologic parameters and build capacity for large trials. Sites in Mozambique and Cambodia will start similar studies soon. Main funders are AERAS and EDCTP. Site requirements include adequate basic infrastructure, availability of qualified or trainable staff, functioning primary health care services and surveillance, a stable population, sophisticated laboratory backup for microbiological and immunological trial endpoints, expert clinical backup for clinical endpoints and high TB rates. TB-VACSIN (TuBerculosis VACcine trial SItes Network) represents institutions and investigators involved in preparing for TB vaccine trials. Four sites in Africa and two sites in Asia are involved. The network also comprises AERAS Global TB vaccine Foundation, and collaborators as KNCV TB Foundation, Academic Medical Centre, Amsterdam, and Karolinska Institute, Sweden. The network has presented the opportunity for meaningful South-South and North-South collaborations. This has been accomplished through working together on proposals and protocols, meetings and workshops hosted at one of the site locations, exchange visits and visits by external collaborators, the development of a website, sharing of clinical and laboratory standard operating procedures and case report forms, and collaborative training in clinical research. The network increases the potential for cross-site and multi-site grant applications and collaboration, whereby new sites can benefit from the lessons learned.

Prevalence of *M. tuberculosis* infection and TB disease among adolescents in Kenya

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Introduction: Kenya is ranked 13 among 22 high TB burden counties. No current vaccine has been shown to reliably prevent pulmonary tuberculosis and the risk of TB disease following infection begins to increase in adolescence. This high risk population is a target for new TB vaccines. Establishing the prevalence of TB infection and disease plus incidence is important as part of preparing and obtaining assumptions useful for future TB vaccine trials.

Methods: A prospective cohort study of 5000 adolescents aged 12–18 years is being conducted by KEMRI/CDC in Western Kenya in an area under demographic surveillance. Adolescents are enrolled and followed for one year. TB suspects are identified using clinical criteria/history of contact with a TB case/positive mantoux (TST). TB diagnosis is by sputum examination (microscopy and culture), and chest radiography.

Results: Out of 1429 adolescents enrolled by February 2009, 698 (48.8%) were female, median age 14 years. 578 (40%) were identified as TB suspects with 514 (89%) having one trigger for being TB suspects i.e. either clinical symptoms, TST or history of contact, 57 (10%) and 7(1%) had 2 and 3 triggers respectively. The prevalence of culture or smear positive TB and all types of TB was 350/100 000 and 560/100 000 respectively. The prevalence of TB infection was 239/1000.

Discussion and conclusion: The prevalence of TB among adolescents in western Kenya is quite high. A large number of participants are also infected with TB which might result in high TB incidence over time. The high prevalence of TB disease and infection makes this an ideal target population for TB vaccine trials.

Recruiting and diagnosing TB among an infant cohort in Uganda

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Background and rationale: The Uganda TB Vaccine Preparation Project is building capacity to conduct TB vaccines trials. Knowledge of background TB epidemiology and demonstration of ability to recruit, investigate and follow up cohorts with high retention

rates are prerequisites for trial preparation. The project is being implemented in the Iganga/Mayuge Demographic Surveillance Site.

Objective and methods: This is a prospective study to determine incidence of TB among a cohort of 2500 infants recruited over 1 year and followed for 2 years. Eligible BCG vaccinated infants under 8 weeks of age are recruited and followed up 3 times in the first 4 months and then every 4 months. Criteria for TB suspicion in this study include history of household TB contact, positive tuberculin skin test (TST) and symptoms suggestive of TB. Suspects are admitted to the case verification ward for TB diagnostic work-up which includes sputum induction and gastric lavage for TB smear microscopy and culture, TST and chest X-ray.

Results: A total of 1615 (92%) out of 1755 screened have been enrolled over a period of 8 months. Of these 1111 and 789 participants expected for the 2nd and 3rd follow up visits respectively; 1080 (97%) and 759 (96%) have been completed as scheduled. Main reasons for missed visits are death ($n = 17$) and migration ($n = 9$). Of the 262 infants that have so far met the TB suspect criteria; 169 had symptoms and 114 reported history of contact. Commonest symptoms are cough (82%), fever (45%) and weight loss (27%). Of those who had TST done, 36 (17%) were positive. All sputum smears done are negative and culture results are awaited.

Conclusions: The site is demonstrating capacity to recruit and retain an infant cohort with minimal loss to follow up. Many infants have signs suggestive of tuberculosis but identification of culture-confirmed TB in infants remains a challenge. Our results will be used to validate infant TB diagnostic algorithms.

Difference in TB incidence between active and passive follow-up among adolescents and infants

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Background: Surveillance methods for childhood and adolescent tuberculosis (TB) in vaccine efficacy trials must be sensitive and reliable.

Objectives: To compare TB incidence in infants and adolescents followed up actively with those followed up passively.

Methods: Newborn infants and adolescents were randomized to active or passive surveillance for two years. Participants in the active group were screened for TB every 3 months while those in the passive group were seen only at baseline and 2 year follow-up. Participants in both groups were monitored for TB through surveillance at TB clinics and review of hospitalizations.

Results: 4786 infants were randomized (2392 Active; 2394 Passive). The cumulative incidence of bacteriologically confirmed TB was similar in both groups (0.5% and 0.3%, active and passive groups respectively, $P > 0.05$). The proportion of cases classified as probable TB (radiological features and $\geqslant 1$ TB related clinical feature) was 9.4% in the active group and 6.0% in the passive group ($P < 0.05$). 6363 adolescents were allocated to active (3236) and passive (3127) follow up. % prevalent per protocol defined TB cases in the active group at baseline (57.9%, 95%CI 35.7–80.1%)) was similar to % incident cases after follow up (59.4%, 95%CI 47.3–71.4%).

Conclusion: Amongst infants, active and passive surveillance yielded an equal incidence of bacteriologically proven TB, while active surveillance yielded significantly more cases of probable TB. Active surveillance did not appear to improve detection amongst adolescents. Final results for all subjects will be presented at the conference.

Knowledge, attitudes, practices towards TB and willingness to participate in TB vaccine trials in Uganda

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Background: This study assessed knowledge, attitudes and practices about TB and willingness to participate in a new TB vaccine trial in order to inform the design of a community-based TB sensitization in preparation for the trial in infants and adolescents.

Methods: 28 focus group discussions and 12 key informant interviews were conducted. This comprised of mothers/fathers/caretakers of infants and adolescents and key informant interviews with community leaders (LCs), traditional healers and TB patients.

Results: Knowledge about the causes of TB was found to be low, with only a few key informants mentioning a TB germ and majority believing that the cause of TB is smoking. TB patients were reported to seek care late, when disease has shown signs of severity and others have to be forced to seek healthcare. Seeking care from traditional healers is common. Poverty, fear of being tested for HIV and fear of TB treatment given in health facilities, affects health seeking behavior. Regarding procedures for TB diagnosis in infants, respondents are not comfortable having

their children done gastric lavage. Majority of respondents are willing to have their children vaccinated with BCG and participate in the new TB vaccine trial as long as they are assured that the vaccine is safe.

Discussion & conclusion: Findings from this study reveal the community's knowledge and treatment options for TB are different from the biomedical knowledge. The gaps in knowledge and fears in this community need to be addressed before a TB vaccine trial can be performed.

Immune response to BCG and correlates of protection among infants

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Background: Bacille Calmette-Guerin, the current tuberculosis vaccine available, has an 80% efficacy in prevention of childhood miliary disease and meningitis, but the efficacy in prevention of pulmonary disease varies from 0% to 70%. BCG is usually given at birth, but recent data from the University of Cape Town suggest that giving BCG at 10 weeks of age may induce a more optimal immune response compared with administration at birth. These immune responses are vital for protection of children against tuberculosis infection.

Objectives: To evaluate whether BCG given at 6 weeks of life gives a better immune protection responses against tuberculosis infection compared to that administered at birth, and compare the incidence of tuberculosis infection in the two categories.

Methods: A cross sectional study to enroll infants coming for immunization at 9 months of age. Fifty infants vaccinated at birth and 50 at 6 weeks of age are to be enrolled, and blood drawn for determination of frequency of BCG-induced CD4 and CD8 T cells immunity, as defined by cytokine expression (IFN-γ, IL-2, TNF and IL-17) in supernatants of 12 hour BCG stimulated whole blood culture. Cell proliferative assays will also be done. This study will adopt the technique already used in the South African collaborative site and transfer the technology to Uganda. The study will also determine which infants have been inter-currently infected with *M. tuberculosis* by Quantiferon assay.

Results: The study has been approved by the ethics committee, is on going and results will be presented at the meeting.

Immune response to BCG and correlates of protection among infants

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BCG is likely to remain the cornerstone of new TB vaccination strategies; however, very little is known about the immune response to this vaccine. We have shown that BCG induces a robust CD4 T cell response in infants, characterized by Th1, Th17 and regulatory T cells. The CD8 T cell response is of lesser magnitude. Current studies focus on longitudinal changes in the BCG-induced response, to suggest optimal timing for booster vaccination—the first results will be presented. We have also shown that delaying BCG vaccination from day 1 of life to 10 weeks of age results in an enhanced memory T cell response, as measured at 1 year of age. These results suggest that timing of BCG may be critical variable in vaccination success, and should be studied further. The TB vaccinology world needs validated biomarkers of protection against TB. These correlates would be used to predict efficacy of new TB vaccines. To determine biomarkers of protection against childhood TB, we collected, processed and stored blood from 5675 10-week old South African infants, routinely vaccinated with BCG at birth. Infants were followed for at least 2 years to identify those who subsequently developed culture-positive TB (not protected, $n = 29$), and those who did not develop disease despite exposure to adults with TB (protected, $n = 55$). By examining blood products stored at 10 weeks of age, from protected and unprotected infants, we have shown that unprotected infants often had a quantitatively greater specific T cell response. These infants also have up-regulated pro-inflammatory and myeloid cellular genes, shown in analysis of unstimulated and BCG-stimulated PBMC. Together, these results suggest that an inappropriate innate immune response may predispose to TB disease, following BCG vaccination.

THE ROLE OF COMMUNITIES IN SCALING UP INTEGRATED TB-HIV AND PMTCT SERVICES, INFECTION CONTROL AND POVERTY ALLEVIATION

Strengthening community-level TB-HIV services in Nigeria: the challenges, gains and lessons learnt

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Background: Dual infection of tuberculosis and HIV/AIDS is a global public health problem. With a co-infection rate of 27% in Nigeria, tuberculosis is the leading cause of death among PLWHAs. To reduce

the disease burden, collaborative TB-HIV activities commenced in Nigeria in 2006. At inception, it was wholly a facility-based program but was later scaled up to include community-based care with the aim of increasing access to care.

Design: The steps in implementation include community assessment, advocacy to community leaders, community mobilization, selection of community volunteers, training of community volunteers, community diagnosis and treatment monitoring, supervision and monitoring of the implementation process. These activities are being implemented by the FMOH in collaboration with partners.

Challenges: Issues encountered in implementation include cost of home-based care, high attrition rate among volunteers, lack of standardization of TB infection control measures, stigma and discrimination.

Gains: Benefits include reduced cost of providing services, strengthening of the health system through community empowerment to participate in health care delivery and positive health-seeking behavior.

Lessons learnt: Active community participation in the program caused an improved uptake of services, early diagnosis of co-infection, better adherence to treatment schedule, reduced stigma and discrimination, community ownership and enhanced sustainability of program in the communities.

Conclusion: Community-based care is crucial to the delivery of quality, equitable, sustainable and participatory TB-HIV care in resource-constrained settings.

Recommendation: TB-HIV services in rural communities of low-income countries with high disease burden should be decentralized through broad partnership to encourage community ownership.

Engaging community members in integrated TB-HIV and PMTCT services and infection control

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Setting: Khayelitsha is a peri-urban township in Cape Town, South Africa with high levels of poverty and overburdened health services. The TB incidence was 1518/100 000 in 2009 and antenatal HIV prevalence was 33% in 2008. Among 96% of TB patients tested, 69% were HIV-positive.

Objective: To describe the experience of TB-HIV Care Association in implementing different models of community based TB adherence support.

Methods: TB treatment outcomes were compared between daily directly observed TB treatment (DOT) and 2 new models of community based adherence: weekly support for TB patients and integrated support for TB patients and patients on antiretroviral treatment (ART) (Table). Treatment supporters (TS) were trained on infection control.

Table Models of community-based adherence support for TB and antiretroviral treatment

	TB DOT	Weekly TB Adherence	Combined TB/ART
Diseases covered	TB	TB	TB, HIV
Person initiating treatment	Nurse	Nurse	Nurse/ Doctor
Buddy support	No	Yes	Yes
Treatment literacy sessions	1	4	4
Home assessment	No	Yes	Yes
Exclusion criteria	Homeless, mental illness	Homeless, mental illness, substance abuse, no buddy support	Homeless, mental illness
Coordination meetings	Monthly	Weekly	Weekly

Results: The new models achieved similar smear conversion and treatment completion rates to DOT. Implementation challenges included resistance to changing from DOT and coordinating many role players. Home visits helped verify the patient's address and assess social circumstances. Integrating TB and ART adherence support was more convenient for patients, efficiently used human resources, avoided 2 TS visiting one household and helped decrease stigma. Community support benefited the facility by reducing the patient load, improving case finding and holding and assisting with infection control. It also decreased poverty by providing employment for community workers and keeping community members healthy and able to work.

Conclusions: Weekly TB adherence support and integrating TB and ART adherence do not adversely affect TB treatment completion and are beneficial to facilities and patients. Planning and implementation should involve TB and HIV programs, facility staff and other NGOs and requires clear role clarification. A facility-based coordinator of community workers provides mentorship, supervisory support and monitoring and evaluation. Staff attrition can be avoided by providing fair stipends and non-monetary incentives to TS.

ADDRESSING ETHICAL ISSUES IN TB CONTROL: THE WORK OF THE WHO TASK FORCE

The purpose and process of the WHO project on Addressing Ethical Issues in TB Control Programmes

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Tuberculosis prevention, care and control raise important ethical and policy issues that have been accentuated by the emergence of MDR-TB and XDR-TB as a major threat to the progress achieved in TB control. In 2008, the WHO established a Task Force on Addressing Ethical Issues in TB Control Programmes. The aim was to undertake a comprehensive analysis of ethical issues in TB and to lay the groundwork for the formulation of WHO guidance in order to help governments and other stakeholders to implement TB control programmes in an ethical manner. A further goal was to create a forum to exchange experiences and information on ethical issues and how to deal with them, as well as to promote research collaborations between institutions working on these issues. The TF held its first meeting in Toronto in December 2008, followed by a second meeting in August 2009 in Geneva. Discussion papers on the following topics were commissioned: 1) Diagnosis and treatment; 2) Obligations and rights of health care workers and patients; 3) Public health measures; 4) Research. The discussion papers have been refined with the input of the Task Force members. A draft WHO document on 'Ethical guidance for TB Control and Care Programmes' has been elaborated by the TF. It has been widely shared with key stakeholders to ensure the input and participation of civil society, national TB control programmes, TB technical agencies, the bioethics community, policy-makers, and field workers. Training tools for capacity-building in countries are being developed.

Ethical aspects of TB diagnosis and treatment

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In August 2008 the Ethics and Health Unit and the Stop TB Department of WHO jointly established the Task Force on Addressing Ethical Issues in TB Control Programmes. The objectives of the Task Force are:
- To provide a comprehensive analysis of ethical issues associated with TB control.
- To lay the groundwork for the formulation of WHO guidance to help governments and other stakeholders to implement TB control programmes in an ethical manner.

- To create a forum to exchange experiences and information on ethical issues arising in TB control programmes and how to deal with them.
- To promote research collaborations between the agencies/institutions working on ethical issues in TB control.
- To promote resource mobilization for research activities on ethical issues in TB control.
- To help disseminate and implement these global guidelines to policy-makers and other stakeholders at international and national levels.

The Task Force has written background papers, held two meetings one in Toronto and one in Geneva, most recently in August 2009, and is producing a final report on recommendations on a broad range of ethical issues related to TB care, with the ultimate goal of developing standards for national TB programs.

CLOSING THE GAP TOWARDS OPTIMAL AFB MICROSCOPY

Whither LED system? A comparative review of performance

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In past few years, the advent of the Light Emitting Diode (LED) as the light source for fluorescence microscopy (FM) has generated a new hope for better smear microscopy than the traditional basic fuchsin based staining methods. Smear microscopy in high burden countries is usually the confirmatory test for TB and plays a critical role in diagnosing, treating and controlling the transmission of TB. The LED light source being free from the shortcomings of traditional mercury vapor (HBO) lamps is being accepted by the laboratorians with great enthusiasm. This also prompted the use of LED as light source as an add-on to the existing light microscopes to convert them as fluorescence microscopes. New types of microscopes are now being manufactured with a fixed built-in LED light source. The current available microscope models provide either epi-fluorescence or transmitted light fluorescence. To keep the cost low, FM microscopes are also offered in monocular versions. This brings-up a basic question of quality and usability of microscopes for TB testing. Which microscope provides better viewing—a monocular or a binocular FM? Does it make any difference in sensitivity and specificity on AFB smear microscopy if using transmitted light or epi-fluorescence illumination? The smear staining process for fluorescence microscopy remains the same for both kinds of microscopes. No significant studies have been published to compare different LED microscope models about their respective performances in term of sensitivity, specificity, ergonomics, and usability

under field conditions. Additional comparative studies are needed to allow the end users to determine the most suitable product for their respective settings.

LED versus classical fluorescence microscopy systems

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The rapid development of high power light emitting diodes (LEDs) with dramatically increased efficiencies and available emission frequencies in recent years means that they are now ideal light sources for fluorescent microscopy. Individual LEDs are solid state devices that emit light within only a narrow range of wavelengths. As a result LEDs are very robust, stable and, particularly for applications which require single colour illumination, extremely energy efficient. The characteristics of the classical mercury vapour arc lamps (MVL) are very different to those of high power LEDs. Therefore the use of LEDs as an alternative light source for fluorescent microscopy has greatly increased the microscope design possibilities and practicability of fluorescent microscopy. Microscopes illuminated with MVLs always require epi-illumination as there must be no possibility for direct exposure of the operator's eyes to unfiltered light, whereas with LEDs illumination from below becomes feasible and safe. This and other factors have allowed a range of dedicated microscopes and adaptors for standard laboratory microscopes with different characteristics to be commercially developed. The major classes of these systems and their main characteristics as well as the possible limitations of specific systems currently available will be discussed. If implemented and maintained correctly LED based fluorescent microscopes promise to provide the benefits of fluorescent microscopy while avoiding the main problems associated with the use of MVLs to many more laboratories than was previously possible.

Fuchsin: basic and poorly understood

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The laboratory diagnosis of tuberculosis by smear positive microscopy is, and will continue to be, a first line investigation in suspected clinical disease. In resource poor settings, it is often the only available testing regimen. Basic Fuchsin (BF) is the dye of choice in the time honoured Ziehl-Neelsen (ZN) method for detection of acid-fast bacilli. The selection of BF powders for national programs in resource poor settings often involves limited analysis on a selection of non-certified powders, which may not take into account the complex heterogeneous nature of such labelled dyes. An unexpected poor performance in ZN stain-

ing with concomitant decreased sensitivity of detection of tuberculosis may be the end result. Basic Fuchsin is the collective name for any combination of four dye molecules which form a homologous dye series based upon the triaminotriphenylmethane molecule. Manufacture of such dyes involves complex organic chemistry which yields powders in which the amount of coloured and non-coloured components can be variable and poorly defined. Some national programs conduct limited investigations of dye samples using spectrophotometric analysis. Such assessment may not predict adequate performance in ZN staining. Interestingly, the relative performance of chemically pure samples of basic fuchsin within the ZN method has never been elucidated. Despite this, an increasing body of evidence suggests that at least three relatively simple investigations, accessible to a basic laboratory environment, should be sufficient to assess and predict basic fuchsin dye powders for applicability in ZN staining.

Bulk staining of sputum smears: ending a taboo

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Setting: A high-throughput laboratory routinely performing fluorescence microscopy for acid-fast bacilli (AFB) smear with automated bulk staining.
Objectives: To determine the risk of false-positive AFB sputum smears from bulk staining showing as smear-positive, culture-negative specimens, or a decrease in smear- and culture-positives.
Design: Direct AFB smear and Löwenstein-Jensen culture were performed for a total of 39 350 routine sputum specimens. Of these, 6633 were randomly selected for individual AFB staining, while the remaining 32 717 were processed by bulk machine staining. Positives for smear and culture were compared.
Results: Overall, 111 specimens yielded a positive individually stained smear; of these, 100 (90.1%, 95%CI 83.0–95.0) were also culture-positive compared to 504/543 smear-positives after bulk staining (92.8%, 95%CI 90.6–95.0). The proportions of smear-positive, culture negative and smear- and culture-positive specimens were respectively 1.8% vs. 2.2% and 90.1% vs. 92.8%, for individual and bulk staining (non-significant).
Conclusions: The risk of transferring AFB from positive to negative smears during bulk AFB staining is negligible, if it occurs at all. Bulk staining should not be discouraged, as even in low-income countries this method will save significant resources, particularly manpower, and improve staining results in laboratories with a high workload.

Results of demonstration studies with the Zeiss LED fluorescence microscope outside central and reference laboratories

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Currently, sputum smear microscopy by ZN method remains the key diagnostic method for diagnosing TB in high burden countries. Increasing the sensitivity of ZN by LED based fluorescence microscopy (FM) is one of the viable options to improve case finding and reduce work load. This would also provide a way to overcome the present limitations of using conventional, expensive FM. To address these requirements and limitations, FIND fostered the development of a dual microscope with Zeiss (Primo Star iLED) that could easily be switched to perform either fluorescent or bright-field applications. After ensuring that performance targets were met through feasibility and evaluation studies, demonstration studies are being carried out in 28 routine microscopy centers in nine countries. Prior to the start of the demonstration studies, the performance of study sites was validated by a month-long base-line study with ZN method. Following this, a validation phase of the demonstration study was conducted at each site. During this phase, 100% of slides screened by iLED were rechecked by conventional FM method. After ascertaining acceptable performance levels, the sites were allowed to move on to an implementation phase. The results obtained with iLED in the implementation phase were used for diagnosing patients. Study sites which maintained the expected level of performance then moved on to a continuation phase. To sum up, microscopists with no prior experience with FM passed proficiency testing with iLED after 2–5 days of training. User acceptance /appraisal was observed to be uniformly high at all sites. The sensitivity and specificity obtained with iLED was comparable or better than ZN after the microscopists had practiced for a month. Reading time with iLED was approximately 50% compared to ZN. The interim analysis of iLED versus FM revealed an overall agreement of 96.1% and 96.3% in the validation and implementation phases respectively.

Stains and staining solutions for fluorescence microscopy of acid-fast bacilli

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Light-emitting diode (LED) lamp fluorescence microscopes (FM) have opened exciting perspectives for mass application, raising questions on the most appropriate stains. Auramine O (AO) has been virtually the only primary dye used. Addition of Rhodamine B was recommended to improve its efficiency, but it has never used much outside the USA, and a recent meta-review didn't find any advantage. Acridine orange has been advocated instead of the carcinogenic AO, but did not give better results. New nucleic acid stains with a much higher affinity for the binding sites, i.e. of the CYTO family, might be much better but they are prohibitively expensive. The short shelf-life of AO will require decentralised preparation, or distribution of concentrated stock solutions, and details such as optimal concentrations or additives such as glycerine should be looked into. AO smears are difficult to de-stain with watery acids, but huge quantities of alcohol are costly and difficult to procure. Older methods without alcohol, i.e., using ferrichloride as decoloriser and counterstain may provide an alternative. Multiple counterstains have been used with AO, potassium permanganate (PP) being by far the most common. It creates too dark a background on some FM systems but not on LEDs, and it has become very difficult to procure. In a large study with LEDs, simple 0.3% methylene blue and PP counterstaining yielded equivalent results (false negatives/positives). Modifications such as Loeffler methylene blue may suppress fluorescent artefacts more efficiently. Acridine orange and thiazina red counterstains cause a too little contrasting background.

RESEARCH FOR OPTIMISED TREATMENT OF MDR-TB: UPDATE ON RECENT DEVELOPMENTS

Scientific basis of currently recommended MDR-TB treatment regimens

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Current treatment regimens for MDR-TB are based on randomized controlled trials of older anti-TB drugs for drug-sensitive TB conducted in the 1950s and 1960s, on expert opinion, and on the results of cohort and case series analyses. To date, no randomized controlled trials of current four and five-drug MDR-TB regimens have been conducted. Treatment duration, dosages, and the use of third-line anti-TB drugs are also drawn from previous experience and expert opinion. This presentation will: (1) review the evidence supporting the use of specific first, second, and third-line drugs in the treatment of MDR-TB, and (2) review the evidence for the use of these drugs in particular phases and combinations during an MDR-TB treatment regimen.

MDR-TB treatment in HIV-infected persons

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Introduction: With a two-fold increase of MDR-TB and documented outbreaks of XDR-TB in HIV-positive individuals, the management of co-infected individuals ordinarily complicated by the magnitude of the epidemic, limited drugs, combined drug-toxicities and poor prognosis are additionally challenged in resource-constrained environments by delays in diagnosis, access to care and drugs, archaic infection control and poor social supports.

Discussion: Evidence that hospitalizing patients failing standard therapy, awaiting ARV or commencing MDR treatment regimens fuels nosocomial outbreaks Programmatic strategies with focused leadership, integrated care, co-administration of HAART and revision of when to start combined treatment with optimal drug combinations are required. A pilot programme in Kwa-Zulu Natal of community care is one such example. While improved process indicators for treatment adherence and access have been demonstrated, scale-up activities will need to address long-term follow-up, transmission in the household and the role of ARV home-based care programmes in scale-up activities.

Conclusion: Enhanced resources need to target re-infection by infection control introduced from household to hospital. Early diagnose early with available rapid diagnostics combined with empirically until results are available for individualized treatment. Alternatives to hospitalization in a socially supportive environment are urgently required as are guidelines and procedures for palliative care under resource-constraints.

TOBACCO AND POVERTY: CASE STUDIES FROM THE FRONT LINE

Inhuman working conditions, further impoverishing the poor: bidi production and use in Bangladesh

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Tobacco use is not only disastrous to lung health but also further worsens poverty. In Bangladesh, research has confirmed the negative effects of tobacco on poverty at three stages: in growing tobacco, in producing tobacco products (particularly for rollers of local cigarettes known as bidis), and for the users of tobacco products. Research has also shown that at the national level, expenditures on health far outweigh the economic benefits of tobacco use. Many tobacco farmers in Bangladesh are caught in a cycle of debt whereby they take out loans from the industry to grow tobacco, sell at less than their production cost, and thus never escape the debt. The problem is worsened by the lack of availability of loans to small farmers to grow more lucrative food crops. Those working to make bidis often work in inhuman conditions for absurdly low wages; these workers tend to be women and children working out of compulsion rather than choice. The main profits of bidi making accrue to the middlemen and the bidi companies. Finally, for low-income tobacco users, the use of tobacco means even less money available for basic needs such as food and education. Research has shown that tobacco expenditures may contribute to malnutrition of over ten million children in the country. This presentation will reveal new research on the subject of tobacco and poverty in Bangladesh across the issues of farming, bidi production and tobacco use.

Countering industry claims: how tobacco worsens poverty in Vietnam

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In corporate social responsibility (CSR) campaigns, the tobacco industry claims that it plays an important role in reducing poverty by a significant contribution to the government revenue and through various programs aimed at helping the poor and that tobacco farming and manufacturing is a major source of employment on which the poor are dependent for their survival. Are lung and other diseases caused by tobacco simply the price we must pay to benefit the poor? The research in Vietnam showed a contrary, tobacco use worsens poverty and carries heavy costs to the government as well as society. On the national level, the costs of treating just the three leading tobacco-related diseases outweigh the economic benefits of tobacco production. On the household and individual level, both tobacco related health cost and the diversion effect of poor users spending their money on tobacco rather than basic needs further worsens rather than alleviates poverty. Tobacco use has high opportunity cost. If the amount spent on tobacco was instead used to purchase food commodities, 11.2% of food poor people would be able to emerge from poverty. The families of smokers spend less on food and education than those of non-smokers. Smoking increases inequity and the effects of expenditures on cigarettes are particularly harmful on the poorest. The poor smokers spent greater percentage of expenditure on tobacco than non-poor smokers. Children and women are more disadvantaged in the families of smokers as compared with families of non-smokers; The farmers are dissatisfied with tobacco growing explained by high labor cost, low benefit and instable selling price. Tobacco growing and proceeding contributed to deforestation and soil erosion and worsen the health of growers. This is a case where working

for health and for poverty reduction require the same actions: efforts to reduce tobacco use will not only improve lung health but also assist in poverty reduction.

Tobacco, poverty and hunger among Indonesian children

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Background: The prevalence of male smokers in Indonesian was 65.6% in 2007. On average, the cigarette expenditure counted 11.5% from total expenditure per month or the second after cereal expenditure, or even higher than animal food-source as of 11%. Among the poor, cigarette expenditure will decrease the expenditure for food in the household and can lead to malnutrition especially children under five as a vulnerable group.

Objective: The purpose of this secondary analysis was to examine association between smoking/cigarette, poverty and child malnutrition.

Method: A cross sectional data with 6168 households who have children under five, from the study of Maternal and Child Health Practices and Care-seeking Behavior at the Community Level in West and East Nusa Tenggara, Indonesia (2007) were analyzed using path analysis.

Results: The proportion of household member who smoke was 66%. The cigarette expenditure per house hold was 12% from total expenditure per month. Using the WHO child growth standard, the prevalence of stunting, underweight and wasting was 34%, and 40.7% and 19.2% respectively. There was 55.3% of underfive children has infectious disease. Among the poor family the proportion of cigarette expenditure has significantly higher than non poor family in East Nusa Tenggara ($P < 0.05$). The prevalence of smokers was higher in the household with expenditure less than 1 USD per capita per day as of 66.3% compared to 58.8%. Among them there were association between household member smoking and child infection (r = 0.042, $P < 0.05$) especially in East Nusa Tenggara Province. These infectious diseases among children has association with wasting (r = 0.040, $P < 0.05$) and underweight (r = 0.058, $P < 0.05$).

Conclusions: Household member who smoking can influence indirectly underfive nutritional status through infectious diseases.

Poorest of the poor: bidi workers in India

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Context: Tobacco and poverty are deeply connected at the individual, family and societal levels. Family incomes are spent on tobacco use and treatment of tobacco-related diseases at the cost of basic necessities. Tobacco cultivators and bidi rollers owe debts to the industry, earn measly wages and suffer from diseases caused by exposure to tobacco dust and hazardous chemicals. The society suffers from huge healthcare costs and loss of productivity.

Objective: This study will generate stronger evidences to demonstrate that tobacco is closely linked to poverty as well as underdevelopment and is not just a public health concern.

Methodology, location and timeline: Primary approach will involve field work, data collection, analysis, focus group discussions, interviews and participant, non-participant observations across three states of India—Uttar Pradesh, Jharkhand and Madhya Pradesh. Secondary information sources will be available studies, government documents and statistics, media reports and web. The approach, process and findings will be documented.

Total project period: August–December 2009.

Findings and implications: The study is expected to generate a substantial body of country, region and occupation-specific information on the tobacco-poverty linkage. It will strengthen policy advocacy efforts, promote knowledge sharing and will be an essential tool to sensitize and educate policymakers, media and stakeholders on safer, alternative livelihoods for tobacco industry workers. The findings will be disseminated through a media release and at a larger seminar forum.

SOCIO-ECONOMIC STATUS IN TUBERCULOSIS PREVALENCE SURVEYS; MEASUREMENT METHODS AND USEFULNESS

Assessing socio-economic status in tuberculosis prevalence surveys

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TB-prevalence surveys are undertakings that need a vast amount of resources. It is therefore understandable that there is a large desire to collect as many data as possible since such a unique opportunity will not present itself again soon. One of the areas in which extra data can be collected is on socio-economic status. This information can be used to inform NTPs where the national TB-programme needs strengthening to be able to reach the poor. This presentation will discuss the opportunities and difficulties of different ways to collect data on socio-economic status. It will provide NTP-managers and researcher the necessary information needed how to include this type of data in their TB-prevalence survey.

Measuring socio-economic status in the third nationwide prevalence survey in Philippines

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Objective: To determine the association between pulmonary (PTB) and socio-economic status (SES) and other risk factors in the Philippines, a high burden country.

Method: Data was obtained from 99.9% household heads and 94.5% of individuals >20 years in the nationwide TB prevalence survey (NTPS). SES of each household was derived by Principal Component Analysis (PCA) based on assets, education and working status of the household head. The lower four quintiles were combined into one stratum to approximate the population distribution; 79.9% being low, 19.9% middle and 0.1% high. Outcome measure was bacteriologically confirmed PTB plus radiographic PTB minus those with minimal change. Association of SES and other risk factors with PTB was determined by logistic regression using multilevel analysis after controlling for age and gender.

Results: The risk of the low income group PTB was significantly higher than the upper income group. Other risk factors for PTB were being underweight, diabetes mellitus, and tobacco exposure of 10 or more pack years. Indoor air pollution from biomass fuel for cooking, Vitamin A deficiency and alcohol exposure of >40 gms/day were not independently significant risks for PTB by multivariate analysis (Table).

Conclusion: Addressing the deprivation of assets that limit access to health services among the poor and amelioration of the other risk factors for PTB are essential complements to DOTS for sound TB control.

Table Association of socioeconomic status and risk factors with pulmonary tuberculosis based (PTB) on bacteriologically confirmed PTB plus radiographic PTB minus minimal change

Socio-economic status and risk factors	Bacteriologically confirmed PTB + radiographic PTB			
	Univariate analysis		Logistic regression by multilevel analysis	
	Odds ratio	95% CI	Odds ratio	95% CI
Socioeconomic status*				
Lower 80%	1.6	1.2–2.3	1.7	1.1–2.6
Higher 20%	1.0		1.0	
Fuel for cooking				
Wood	1.5	1.1–1.9	1.0	0.7–1.5
Electricity/LPG/Gas	1.0			
Nutritional status				
Underweight	2.5	2.0–3.2	7.9	5.4–11.7
Normal and overweight	1.0		1.0	
Vitamin A deficiency				
Present	1.9	1.5–2.5	1.04	0.7–1.5
Absent	1.0			
Diabetes Mellitus				
Present	2.4	1.5–4.0	2.3	1.2–4.3
Absent	1.0		1.0	
Exposure to tobacco, cigarette packs/yr				
≥20	4.6	3.3–6.4	2.3	1.3–4.0
10–19	3.2	2.1–4.7	1.8	1.04–3.2
<10	1.4	1.03–2.0	1.2	0.9–1.9
Never	1.0		1.0	
Exposure to alcohol				
≥40 g/day	2.8	1.9–4.2	1.6	0.8–2.9
<40 g/day	1.3	0.9–1.7	0.9	0.6–1.5
Never	1.0			

* Based on wealth quintiles by Principal Component Analysis.

Prevalence of TB in different socio-economic groups: data of the first National Prevalence Survey

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Setting: Data of the first National Prevalence Survey in Vietnam.

Objective: We used low-cost methodology to study the association between tuberculosis and household expenditure level of participants to a nation-wide tuberculosis prevalence survey using a shortlist of nine household characteristics: six assets and three demographic household characteristics.

Design: A nation-wide representative, cross-sectional survey with multistage cluster sampling stratified by urban, rural and remote areas was carried out in 2006–2007 in Vietnam to assess the prevalence of tuberculosis. Per household, nine characteristics were scored and adapted to match a set of characteristics collected in the 2nd Vietnam Living Standards Survey (VLSS) that was shown to form a good indicator of poverty. We derived coefficients for these characteristics by regressing them against household expenditure per capita obtained from the VLSS database. We subsequently used the coefficients to predict household expenditure level (in quintiles) in our survey and assessed its relation with tuberculosis prevalence.

Results: The household characteristics explained 58% of the variability in household expenditure per capita and its accuracy was similar to that in the VLSS. The prevalence rate of bacteriologically confirmed tuberculosis was 307/100 000 in persons aged ≥15 years (95% CI 249–366). After adjustment for confounders, tuberculosis prevalence was associated with household expenditure level ($P = 0.04$). Compared to those in the highest household expenditure quintile, those in the lowest quintile had a 2.4 times higher tuberculosis prevalence rate (95% CI 1.5–4.0).

Conclusions: Scoring a set of nine household characteristics, we could predict household expenditure level with fair accuracy. There was a significant association between the tuberculosis prevalence rates and household expenditure level, suggesting that tuberculosis is related to poverty in Vietnam.

The social epidemiology of TB in Zambia: a multilevel approach

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Setting: Two communities in Zambia.
Objectives: To explore the association between socioeconomic position (SEP) and TB.
Design: To assess the association between TB disease and TB infection we used, respectively: 1) a case-control study; 2) a cross-sectional study restricted to the controls. Both studies were nested within a TB prevalence survey (2006). Variables on four domains of household SEP were combined into a SEP index using principal components analysis. Multivariable analysis was guided by a conceptual framework reflecting the multilevel structure of the data. Adjusted Population Attributable Fractions (PAF) were estimated.
Results: TB disease was associated with lower household SEP (OR = 2.7, 95%CI 1.2–5.9, low SEP vs. high SEP). This association appeared to be mediated by inadequate nutrition. HIV was also associated with TB disease (OR = 3.2, 95%CI 1.5–7.2), after controlling for SEP. PAFs for HIV and inadequate nutrition, adjusted for SEP, were 35.8% and 41.7% respectively. In contrast, TB infection was associated with higher SEP (OR = 0.4, 95%CI 0.2–0.8 high SEP vs low SEP) and proximity to community services.
Conclusions: Household SEP was oppositely associated with TB disease and infection. Higher household SEP may be associated with lifestyles increasing social mixing and therefore the risk of infection. Among infected people, the poor may be more likely to progress to TB disease and thus more likely to be detected in a prevalence survey. In the association with TB disease, SEP seems to operate mainly through inadequate nutrition. At population level, inadequate nutrition could explain more TB cases than HIV in these communities.

Experience with measuring socio-economic status in a local survey in Kenya

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Background: We conducted a survey among a rural population of 136 000, with high rates of TB and HIV, and monitored by demographic surveillance. The objectives were to estimate the prevalence of smear positive (+) and culture+ pulmonary tuberculosis (PTB), and determine HIV infection and care seeking patterns among prevalent cases.
Methods: Forty clusters of 1–4 villages were sampled randomly out of 105. All persons ⩾15 years of age and resident for ⩾1 month were eligible. Participants responded to a symptom questionnaire, had chest radiography (CXR) and provided 2 sputum samples for fluorescent microscopy. Persons with CXR abnormalities and/or symptoms suggestive for PTB provided 1 additional sample for culture. PTB was defined as 2 positive smears and/or a positive culture. PTB cases were offered HIV testing and referred for TB and HIV care. Socioeconomic status was based on an asset score.
Results: 20 566 participants, 63% female, enrolled between August 2006 and December 2007, and 120 persons with PTB were identified of whom 51 (43%) were smear+. Prevalence was 583/100 000 (95%CI 448–719) for all PTB. Of the 120 cases, 114 (95%) were not on TB treatment at the time of survey. Of 89 (78%) of these with care seeking data 25 (28%) had consulted a public health facility prior to the study visit. PTB prevalence was lower in women (OR 0.6; 95%CI 0.4–1.0). Age distributions differed by gender ($P = 0.04$). Prevalence was highest in women aged 25–34 and men of 35–44 years. Recent migration into the area (OR 2.9; 95%CI 2.0–4.1), smoking (OR 2.0; 95%CI 1.1–3.6) and a lower socioeconomic asset score (OR 1.8; 95%CI 1.0–3.6) were associated with an increased prevalence of PTB. Recent in-migrants with PTB were also more often HIV-infected (OR 11.2; 95%CI 3.4–36.3).
Conclusion: Undiagnosed PTB is common in this community, in HIV infected and uninfected. Risk groups, especially recent in-migrants, could be targeted for intensified TB case finding.

The relationship between monetary indices and assets score in a national TB prevalence survey in Bangladesh

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Setting: Bangladesh, ranked 6th among the 22 high TB burden countries, considered as a low income country as per World Bank classification in 2008. DOTS was adopted and implemented since 1993 and the national TB prevalence survey was carried out during 2007–2009.
Objective: To describe the experiences in using different methods to measure SES in the national TB prevalence survey in Bangladesh.

Design: Collection of information on household income, expenditure and observation of possession of household assets through house to house visit during the national TB prevalence survey. Data was collected from 40 randomly selected clusters from rural and urban strata.

Results: Over 21400 households were visited and information about 96000 population was collected. The disease prevalence varied with income, expenditure and asset gradient and with the residence. Peoples' response to provide information on income and expenditure varied between urban and rural areas and among themselves. In urban areas many of the assets items were shared and characteristics of the household were not straightforward to define. Exaggeration of expenditure and under stating the income was common while some assets were difficult to observe.

Conclusions: Measuring SES in prevalence surveys should consider using multiple indices. Special attention and effort is needed for collecting information on income and asset data.

COMPREHENSIVE LUNG HEALTH SERVICES IN RESOURCE-LIMITED SETTINGS

Applying the Union tuberculosis model programme in the management of non-communicable diseases

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In most of the developing world, management standards for non-communicable diseases (NCDs) in the public health services are poor. Unstructured care of diseases such as hypertension, diabetes mellitus and asthma, is likely to result in poor health outcomes. There is no reliable information on the number of patients presenting with NCDs and on their morbidity and survival outcomes. The 'DOTS' model has been used as the framework for the control of tuberculosis for over a decade, allowing monitored, structured therapy to be successfully delivered to millions of tuberculosis patients in some of the poorest countries in the world. This model has been adapted for monitoring and evaluating the scale up of antiretroviral therapy (ART) in Malawi, and has allowed strategic national planning and rational drug forecasting. This lecture shows how the DOTS model could be adapted for facility level managing and monitoring NCDs in the developing world. Particular attention is paid to the monitoring component. Numbers of new patients started on therapy in each quarter (new incident cases) and the cumulative number ever started on therapy are sensitive indicators for programme performance

and access to services. Using quarterly reporting cycles of treatment outcomes for all patients, the number of patients alive and on treatment at set points in time constitutes the prevalent number of cases, the burden of disease, and this should provide the necessary strategic information for rational drug forecasting and planning of logistics and staffing. Adaptation and application of the DOTS model would enormously strengthen the ability of resource-poor countries to monitor and assess their response to the growing epidemic of NCDs.

Standard case management in Sudan: what is next after initiation?

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4 years after implementing for common respiratory illnesses in Sudan, there have been many lessons learned for all parties concerned. The project was launched with a myriad of partners including The Union, The World Bank, The Epidemiological Laboratory (Epi-Lab), Sudan's Khartoum & Gezira States Ministry of Health and WHO-EMRO. The initiative gradually expanded and is now operational in 14 district hospitals across 2 states in Sudan; it has moved to consolidation in preparation for further expansion nationwide. Following initiation as an operational research project, the intervention reflected promising preliminary results. The project team then started networking and preparing for the next stages as early as the first quarter of year 3. Being a unique and novel approach, there were many avenues to explore for ensuring sustainability and expansion as well as for selling the idea to national, regional and international stakeholders. To maximize opportunities for success, the Epi-Lab has taken the initiative to build partnerships with various parties simultaneously: a partnership with the Federal Ministry of Health to prepare and launch a nationwide program for implementation of standardized case management for asthma (and COPD in the near future), a partnership with WHO Sudan and Sudan's National Tuberculosis Program (SNTP) to launch a combined PAL/Comprehensive Lung Health Services Strategy in Sudan, and even a partnership with Khartoum's Revolving Drug Fund (RDF) and The Asthma Drug Facility (ADF) to trial including asthma steroid medicines in the national RDF system. All these are measures to ensure the long-term sustainability of this initiative as well as commitment to alleviating the burden of these diseases on individuals and nations.

Comprehensive lung health services: the way forward

D Enarson. Scientific Activities, International Union Against Tuberculosis and Lung Disease, Paris, France

Much progress has been made in enhancing the visibility of chronic non-communicable diseases, amongst which are the lung diseases that carry a heavy toll on the health of the human population. In addition to raising visibility, progress has also been made in establishing standards of care and demonstrating feasibility of delivering such services in low-income countries. This session will build on the work of the WHO in introducing the Practical Approach to Lung Health and that of The Union in developing the Comprehensive Approach to Lung Health. The core value of the work of The Union in this area was adopted from the FIDELIS project, in the belief in the ability of local people to solve their own problems. This mandates that the vulnerable community must be at the core of any activities, that any activities should aim to strengthen, not replace, existing structures and services, that both primary care levels and first referral levels must be strengthened, that lessons learnt must be adapted, and that effective accountability and communication is vital to extend such services. Key steps in the process include the establishment of a written agreement, engagement of all stake holders, adaptation and testing of standard approaches to care, maintenance of monitoring and evaluation and routine reporting. Work is most efficiently undertaken in a series of work packages: policy, planning and assessment; adaptation; coordination; training; monitoring and evaluation. Activities are sustained through a revolving chain of evaluation, adaptation, training, application, monitoring and evaluation.

SYMPOSIA: MONDAY 7 DECEMBER 2009

REACHING THE MDGS FOR TB AND SCALING UP TB-HIV: THE ROLE OF DONOR PARTNERS

Donors and implementers discuss challenges and approaches to ensuring coordination at country level: the Philippines

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The Philippines ranks 9th on the list of 22 high-burdened countries in the world, according to the World Health Organization's (WHO's) Global TB Report 2008. TB is the sixth greatest cause of morbidity and mortality in the country. In 2004, the country achieved the WHO global targets of 70% case detection rate (CDR) and 85% treatment success rate. From 72% in 2004, CDR increased to 76% in 2008. A national strategy adopted in 2004, the Public-Private Mix DOTS (PPMD) contributed significantly to this achievement. GFATM and USAID supported PPMD initiatives have resulted to 221 PPMD units installed nationwide where private physicians refer patients for casefinding and caseholding. In 2008, 6914 smear (+) TB cases were detected from these referrals contributing 6% to national CDR. Scale-up of the strategy is on-going with support from GFATM to increase population coverage from 40% to 90%. The success of the PPMD strategy is attributed to effective coordination and communication among donors and project implementers and the strong leadership by the National TB Program. The Philippines Department of Health (DOH) outlined a national strategy for a large-scale implementation of PPMD in collaboration with implementers of GFATM and USAID supported projects. DOH also provided avenues to address coordination issues among implementers, ensured that donors are able to respond to immediate problems at country level and provided overall direction. Two well functioning mechanisms, the Country Coordinating Mechanism (CCM) and the TB Technical Working Group (TWG) have likewise help out to address challenges in coordination among donors and implementers. In addition, a national coordinating committee and (16) regional committees tasked to oversee PPMD implementation also ensured effective coordination.

Donors and implementers discuss challenges and approaches to ensuring coordination at country level: KNCV

P Gondrie. KNCV Tuberculosis Foundation, The Hague, Netherlands

The UN Millennium Development Goals Report 2009 is rather pessimistic about the International TB Community achieving the targets of Goal 6, Combat HIV/AIDS, malaria and other diseases. It concludes Tuberculosis prevalence and mortality rates are falling, but not fast enough to meet global targets. This means that we are not diagnosing/curing enough patients and/or we are diagnosing them late. In the Conceptual Framework for improved and early case detection, a number of causes for this low and delayed case detection are presented. It is stated that a solid analysis of the existing case detection situation is required to devise locally appropriate strategies and prioritize among possible options. A number of entry points are listed. Careful analysis of these entry points reveals that the vast majority of the strategies proposed require actions outside the tuberculosis control programs and in some instances even outside the health care system. This also includes strengthening of the collaboration between the TB and HIV-AIDS programs. It implies a change of mentality for all working in TB control: National TB Control Programs, Technical Agencies and Donors. KNCV Tuberculosis Foundation will promote this change in its technical advisory work. It will also employ in the future consultants that have a background in health systems in the broader sense and it will cooperate more intensely with national and international organizations with specific expertise on general health system issues. We will also stimulate the organization of round table conferences at country level to tackle the challenge of coordination on these issues.

The Millennium Development Goals Report 2009, United Nations, New York, 2009.
DEWG Focus, Quarterly Newsletter of the DOTS Expansion Working Group of the Stop TB Partnership, Issue 1, July 2009.

IMPLEMENTATION OF THE THREE Is IN THE MOST AT-RISK POPULATIONS

Implementation of the 3Is package among mobile fishermen population in the Great Lakes area of Tanzania

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MOH Tanzania and ICAP–Columbia University provide HIV care and treatment (C&T) at 90 HFs in 3 regions (Kigoma, Kagera, Pwani) and Zanzibar. National HIV prevalence 5.8%, being 0.9% and 3.4% in Kigoma and Kagera regions respectively (THMIS 2008). National TB prevalence 496/100 000, over 60 000 TB cases notified annually, 50% living with HIV. February 2008, MOH recommended using national TB Screening Questionnaire (TSQ) at HIV Clinics (CTCs) to identify TB suspects; May 2009, TB Infection Control (IC) guidelines launched. February 2008, five ICAP-supported sites from Kigoma and Kagera region, covering an area accessed by fishermen from Lakes Tanganyika and Victoria, started HIV C&T, Intensified TB Case Finding (ICF) and TB IC. TB IC guidelines and job aids were disseminated. From October 2008 to June 2009, 576 PLHIV enrolled in HIV C&T at those 5 sites. 567 (98%) screened for TB among whom 403 (63%) screened using the TSQ. A total of 47 TB suspects (8%) identified and 11 confirmed as TB cases. Since May 2009, all HFs developed TB IC plan; 19 HCWs trained on ICF and TB IC, waiting areas located in ventilated places, open windows policy established, nurses practiced rapid identification of TB suspects in waiting areas, at CTCs TB-HIV co-infected patients were separated, PTB patients were admitted in separated area at general wards. Six ICAP-trained Peer Educators conducted weekly education on cough hygiene and TB at all waiting areas. Use of TSQ showed steady high trend over time; proportion of TB cases among PLHIV below expectations (2%), however, regional variability of HIV prevalence, short period of implementation and small sample size limit the data interpretation. Having launched the 3Is package in different periods might have resulted in slow implementation of the intervention. TB IC measures commenced as recent as May 2009, hence will be evaluated by the end of the year.

Does the Three Is strategy benefit medical services in prisons?

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Prisoners are most at risk for TB and HIV, do have needs that differ from those of the general population but do not have access to conventional health systems. Developing, implementing and monitoring programmes that target prisoners to reduce the burden of TB and HIV is challenging. Examples are given of how to cope in a variety of settings through implementation of the 'Three Is' in the context of HIV and TB health services. In Tanzania prisons, TB-HIV can be addressed effectively, even for prisoners at risk of both infections. Antiretroviral therapy (ART) is the single most effective intervention to reduce the incidence and mortality of TB in prisoners living with HIV. However, even those on ART remain vulnerable

to develop TB. The '3 Is' all three together contribute to protection of HIV-infected prisoners from TB infection, reduction of active disease and early treatment of active TB disease thus improving outcomes and preventing further transmission within the prison community. Under the Tanzania Policy for collaborative TB-HIV Activities (2008) the TB and Leprosy Control Programme and the National AIDS Control Programme supported by several partners work together to decrease the burden of TB and HIV in populations affected. The Prison Medical Services in Tanzania combines Counseling & Testing, HIV Care & Treatment and TB services to work as Three in One. The presentation discusses ethical and human rights issues related to the Three Is in prison settings such as the prisoners right to refuse treatment, overcrowding, resource constraints and uncoordinated prisoners' release leading to interruption of treatment and loss to follow-up. Currently there is no reliable data on the prevalence and incidence of TB-HIV co-infection and disease in Sub Sahara prisons. It is imperative to continuously gather, record, and disseminate accurate data on TB-HIV confection so that informed planning can be established and maintained in the programme.

Addressing TB and HIV among refugee populations

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Examining the countries affected by emergencies, a large overlap is seen with the countries having high prevalence rates of human immunodeficiency virus (HIV) and tuberculosis (TB). Furthermore, these emergencies result in crises in life support and security that threaten large civilian populations with suffering and death and can force the populations into becoming either internally displaced persons (IDPs) or refugees (persons who cross international borders). At the end of 2008, there were more than 14 million IDPs and 9 million refugees according to the United Nations High Commissioner for Refugees (UNHCR). More than 85% of refugees originate from and reside in countries with high burdens of TB. Many of these people reside in commonly hard to reach camp settlements worldwide. These camps often lack routine infrastructure such as healthcare services, water and sanitation, and education. While the traditional risk factors for TB among the general public are similar for refugees, those for HIV can be variable. We will examine these risk factors in the context of displaced and refugee populations. In addition, we will identify essential criteria before the decision is made to implement a TB control program (or potentially an HIV care and treatment center) for displaced or refugee populations. Finally, we will discuss available data on prevalence rates for both TB and HIV among refugees.

IPT in HIV-infected children

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Background: Tuberculosis (TB) is the leading cause of death among HIV-infected persons in resource-limited settings. The World Health Organization recommends TB screening for all persons with HIV infection. TB diagnosis in children is difficult because microbiologic confirmation is often lacking; evaluation focuses on chronic symptoms or TB contact history. Data are needed to determine yield of TB screening in HIV-infected children and to develop an evidence-based approach to TB screening.
Methods: During March–June 2008, we enrolled HIV-infected children in 3 HIV/AIDS outpatient care facilities in Rwanda in a cross-sectional study. We conducted a standardized medical history and physical examination, tuberculin skin test (TST), chest radiography, abdominal ultrasound, immunologic testing, and, when clinically indicated, collected sputum or gastric specimens for mycobacteriologic testing. TB cases were categorized as definite if mycobacteriologically or radiologically confirmed, or as clinical based on standardized case definitions and expert review. We determined TB prevalence and calculated sensitivity and specificity of screening, limiting the latter analysis to definite cases.
Results: Overall, 325 children were enrolled. Median age was 9 years (range 0–14 years); 42 (13%) of 325 were diagnosed with TB, of whom 20 (48%) of 42 had definite TB, including two with mycobacteriologic confirmation. Having any one of the following was 70% sensitive and 67% specific: cough ≥2 weeks, failure to thrive, or TB contact history. Adding TST and replacing cough ≥2 weeks with any cough increased sensitivity to 95% (specificity 54%).
Conclusion: TB is common among children with HIV in Rwanda, underscoring the importance of routine screening. An approach to screening incorporating TST and cough of any duration had high sensitivity, and is feasible to implement in resource-constrained settings.

LABORATORY SYSTEMS TO IMPLEMENT NEW CAPACITIES

Performance of first- and second-line drug testing in the SRLN

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Annual rounds assessing proficiency of *M. tuberculosis* drug susceptibility testing (DST) have been the main accomplishment of the Supra-National TB Reference Laboratory Network (SRLN) since its creation over 15 years ago. These rounds are organised by the coordinating SRL, Ottawa (Canada) and, since the 6th Round 1999 Antwerp (Belgium). Starting from 10 strains in duplicate, to be tested by the preferred standard DST method for resistance to isoniazid, rifampicin, streptomycin and ethambutol, the panels have become increasingly complex. More strains and more drugs have to be tested, of which 10 non-duplicate, a subset without multidrug-resistance, and overall about 50% resistance to the same four first-line drugs, besides kanamycin, amikacin, capreomycin and ofloxacin. Initial fast progress thanks to better standardisation slowed down after a few rounds, due to the regular occurrence of problem strains leading to high degrees of discordance among the SRL results, even for a drug as rifampicin. Due to lack of a true consensus result, these discordant strains had to be excluded, lifting average SRL accuracy to around 99% for isoniazid and rifampicin, but fluctuating around 96% for ethambutol and streptomycin. Experience with the second-line drugs is still limited, and DST technical conduct is not yet sufficiently standardised between the SRL. Kanamycin, amikacin and ofloxacin have yielded highly satisfactory agreement (around 97%), but this has been only slightly over 90% for capreomycin.

Best practices from partnership efforts to address laboratory capacity for MDR-TB

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The Maputo Declaration calls for a well-organized integrated laboratory system that supports infectious diseases like TB, HIV, Malaria and Opportunistic Infections (OIs) commonly found in low-income countries. Decades of underfunding for national laboratory systems in resource limited countries have resulted in dilapidated facilities, insufficient numbers of trained workers, limited services, erratic supplies of commodities and functional equipment and suboptimal or non-existing quality assurance programs. At this time of increased awareness and funding opportunities, it is imperative to optimize quality of testing, efficiency and cost-effectiveness by ensuring that lab-oratory strengthening efforts are addressed in an integrated manner. Investments in laboratory infrastructure, equipment, and reagents should be planned to avoid duplication and overlapping. For example, specialized facilities that are built for molecular diagnostics could be planned and designed to accommodate instruments for molecular diagnostics of TB, HIV, and other diseases rather than building separate labs that are only dedicated to one disease. Opportunities should be sought to have partners play complementary roles. Laboratories are complex systems that include resource-related components related to personnel, equipment, supplies, infrastructure, and finance; support systems that cover documents and records, information management, purchase and inventory; and systems for evaluation and continuous improvement, such as process control, internal and external assessment, and occurrence management. From this perspective, it may be more effective for partners with expertise in one area, such as supply chain management, to focus on providing support in this area while another partner may prefer to fund only commodities. Joint coordination among partners at the outset of a laboratory-related project could enable each partner to play a preferred role where they have a relative advantage

Cost and cost-effectiveness of laboratory activities (methodologies and example studies)

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The relatively poor performance of existing tuberculosis (TB) diagnostic tests and diagnostic capacity in developing and high disease-burden countries leaves large numbers of patients undetected, prescription of inappropriate treatment, development of drug resistances. Likewise, TB have re-emerged as a major global health problem. Currently there is a push for development and introduction of new innovative TB diagnostic tools. Furthermore, with the launch of the Global Laboratory Initiative (GLI), laboratory capacity strengthening and modernization of TB laboratories in developing countries has become one of the priorities of global TB control. All of these activities must be evaluated for performance, feasibility of implementation, and sustainability in resource-limited settings. However, technological advancement does not come cheap and 'cost' is one of the more sensitive concerns in resource-poor settings. Traditionally studies evaluating diagnostics and laboratory activities have focused on their performance—there are only a limited number of studies evaluating the cost and cost-effectiveness. Because there are currently no widely accepted standards on how to evaluate cost of a TB test, these studies have high variability in their methodologies, evaluation parameters for cost

and cost-effectiveness. These variations can become obstacles in clearly understanding the actual cost-effectiveness, most importantly, real costs of implementation and sustainability of a diagnostics or a laboratory activity. Simplified and standardized approach in evaluating the cost of novel diagnostic tools and laboratory activities can provide a strong foundation for more sophisticated analyses that evaluates full economic and epidemiological impact from implementation and routine use of performance-verified new and innovative diagnostic tools. Ultimately it will facilitate evidence-based adoption and use of new diagnostics where these tools are most needed.

IMPROVING ACCESS TO BETTER TREATMENT: ROLE OF CLINICAL TRIALS

Treatment of tuberculosis in HIV-infected persons: review of current trials

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As accessed by August 13, 2009, more than 100 clinical trials containing both 'tuberculosis' (TB) and 'HIV' keywords were registered in the clinicaltrials.gov registry, a service of the US National Institutes of Health. Other international trials are not registered in this database but should also get published in the next 2–3 years. Some important topics are covered by these trials. To name only a few, a new TB vaccine is currently tested in healthy volunteers who are infected by HIV (trial NCT00395720), pharmokokinetics of several HIV and TB drugs are being determined, and isoniazid preventive therapy is tested worldwide from a strategy point of view (CPCRA 005 study = NCT00000959; TEMPRANO ANRS 12136 = NCT 00495651; UR-01-2009-IPT-KENYA study = NCT 00850915; trc20B study = NCT00351702; PACTG P1041 study = NCT00080119; HAARTIPT07 study = NCT00463086; ACTG177 study = NCT00000636; 1R01AI48526-01A1 study = NCT00057122; 299/ 2005 study = NCT00330304). Moreover, immune reconstitution syndrome is extensively studied by several groups (06-I-0086 study = NCT00286767; THIRST = NCT00851630). One burning question might also get an answer soon: should we begin anti-retrovirals rather early or late in TB-HIV infected patients, especially when they are severely immuno-suppressed? To solve this issue, at least four ongoing trials are conducted: CAMELIA ANRS 1295/CIPRA KH001 study = NCT00226434; ACTG A5221 study = NCT00108862; SAPIT = NCT00398996 and the TB-HAART study sponsored by WHO. The OXTREC 023-04 study (NCT00433719) addressed the same question in meningitis. Many of these trials take place in resource-limited settings where top-level research is feasible and should certainly be encouraged. In this way, clinical trials are undoubtly a great support to improve access to better treatment. Results of some exciting studies are awaited in year 2010.

Treatment of MDR-TB: a community perspective

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The *Global MDR-TB & XDR-TB Response Plan* set a goal of treating 1.6 million MDR-TB patients by 2015.[1] In order to reach this target from the current estimates of roughly 40 000 patients treated with quality-assured drugs since 2001, significant advances will be required. These include additional suppliers of quality-assured second-line drugs, simplification of and improvements in treatment, diagnostics, further decentralization of treatment delivery, and reduction of administrative delays to MDR-TB treatment. Community-based- or ambulatory-treatment of MDR-TB has now been implemented in places as diverse as S. America, Europe, southern Africa, and Asia. In light of the global volume of patients, lack of hospital facilities, and demonstrated success of community-based approaches in these settings, this approach should be expanded. It provides a nimble structure through which new approaches can be tested and proven approaches can be implemented. This presentation will: 1) enumerate important questions from the perspective of those providing community-based care for MDR-TB; 2) describe the contributions ambulatory treatment programs for MDR-TB can make to TB drug development; 3) and illustrate how proven strategies can be disseminated through ambulatory care. It is noteworthy that 1.6 million patients represent only a small fraction of the 9.6–13.6 million incident and *prevalent* cases of MDR-TB expected by 2015 according to current estimates.[2] Consequently, removal of obstacles to scale-up of MDR-TB treatment, through research and delivery built upon the infrastructure provided by ambulatory MDR-TB programs, is critical to global TB control.

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Clinical trials in developing countries: the patient's perspective

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Problem: Clinical trials are mostly conducted without input by patients; for them, lack of information

on objectives, rights and conditions of research are recurrent.

Development: Information and education—experience of Brazilian community capacity building initiatives. Treatment and research literacy: how engagement in CAB and ethics committees can make a difference. Bringing patients perspectives (and needs) upfront: information creating advocacy in clinical trials (Which research do we want?). The role (and experiences) of operational research linked to clinical trials: Some Brazilian experiences.

Conclusion: Educating advocates in research is the key to create room for collaboration between people affected and researchers in trials design and implementation. Great progress can be achieved in applicability of research, implementing results, accessing new drugs and diagnostics. Clinical research in phase 4 can be boosted. Patients' needs can be met through treatment and research literacy and advocacy.

TOBACCO AND TUBERCULOSIS: EVIDENCE FOR AN ASSOCIATION AND INTERVENTIONS TO CURB BOTH EPIDEMICS

Evidence for an association between active and passive exposure to tobacco and increased risk of TB

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The earliest clear evidence for an association between tobacco smoking and tuberculosis came from Doll and Peto's cohort study of doctors in the UK. They found that smoking increased the risk of tuberculosis by two to three fold.[1] Perhaps the strongest association was found from India where large numbers of patients were studied and a five fold increased risk was found. This study also showed that the commonest cause of death from smokers was tuberculosis, not a disease previously thought to be a serious risk factor for tuberculosis.[2] Smaller community studies carried out in Liverpool have shown a two to three fold increased risk. These studies also showed that smokers tended to socialise less after the diagnosis of tuberculosis had been made. The stigma of tuberculosis continues even in highly developed countries. The association between tuberculosis and passive smoking is less clear as is indeed is the association between other smoking related diseases. One study among South African children has shown that in households with a patient with tuberculosis children were more likely to have a positive skin test in the presence of adult smokers, showing an association with increased infection rather than disease. It has been calculated that as a result of smoking there are probably over a million excess cases of tuberculosis

world wide and about a quarter of a million deaths. As smoking is set to increase in the poorest countries notably India and China, this excess is likely to increase relative to other cases.

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Smoking and mortality from tuberculosis in India

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Background: India has the highest incidence of tuberculosis than any other country in the world. One of the main smoking-related causes of death in India is tuberculosis(TB), causing roughly 10% of all adult deaths.

Methods and results: Case-control studies have been conducted during 1998 to 2000 among adults in 2 areas (urban—in the city of Chennai and rural—in the district of Villupuram) in the state of Tamil Nadu, south India. The cases were those aged 25 and over at the time of death due to medical causes during 1995–98. The controls were those aged 25 or older, either spouse of the deceased or any member living in the home of the deceased. The probable underlying cause of death was assigned by reviewing Verbal autopsy reports. The study included 43 000 cases and 35 000 controls. Since less than 1% of women in Tamil Nadu smoke tobacco, the analysis was restricted to men. The risk of dying from TB among smokers was four times higher than that of non-smokers with TB in both urban (OR 4.5; 95%CI 4.0–5.0) and rural (OR 4.2; 95%CI 3.7–4.8) areas. In a nationally representative case-control study deaths that occurred in 2001–03 in 1.1 million homes were included. Analysed 74 000 cases and 78 000 controls. At ages 30–69 years the risk of death from TB in women was three-fold (95%CI 2.4–3.9) and in men two-fold (95%CI 2.1–2.6).

Prospective study: A baseline survey of 99 598 individuals aged 35 and above in the main city of Mumbai (population: 3.4 million) was conducted between 1991 and 1994. Comparing ever smokers versus never smokers, the age-adjusted relative risk of death due to tuberculosis was 2.1. A higher relative risk was seen for bidi smokers than for cigarette smokers.

Conclusion: Two case-control studies in south India, one nationally representative case-control study and one prospective study in Mumbai have found higher mortality rate for TB in men who smoked than those who did not.

Smoking and tuberculosis in China

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Despite successful implementation of DOTS, the annual tuberculosis (TB) notification rate is around 80/100 000 in Hong Kong, while the prevalence of pulmonary TB was 367/100 000 in a survey undertaken in 2000 in Mainland China. Smoking has previously been found to be an important risk factor of TB in both cross-sectional and mortality studies in different parts of China. More aggressive pulmonary involvement, with more cough, dyspnoea, upper zone involvement, cavity, miliary lung involvement and positive sputum culture, has also been found among ever-smoking TB patients in comparison with never-smokers. In a prospective community cohort of 42 655 elderly subjects in Hong Kong, the annual TB notification rates were 735, 427, and 174 per 100 000 among current smokers, ex-smokers and never-smokers respectively. A statistically significant dose-response relationship was also observed among current smokers. The excess risk applied to pulmonary but not extrapulmonary TB. Smoking cessation almost halved the risk. The trend persisted after control of relevant background characteristics. Smoking accounted for 32.8%, 8.6% and 18.7% of the TB risk among males, females and the whole cohort respectively. About 45% of the gender difference was attributable to smoking. In a time-based, multiple risk factor modelling study, complete cessation of smoking and solid-fuel use in China would reduce the projected annual TB incidence in 2033 by 14–52% even in presence of 80% DOTS coverage. Measures on tobacco control should therefore be considered alongside DOTS in the fight against TB.

Strategies for TB and tobacco prevention: integrating tobacco cessation into TB control programmes

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Smoking cessation intervention is one of the essential components in reversing the epidemic of tobacco use. Yet, smoking cessation intervention has not been consistently provided in health care facilities. National tuberculosis programme rarely addresses the issue of tobacco use in routine services. Smoking has been consistently shown to be associated with tuberculosis. Smoking cessation services in national tuberculosis programme may not affect the development of tuberculosis among registered tuberculosis patients as they have already developed tuberculosis when they are registered for treatment. However, smoking has been shown to be associated with relapse of tuberculosis. Smoking cessation may reduce the risk of relapse of tuberculosis among those who are cured

and consequently reduce the risk of transmission of tuberculosis. The comprehensive endeavor in establishing smoke-free family and smoke-free health facilities may change the behavior of smokers among the family of tuberculosis patients and those who come to health facilities for other services and subsequently reduce the risk of developing tuberculosis among those who quit smoking. The Union model of smoking cessation intervention consists of:

1 Political commitment in reversing the epidemic of tobacco use
2 Identifying smokers by asking
3 Standardized cessation intervention of brief advice
4 Uninterrupted smoking cessation services
5 Standard recording and reporting

Feasibility of brief advice of smoking cessation among tuberculosis patients has been demonstrated in a study from Sudan and further pilot tested in Benin and China. Brief advice of smoking cessation among tuberculosis patients is simple, feasible, accessible, affordable, and sustainable and could be implemented by all national tuberculosis programme.

ARE WE DOING ENOUGH TO REDUCE THE BURDEN OF CHILDHOOD TB IN HIGH-BURDEN COUNTRIES?

Update of childhood TB guidance and TB-HIV guidelines: WHO and The Union

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For national TB programmes (NTPs) to successfully manage TB in children, standardized approaches based on the best available evidence are required. These standardized approaches need to be incorporated into existing guidelines and strategies that have been developed by NTPs. There has been a long standing appreciation that the doses of drugs prescribed for children require adaptation to yield the same exposure to a drug as in adults. However, until recently, there has been a tendency among the tuberculosis community, including WHO and The Union, to recommend the same dosages for the treatment of tuberculosis in children as for adults. Several recent publications have drawn attention to the fact that children receiving anti-TB chemotherapy are often exposed to lower serum concentrations of the medicines than adults receiving the same mg/kg body weight dosages. Based on a systematic review of literature, WHO is now recommending higher dosing of first line drugs (H, R, Z and E) than in adults. New dosing has a consequence on the need to develop new fixed-dose formulations and provide guidance to the NTPs and paediatricians on how to utilize currently available products, before the new formulations are available

on the market. To this extent, WHO and GDF have jointly developed interim instructions on the use of available childhood formulations to achieve the desirable doses of medicines. In addition, new recommendations for treatment of extrapulmonary forms of TB and treatment of young infants are also based on evidence gathered through several systematic reviews of literature. Together with the DOTS Expansion Working Group's Subgroup for Childhood TB, WHO is revising its Guidance for National Tuberculosis Programs on the Management of Tuberculosis in Children to ensure evidence based medicine is applied in the management of children with TB disease or infection. Research is needed to develop and implement reliable diagnostic tests for diagnosis of TB in children.

Table Recommended doses of first-line anti-tuberculosis drugs for children

| | Recommended dose | | | |
| | Daily | | Three times weekly* | |
Drug	Dose and range (mg/kg body weight)	Maximum (mg)	Dose and range (mg/kg body weight)	Daily maximum (mg)
Isoniazid	10 (10–15)†	300		
Rifampicin	15 (10–20)	600		600
Pyrazinamide	35 (30–40)	—		—
Ethambutol	20 (15–25)	—	30 (25–35)	—
Streptomycin‡	15 (12–18)	—	15 (12–18)	—

* Review of existing data on the use of intermittent dose treatment regimens in children is ongoing.
† Same dose is recommended for preventive chemotherapy (treatment of latent tuberculosis infection).
‡ Streptomycin should be avoided when possible in children because the injections are painful and irreversible auditory nerve damage may occur. The use of streptomycin in children is mainly reserved for the first 2 months of treatment of TB meningitis.

Update of childhood TB guidance and TB-HIV guidelines: WHO and The Union

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The DOTS strategy has focused on the management of the most infectious cases of TB (smear positive pulmonary TB in adults) to control the TB epidemic by reducing transmission of infection with *M. tuberculosis*. This strategy was adopted globally and implemented in countries where TB is frequent. The DOTS Strategy which evolved into the Stop TB Strategy emphasises all types of TB, including TB in children. However, reliably diagnosing TB in children has remained a major challenge, particularly in HIV infected children. Management of TB is difficult for children that are also living with HIV/AIDS because it is difficult to acquire material for bacteriological examination (smear and culture), X-ray is difficult to interpret and no other reliable test is available. It is even more difficult in the management of HIV+ chil-

dren suspected of having TB due to the co-morbidity associated with HIV/AIDS and low immune status. The currently recommended approach to diagnose TB includes clinical evaluation and investigations that are also applicable to HIV positive children. With more expansion of HIV treatment services in many resource-constrained settings it is important to ensure proper TB diagnosis and treatment of children with HIV infection and AIDS in these services. The guidance to NTPs needs to be adapted for National AIDS Programs and HIV service providers and based on diagnostic and treatment approaches that are more evidence based. Also areas that need further research for improving TB prevention, diagnosis and treatment among children living with HIV need highlighting. The Guidelines will focus on improving clinical management of children with HIV infection who are suspected of having TB infection or disease.

Working in partnership with other sectors to provide TB control services for children

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Background: Children constitute a high-risk group in TB control due to their physiologic immaturity that predispose them to the more serious/debilitating forms of TB. To address this, the DOH created the first Task Force (TF) on Childhood TB in 1998 and became an official body that formulated TB policies amongst children.
Method: The TF discussed on the adoption of DOTS strategy under NTP, for addressing childhood TB. Eventually, membership expanded and offered an avenue where public and private sectors interface and agree to develop standards and guidelines. Expansion included other critical agencies, private representatives and child-focused NGOs. The main task was the development of technical guidelines in the context of DOTS and to pilot-test such for future expansion. They also provided the technical and managerial back-up during implementation.
Results: In 2004, NTP's childhood TB guidelines were endorsed by the DOH and advanced implementation was undertaken in at least 1 city per region. All throughout, support for drugs and diagnostics came from the Government. With the release of the technical guidelines by WHO on how countries can provide management of childhood TB, the NTP revisited its current policies and took into consideration WHO's recommendations. TF members contributed to the revision and gave various perspectives of implementation, both public and private. Much of the agreements were achieved through a consensus building. They all agreed to contextualize the revisions still within the framework of NTP.
Conclusion: Since the partners have been engaged as early as the inception phase of policy/guideline

development, their participation and contribution became substantive. Currently, the TF members, especially from the private group, are being utilized by the NTP to support the roll-out of implementation. Their expertise has been beneficial to NTP's ongoing training activities.

Integrating treatment of childhood TB with HIV

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It is a recognized fact that HIV/AIDS is devastating sub-Saharan Africa, and that HIV infection is the single greatest risk factor for developing TB disease. In an environment where children continue to be either born with HIV or infected through breastfeeding, there is critical need to increase the number of children enrolling for HIV and TB care. In such populations, children with dual infection will benefit from an integrated approach to management. Unfortunately, the global number of co-infected children receiving services is unacceptably low. In HIV-infected children with confirmed or presumptive TB disease, initiation of TB treatment is a priority. The decision on when to start ART after starting TB treatment involves a balance between the child's age, pill burden, potential drug interactions, overlapping toxicities and possible IRIS weighed against the risk of further progression of immune suppression. This presentation will share the experience of one sub-Saharan African country in overcoming the challenge.

Challenges of managing a child with MDR-TB

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Background: MDR-TB in Latvia was 15% out of all TB cases in 2006. Treatment outcomes shows success rates 69–70% in 2000–2004, 47(5%) patients had XDR-TB with cure 18 (38%).
Aim: To describe management of children with MDR-TB in Latvia.
Results: For 119 consecutive MDR-TB patients from January 2003 to December 2004 identified 297 contacts (137 adults); only 37 index cases had 60 children contacts. For 4 (6.6%) were diagnosed active TB, 25 (41.6%) was infected with TB. Index cases drug resistance patterns: 12% resistance to 2–3 drugs, 43% to 4–5 drugs; 32% to 6–7 drugs; 17% to more than 7 drugs. Prophylactic treatment for MDR-TB contacts not used. Children with risk of being infected with MDR-TB, diagnosed with active TB received individualized treatment regimen (ITR) with second line drugs based on either infectious source case or child's isolates drug sensitivity patterns. 76 children <15 years old, began ITR between February 1998 and December 2006, nobody had HIV coinfec-

tion, all but two were BCG vaccinated, malnutrition had 10 (13.2%), anaemia 8 (10.5%), congenital heart failure 1 (1.3%). 50 (82%) of source cases and 16 (88.9%) of children's isolates were resistant to 4 first line drugs. Treatment consisted of 4–7 drugs (median 5 drugs). Adverse events had 26 (34.2%) children: hepatotoxicity—4; therapy discontinued in 5 patients (after 4–6 months); temporally interrupt treatment 4 to 15 days in 10 patients. Median duration of treatment for 'cured' 12.5 months (10–20). Outcomes: Cured 18 (23.7%) patients (smear/culture negative after 1 month), completed 52 (68.4%), failed 5 (6.6%) due side effects, defaulted 1 (1.3%).
Conclusions:
1 Contact investigation, early diagnosis and treatment is crucial;
2 Treatment success in 92.1% were achieved using ITR;
3 Children tolerate treatment with second-line drugs satisfactorily.

THE COPD EPIDEMIC: THE IMPACT OF SOCIO-ECONOMIC FACTORS

The impact of poverty on the global prevalence of COPD

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COPD is currently the fifth leading cause of death worldwide and will become the third by 2020. From the GOLD initiative and the PLATINO study we have learned that there is considerable variability in COPD prevalence estimates. Economic, environmental and societal factors related to the degree of underlying poverty level may explain, to some extent, the large by-country variation in COPD prevalence. These poverty related factors may either increase the COPD prevalence (higher rates of active and passive tobacco smoke, indoor biomass smoke exposure, malnutrition rates, higher prevalence of other respiratory infections, occupational dust exposure, air pollution, etc) or apparently reduce the COPD prevalence (lower diagnostic rates as a consequence of having less or no access to healthcare and or spyrometer and countries with a comparatively younger population). These presentation will review the how these and other poverty-related factors may influence the global COPD epidemic.

The economic burden of COPD: cost of medications—the Union response

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The morbidity and mortality of COPD is rising worldwide and the rise is likely to be most dramatic in Afri-

can and other developing countries over the next two decades due to the projected increase in the prevalence of smoking. In consequence the economic burden of COPD increase worldwide including in developing countries. There is urgency for multi-dimensional actions to fight against smoking and pollution. In addition the management of COPD in developing countries must be organized through a comprehensive program for lung health promotion. A standardized management will increase patients' quality of life, decrease disease exacerbations and hospitalizations as well as health costs to affected individuals, their families, and countries. The implementation of such management could be done by adapting the program recommended by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) with further essential specific needs: Firstly, equipment of first referral level health district centres with spirometers for diagnosis and COPD severity staging. Secondly, organization of these centres to enable long term management of patients as required for asthma and thirdly, the availability of adequate and affordable treatment. Currently, the drugs chosen by the Asthma Drug Facility (ADF), which are bronchodilators and inhaled steroids, are also the essential drugs for the management of COPD. As in GOLD, these two types of drug could be used in a stepwise approach, with some adaptations for developing countries. Even with such adaptation, the main obstacle remains the high price of inhaled steroids which will be procured through ADF at a lower cost. ADF created to provide affordable essential quality drugs for asthma management could also be a mechanism for drug provision to allow the implementation of COPD management.

Adapting COPD guidelines to low-income realities

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The challenges of implementing the COPD guidelines are quite enormous in low-income countries. Medications like bronchodilators, inhaled steroids, and oxygen therapy are quite expensive. Some of those medications are also not available in most parts of the developing Countries. Patients will have to use almost three quarter of their income to offset hospital bills. The focus for COPD in developing world should therefore be to identify major risk factors in the development of this disease and set up measures to prevent it. A modified guideline focused on use of less expensive drugs will be discussed. The need to explore initiatives like the Asthma Drug Facility (ADF) of the IUATLD will also be discussed. Getting government and multi-nationals involved in confronting the problem of COPD and finding ways of making medications available and affordable will go a long way to minimize the morbidity resulting from this disease.

OPERATIONAL RESEARCH: WHAT, WHY AND HOW?

Operational research: what, why and how?

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The term 'operational research' is increasingly being discussed at institutional meetings, donor forums and scientific conferences, but there is limited published information on its role from a disease-control and programme perspective. This article suggests a definition of operational research ('the what'), clarifies its relevance to infectious disease control programmes ('the why') and describes some of the enabling factors and challenges for its integration into programme settings ('the how'). It is particularly in areas where the disease burden is high and resources and time are limited, that there is the need to invest in operational research and promote a culture of inquiry so that health care can become more efficient. For this, there is a need to develop operational research capacity, allocate specific resources and bring different actors (academic institutions, national programme managers and Non Governmental Organisations) to work together in promoting operational research.

Perceived barriers and solutions to implementing operational research

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The aim of this talk is to attract and assist potential operational researchers by highlighting areas that are perceived as barriers and difficulties, and suggesting practical solutions to these. Barriers to be discussed are lack of time and opportunity for research, ethics reviews, lack of research skills, lack of report writing skills, inadequate resources and finally problems encountered in using research results for policy and practice. Each barrier will be outlined and suggestions made for ways of overcoming it.

The Union/MSF model for sustainable operational research

D A Enarson. Scientific Activities, International Union Against Tuberculosis and Lung Disease, Paris, France

The Model incorporates Fellowships, Training and Field Research. It provides an opportunity for selected individuals who are placed within public health

programs to learn and engage in research to address questions from the routine operations of these services. The learning is facilitated through a mentoring system in which individual fellows are assigned to senior researchers, by which they propose, develop and undertake research. The research protocol is reviewed by peers and by an ethics review group. The research is then undertaken in the field by the fellow with guidance from the mentor. Within three months of completion of the research, a manuscript is prepared, presented at a scientific conference and then submitted for publication. Two scientific articles will be published each year during the fellowship in peer-reviewed scientific journals. Fellows are competitively selected according to recommendations of their senior colleagues, contingent on support from their supervisors and according to the record they present through their curriculum vitae. The fellowships up to six individuals per year through a one-year contract with renewal contingent upon the work achieved within the year. They are provided, in addition to a salary, with a portable computer. Each of the fellows will participate in a modular training program with three separate modules that will equip them with the knowledge and skills to develop and carry out the research. The three modules include a protocol development module, a data management and analysis module and a module for preparing a scientific report and publication. The program will enable the fellows to undertake research of relevance and priority to the health services in which they and their colleagues work and is aimed to provide new knowledge that will lead to action in improving those health services.

Translating operational research into policy and practice

A D Harries. International Union Against Tuberculosis and Lung Disease, Paris, France

Operational research can be defined as research into strategies, interventions, tools and knowledge which can help to improve programme performance. The intermediate steps along the way include the implementation and publication of research which can change policy and ultimately lead to a change in practice. This lecture shows several examples of how operational research has lead to changes in medical practice, changes in policy guidelines and helped to advocate for novel ways of managing disease-specific conditions. Using an example from Malawi about how research into the prevalence of pulmonary TB in a large central prison formed the basis of a TB Control Programme in all prisons in Malawi, the lecture describes the main steps that lead to this process. These steps included rapid writing of the paper after the work was completed, sharing the information with the highest prison authorities in the country, a clear action

plan and budget about including prison control into TB routine activities, regular meetings every 6 months between TB Programme staff and Prison Medical staff, and on-going surveillance, monitoring, evaluation and reporting of results to key stakeholders. Similar lessons can be learnt and applied to ensure that operational research can lead to changes in policy and practice.

PROGRESS IN IMPLEMENTATION OF THE THREE Is OF HIV-TB TO REDUCE THE BURDEN OF TB AMONG PEOPLE LIVING WITH HIV

Panel discussion on resource mobilisation for collaborative HIV-TB activities

W L Coggin, C B Holmes. Office of the US Global AIDS Coordinator, Washington, DC, USA

PEPFAR supports evidence-based interventions that take advantage of the infrastructure PEPFAR and its partners have developed in close collaboration with national governments in order to mitigate the impact of TB-HIV. From 2005 to 2008, PEPFAR increased bilateral funding for HIV/TB-HIV from $26 million to $140 million per year, supporting TB treatment for over 395 400 HIV-infected patients through September 2008. In FY2009, there was a $150 million budgetary requirement for TB-HIV. Planning for FY2010 assumes a similar requirement. Resource allocation under PEPFAR is decentralized. US government teams in the 31 countries where PEPFAR has staff receive annual budget allocations and are responsible for developing funding operational plans in consultation with host country governments. Priorities under these plans should reflect the local epidemiology of HIV and be aligned with national strategies. As the leading cause of mortality among PLWHA, TB-HIV is considered a priority intervention for programming under PEPFAR as reflected in guidance and technical considerations for TB-HIV programming. The basis for these is normative guidance developed by WHO. PEPFAR considers the Three Is as integral to 'standard of care' for HIV and supports their integration into all PEPFAR-supported care and treatment programs. Given the current economic crisis, PEPFAR is operating in a level-funding budget environment. However, PEPFAR is committed to support continued integration of the Three Is into our programs and is seeking programming efficiencies to maximize impact of available funding.

Scale-up of Three Is activities in Kenya

I Mohammed, W Herman, M Irene, V Shobha, L Bernard, S Joseph, H Kipruto, W Joyce. Ministry of Health, Nairobi, Kenya

Introduction: Tuberculosis and HIV/AIDS are major public health problems in Kenya. National HIV prevalence is 7.1% among 15–64 year old. High HIV prevalence 45% (49 000) among TB patients, high TB morbidity (30%) among HIV/AIDS patients and emergence of drug-resistant forms of TB has highlighted the urgency of controlling TB in all settings and by 2008, 83% of TB patients tested for HIV. However implementation of intensified case finding (ICF), isoniazid preventive therapy (IPT) and infection prevention therapy (IPT) and infection prevention control (IPC) (3Is) in HIV settings remained unreported. We reviewed TB and HIV programs to determine the implementation of these activities.

Methods: We interviewed workers at National TB and HIV control programs and partner organizations, reviewed available policy documents, data collection tools and analyzed data on 3Is.

Results: Cascade orientation of healthcare workers on the 3Is was ongoing in all provinces and IPC guidelines availed. TB infection prevention committees are set up in provincial and district hospitals. Tools for TB ICF in HIV settings are developed and 3% (23) of HIV treatment sites document ICF but do not report to national level. IPT is implemented in research and few health facilities where ICF is high and defaulter tracing mechanisms well establbished. Over 12 000 TB patients at these sites are on IPT and 70% (8400) complete treatment.

Conclusion: Implementation of the 3Is on a wider scale is feasible in Kenya. Improving ICF, defaulter tracing and flow of data to National level must be strengthened.

Putting it together: a comprehensive approach to TB prevention and control in HIV treatment settings

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Integration of tuberculosis and HIV care is now widely advocated for improving survival and treatment outcomes for patients with TB-HIV co-infection. Despite these guidelines, however, few treatment programs have integrated TB and HIV care. One major barrier to integration is a concern of allowing contagious TB patients to intermingle with vulnerable HIV patients. In this presentation, we will discuss how a comprehensive, integrated TB-HIV treatment program can not only improve treatment outcomes for both diseases, but also minimizing the risk of TB transmission. Key components of the integration strategy are: 1) early identification of active TB disease using active case finding and mycobacterial culture, 2) use of education and community-based treatment support to facilitate high levels of adherence to both TB and HIV therapy, 3) prevention of TB transmission by creating and implementing an infection control program, and 4) prevention of reactivation TB disease by implementing isoniazid preventive therapy.

DIABETES AND TUBERCULOSIS

Dual burden of diabetes mellitus and tuberculosis: the linkages between the two diseases

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Background: Medical literature points to a long-standing linkage between diabetes mellitus (DM) and TB. This association does not bode well for countries of high TB burden experiencing increasing prevalence of diabetes.

Objective: To summarize the strength of association between diabetes mellitus (DM) and TB disease and TB infection. To summarize the findings of screening studies on DM and TB and use of chemoprophylaxis among diabetics.

Methods: We conducted a systematic review of observational studies quantifying the association between DM and TB disease and TB infection. We performed meta-analysis of the associations and explored heterogeneity through meta-regression and subgroup analyses. We also conducted a systematic review of studies on screening for TB among diabetics and screening for DM among people with active TB.

Results: We found heterogenous associations of DM and TB in four cohort studies with relative risks ranging from 1.77 to 3.57, and in nine case-control studies with odds ratios ranging from 1.16 to 7.81. Stronger associations were found in diabetics with poor control of glucose. No association between DM and TB infection was found (OR = 1.14, 95%CI 0.96–1.34). In screening studies, prevalence of TB disease among diabetics varied widely by the method of the TB detection as well as background TB burden. TB was more common in insulin-dependent diabetics than in non-insulin dependent diabetics. Hyperglycemia was prevalent in TB patients before treatment, but often resolved with TB treatment.

Conclusion: Diabetics, especially those with poor glucose control, are at higher risk of TB disease. Screening diabetics results in identifying previously undetected TB cases; however, the number needed to

screen depends on the overall prevalence of TB. The utility of chemoprophylaxis against TB among diabetics has yet to be studied systematically.

A prospective study of association between tuberculosis and diabetes in China

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Setting: China is experiencing incredible increase in diabetes mellitus (DM) prevalence and the highest burden of tuberculosis (TB) in the world; the merging epidemics of DM and TB have raised concerns.
Objective: To investigate current prevalence of DM in TB patients in poverty zones in China, and to promote health education amongst the lay public and health professionals of the link between TB and DM.
Design: A cross-sectional study was designed for screening and intervention of DM in patients with pulmonary TB in poverty zones in China.
Results: There are 1.5 million new cases of TB and approximately 270 000 deaths in China each year, particularly in regions without a directly observed treatment. Moreover, the prevalence of DM among Chinese adults has been increasing in recent years. Overall, 5.2% or 12.7 million men and 5.8% or 13.3 million women in China aged 35 to 74 years have DM. Our preliminary data among about 1000 TB patients indicate a very high prevalence of DM in TB. We aim initially at screening 7000 TB patients for DM in the communities of 19 counties located in low and middle income areas of northeast and northwest China, respectively, and then screen for DM in a control population without TB in the same communities.
Perspectives: This prospective study of a potential association between TB and DM will be the first carried out on a large scale in China, and will be important to reflect the magnitude of the double burden of TB and DM.

Diabetes and tuberculosis on the Texas–Mexico border

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Type 2 diabetes increases the susceptibility to tuberculosis (TB). With the growing pandemic of type 2 diabetes world-wide, there is an urgent public health need to understand the biological basis of this emerging association. We created a bi-national consortium with public health workers and researchers from both sides of the Texas–Mexico border. Retrospective data from nearly 5000 patients reveled type 2 diabe-

tes was by far the most common risk factor for TB in our study site. Among TB patients we found 28% of Texan and 18% of Mexican adult TB patients self-reported diabetes, significantly exceeding the published prevalence of self-reported diabetes from both populations. Furthermore, TB patients with diabetes (when compared to TB patients with no diabetes) were more likely: i) to be older females with no other social or medical (HIV infection) risk factors to explain their increased susceptibility to TB ii) to have primary MDR-TB (Texas, ORAdj = 2.4, 95%CI, 1.1–4.2; Mexico, ORAdj = 1.8, 95%CI, 1.1–2.9), and iii) to be smear positive at diagnosis, and remain smear and culture-positive during the first phase of treatment. Since 2006 we have conducted prospective enrollment of TB patients to evaluate the impact of diabetes on TB control in our study population. In the process, we also collected biological specimens from TB patients to evaluate the association between diabetes and immunity to *Mycobacterium tuberculosis* antigens. Our prospective study confirmed and expanded our previous retrospective findings, with an overall 36% diabetes prevalence, and an attributable risk of diabetes to TB of about 25%. We have also conducted immunological studies which show altered immunity to *M. tuberculosis* in diabetes patients, particularly among those with chronic hyperglycemia. Further details on the prospective epidemiological and immunological data will be presented, and the impact of these findings for TB prevention and management among diabetes patients will be discussed.

The practicalities of running a diabetic clinic in a high HIV-TB burden area in Tanzania

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Tuberculosis (TB) remains a major public health challenge in many parts of the world and is one of the most common communicable diseases worldwide and a leading cause of death. Prevalence of diabetes is also increasing rapidly in most parts of the world and is expected to rise from 171 million in Year 2000 to 366 million by 2030. Most of the people with diabetes live in low and middle income countries, and most of the increase in diabetes over the next twenty years will be in young to middle aged adults in the rapidly expanding urban centres. The rapidly increasing burden of diabetes in such areas may have a significantly larger impact on TB control. The public health and clinical relevance of this relationship is enormous. World Health Organization's Stop TB Strategy refers to the problem of TB in 'high-risk groups' including people with diabetes, but WHO has not yet made specific recommendations for the treatment (clinical) and management (public health) of TB associated with diabetes. In Tanzania, under the umbrella of Public-Private-Partnership (PPP), there is a system for

linking available health care provider sites to national public health/disease control programmes so as to increase access to priority public health care interventions, improving the quality and sustainability of essential services, and coordinating essential service delivery within a health district. This presentation will highlight the challenges of running diabetes clinic in a high HIV-TB burden area.

Adapting the TB-DOTS model for monitoring non-communicable diseases, with particular reference to diabetes

A D Harries. International Union Against Tuberculosis and Lung Disease, Paris, France

In most low- and middle-income countries, management standards for non-communicable diseases (NCDs) including diabetes mellitus (DM) in the public health services are poor. The burden of NCDs is predicted to grow during the next 20 years, but there is no standardised and structured care and no reliable information on the number of patients presenting with NCDs and on their morbidity and survival outcomes. The 'DOTS' model has been used as the framework for the control of tuberculosis for over a decade, allowing monitored, structured therapy to be successfully delivered to millions of tuberculosis patients in some of the poorest countries in the world. This model has been adapted for monitoring and evaluating the scale up of antiretroviral therapy (ART) in Malawi, a very poor country with a huge HIV/AIDS burden, and between 2004 and 2008 over 220 000 patients have been registered for treatment along with regular information about retention on therapy and treatment outcomes. The system allows strategic national planning and rational drug forecasting. This lecture discusses how a very similar system could be adapted at facility and national level for managing NCDs and DM in resource-limited settings. The lecture focuses especially on monitoring and evaluation and makes the cases that if case numbers and treatment outcomes of DM patients were measured reliably and consistently and as part of a programmatic approach, this would enormously strengthen the ability of resource-poor countries to monitor and assess their response to the growing epidemic of diabetes mellitus.

What are the research questions around joint risks and joint management of diabetes and tuberculosis?

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Ancient experience and recent research indicate correlations between diabetes mellitus (DM) and tuberculosis (TB). It is still debated, as summarized by Broxmeyer, 2005, whether Root's 1934 description of a one-sided relationship holds true, e.g., TB as a common complication of DM, while DM is no more common among TB patients than in the general population. As another presentation at this symposium indicate (and several earlier studies), DM does appear to be more common in TB patients also. It is well-documented that DM may reactivate TB, and presentation and prognosis of TB are different in diabetics with TB than in non-diabetic controls. However, many research questions remain regarding magnitude and mechanisms of interaction(s), and how the dual diseases could be managed effectively and efficiently. Questions and controversies to be presented and discussed include: a) are there immunological mechanisms behind the interaction, and if so how should they be identified and screened for; b) are patients with dual disease at increased risk for developing multidrug-resistant TB; c) are there other risk factors than tobacco, alcohol, and avitaminoses, which can be jointly intervened against; d) should DM patients routinely be screened for TB and vice versa, and if so when, where, how (skin test or IFN-γ blood test), how often; e) should patients with dual disease be followed in DM clinics or TB clinics, or both; and finally f) are there only threats, not opportunities in managing DM and TB jointly? Fortunately, some of the answers will be given by other presenters at this symposium.

STRENGTHENING PRIMARY HEALTH CARE SYSTEMS FOR WOMEN AND CHILDREN

Providing reproductive health module within HIV care and treatment

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Setting: USAID-AMPATH Partnership cares for more than 65 000 adult HIV-infected patients whom 70% are women faced with reproductive health (RH) needs. RH and HIV clinics run vertically (independently) in the original care model. This posed two challenges: increased number of hospital appointments and an anecdotally reduced uptake of RH services by these women. To respond, the USAID-AMPATH Partnership integrated RH services into one of its urban HIV clinics.

Objectives: 1) To describe AMPATH's integration of RH services into HIV care, including: family planning (FP), screening and treating sexually transmitted infections (STIs), cervical cancer screening with visual inspection with acetic acid (VIA), antenatal care, and postnatal care; and 2) To describe the uptake of these services.

Methods: A descriptive study of the integration between October 1st 2007 and May 31st 2009. HIV-infected women receive same-day 'one-stop-shop' care of RH and HIV care. A blend of both vertical and horizontal (running both services under same setting) integration is utilized.

Results: Of 3135 female clinic patients, 1420 (45%) received RH services during this period: 1) All 1420 were counseled for modern FP methods and 536 (38%) were provided a method and screened for STIs, 2) 565 (40%) were provided antenatal services, 3) 169 (12%) were provided postnatal services, and 4) under a research protocol,150 (11%) were screened for cervical cancer with VIA, of whom 46 (31%) underwent Loop Electrosurgical Excision Procedure.

Conclusion: Integration such as described here is a successful approach towards addressing RH needs faced by HIV-infected patients.

Model programme: integration of PMTCT, pregnancy and TB-care provision issues in Kenya

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Background: Within the United States Agency for International Development (USAID)–Academic Model Providing Access To Healthcare (AMPATH) Partnership approximately 20% of HIV infected patients require TB treatment, 11% of women are pregnant at enrollment and annual pregnancy incidence is 50 per 1000 woman years. As such addressing the issues arising from the intersection of TB, HIV and pregnancy is imperative.

Objectives: To develop standard TB treatment protocols for pregnant women enrolled in a prevention of mother to child HIV transmission (pMTCT) program that utilizes Lopinavir/ritonavir-based combination antiretroviral therapy (cART) from 28 weeks gestation until weaning for prophylaxis and Nevirapine-based cART for treatment.

Methods: Protocols were developed through an iterative process which included discussions between local TB and pMTCT experts, review of the literature, and consultation with international experts.

Results: TB treatment guidelines were developed taking into account, patients' previous history of HIV treatment, immunologic/clinical status, the fetal gestational age, and the severity of TB. Four distinct initial decision branches were identified: I—No requirement for cART for treatment (WHO stage 3, CD4 >350), II—cART naïve requiring treatment (Stage 3 CD4 <350 or stage 4), III—on first-line cART (Nevirapine based regimen), or IV—on second-line cART (Lopinavir/ritonovir based regimen). The second decision branch in three of four categories was based on gestational age, and the third decision branch in two of four on TB severity. Another factor that was considered during guideline development was Kenya's current transition from an isoniazid/ethambutol-based continuation regimen to an isoniazid/rifampin-based continuation regimen.

Conclusion: Co-management of HIV, TB, and pregnancy is complex requiring clear guidelines and an integrated management team. More study of this issue is needed.

ALTERNATIVE PATHWAYS OF TB PROPAGATION: MICROBIAL FITNESS, TRANSIENT INFECTION AND REINFECTION

Classical TB propagation pathway and risk factors

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Tuberculosis (TB) is the prototypical airborne infection that is propagated by a cycle of transmission from an infectious person to one or more susceptible hosts. Crowding and poor ventilation increases the risk of infection, which is established upon inhalation of aerosol particle(s) into the alveolar region and uptake by phagocytic cells. In animal models, there appears to be an inhaled dose-response relationship, with more severe disease associated with larger inhaled doses of bacilli. However, the importance of the inhaled dose in humans is unknown. The importance of the innate response in protecting humans against TB is also unknown. After infection, over 90% of humans develop latent TB infection (LTBI) and never show signs of disease; only 5–10% of persons develop active disease. The factors associated with the establishment of latency versus primary disease are poorly understood. The risk factors associated with reactivation of TB are better understood, and are often associated with suppression of the immune system, e.g., with malnutrition. However, in most cases, the reason for reactivation is unknown. A major limitation in understanding TB transmission among humans is the continued reliance on the sputum smear

for acid-fast bacilli as the index of infectiousness. There is substantial variability of infectiousness in TB. TB likely follows the 20/80 rule, i.e., that 20% of patients transmit 80% of the disease. Identifying the most infectious cases would enable targeting of control measures, and this could have a significant impact on TB control.

The impact of drug resistance on microbial fitness and propagation

T Cohen. Division of Global Health Equity, Brigham and Women's Hospital, Boston, Massachusetts, and Department of Epidemiology, Harvard School of Public Health, Boston, Massachusetts, USA

The relative reproductive capacity of drug-resistant *M. tuberculosis* compared to drug sensitive *M. tuberculosis* can be examined on more than one scale. Within an individual human infected with *M. tuberculosis*, the comparative growth characteristics of spontaneously occurring drug-resistant mutants and their drug sensitive progenitors (relative fitness of drug-resistant *M. tuberculosis*) influence the probability of the emergence of phenotypic resistance under the selective pressure of antibiotics. Within human populations, the relative propensity of individuals with drug-resistant and drug sensitive tuberculosis to infect and cause secondary disease among their respiratory contacts (relative fitness of drug-resistant TB) impacts the likelihood of self-perpetuating cycles of transmitted drug-resistant TB. I will review the methods used to measure the relative fitness of drug-resistant *M. tuberculosis* within individuals and drug-resistant TB within communities and discuss the implications of the data arising from such studies. In particular, I will focus on recent work examining the impact of relative fitness on the risk of acquired resistance within individuals.

Epidemiological evidence suggesting transient tuberculosis infection

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It is widely assumed that once an infection with *Mycobacterium tuberculosis* is established then it will not be cleared—it will either go on to a dormant latent state or progress directly to disease. Data both from animal models and human studies provide evidence against this assumption. Most recently, comparisons between new T cell based tests (IGRA) for *M. tuberculosis* infection and the traditional Mantoux skin test (TST) have raised the possibility that transient *M. tuberculosis* infection occurs and is more common than anyone ever thought. It is actually surprising that, in cross-sectional studies, IGRAs and the TST perform so similarly to each other after a known recent contact to a TB case. The most profound difference between the two test platforms discovered so far is the huge difference in test reversion rates. Approximately 40% IGRA positive TB case contacts may have a negative test 3 months later, whereas only 10% of TST positive contacts will have a negative test after 18 months. Three key possibilities for IGRA reversion are: issues of reproducibility of the test, clearance of infection (transient infection) or transmission of the organism into a dormant state. Here we review the available epidemiological evidence for IGRA reversion, what insights there are regarding whether any or all of these three are the reason, discuss the implications, and provide a forward look.

Immunological basis for TST and IGRA reversion

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It has long been assumed that once infected with *M. tuberculosis*, humans remain infected life-long. Reversion of positive tuberculin skin test results has long been recognised but is uncommon and of uncertain significance. The advent of more sensitive and more dynamic T-cell-based tests for *M. tuberculosis* infection presents the possibility to re-evaluate the epidemiology and transmission dynamics of *M. tuberculosis* infection. *M. tuberculosis* antigen-specific T-cells are in dynamic equilibrium with tubercle bacilli in vivo and reversion of T-cell-based blood test results following exposure to *M. tuberculosis* in skin test-negative contacts has now been observed in many different settings, including precisely characterised point-source outbreaks. Disappearance of these T cells from blood implies withdrawal of ongoing antigenic stimulation in vivo and the likeliest explanation for this is spontaneous clearance of *M. tuberculosis* infection. The immunological basis for this recently recognised phenomenon and its implications for our understanding of the biology and natural history of *M. tuberculosis* infection will be presented and discussed.

THE TOBACCO INDUSTRY, HEALTH AND DEVELOPMENT AGENDA: THE REAL PICTURE

Tobacco industry tactics in the last decade

C Callard. Physicians for a Smoke-Free Canada, Ottawa, Ontario, Canada

Almost ten years have passed since the start of negotiations which lead to the development of the Framework Convention on Tobacco Control (FCTC), one of the most widely adopted modern treaties. The enormous progress made around the world in implementing

the key measures of the treaty (such as smoke-free spaces, package warnings, advertising bans) have come despite intense efforts by tobacco companies to defeat, derail and delay their implementation. As the treaty gained ground, the industry developed new strategies to diminish its effect. This presentation draws on industry documents to identify the strategies and tactics of multinational tobacco companies to resist tobacco control measures, and traces the industry's change in tactics in response to the FCTC.

Big tobacco in Asia-Pacific

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As tobacco consumption declines in the developed world, transnational tobacco companies continue to expand and look into new markets in developing countries such as in the Asia Pacific region. This paper will provide evidence of Big Tobacco's market expansion, as well as its activities to influence, oppose, and interfere in health and development agendas. Examples cover direct and indirect advertising, promotions, and sponsorships that target the youth, corporate social responsibility, and lobbying against effective tobacco control policies, such as increasing tobacco tax and pictorial health warnings.

Tobacco industry's tactics in Africa

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Setting: Africa with a population of about a billion people but weak tobacco control laws is faced with aggressive market expansion activities of tobacco companies.
Objective: To examine tactics deployed by tobacco companies to increase tobacco consumption and delay or undermine legislations.
Design: An assessment of the various tactics of tobacco companies in select African countries and the linkage between those activities, health policies, consumption pattern, tobacco related diseases and mortality.
Results: There is rising smoking rates on the continent particularly among the youth. Africa currently has the highest smoking rate increase of 4.7 per cent per year. Some of the tactics have also led to slow down implementation of public health policies.
Conclusion: There is direct linkage between tobacco companies' tactics and smoking rate increases which also contribute to high increase of cancer cases on the continent. The findings support the need for governments on the continent to begin immediate implementation of public health policies as contained in the Framework Convention on Tobacco Control

(FCTC), the EMPOWER Package and Article 5.3 Guidelines.

ADDRESSING SOCIAL DETERMINANTS AND RISK FACTORS OF TB: EXPANDING THE TUBERCULOSIS CONTROL PARADIGM

Tuberculosis: successes and failures in the control of a 'social disease'

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Implementation of the WHO DOTS strategy, based on drug treatment of active disease, has been a 15-year experiment in TB control worldwide. DOTS has cured millions of patients but, on present evidence, has had a more limited impact in reducing transmission and incidence. I will discuss the successes and failures of DOTS against the backdrop of social and economic change, with examples from each of the 6 WHO regions. And, now that the global TB epidemic has (more or less) peaked, I will consider the factors that are most likely to determine the rate of decline in TB cases and deaths over the next decade.

Fighting poverty to control TB: preliminary results of a trial in Peru

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Background: Poverty causes overcrowding, stress, and under-nutrition, which increase tuberculosis risk. Many TB-affected families experience marginalization and those at greatesr risk tend to have least access to their health rights, hampering TB control.
Objectives: To develop and evaluate socio-economic interventions for strengthening tuberculosis control and preventing TB.
Settings: Peruvian shantytowns.
Methods: Integrated activities for tuberculosis-affected families:
1 Poverty reduction focused on training-for-work, micro-enterprise, microcredit loans and gender equity.
2 Promotion of health-rights for enhancing equitable access to healthcare and uniting patients for advocacy.
Evaluation employs community-randomized phased-implementation, comparing TB-affected families receiving versus those awaiting the interventions. This approach respects ethical issues whilst rigorously assessing socio-economic, rights and health benefits.

Results: Patients and their household contacts have high rates of depression and poverty. Over the first year of this ongoing project the interventions have been refined such that most tuberculosis-affected families are participating, leading to significant improvements in poverty-reducing activities and equitable access to healthcare (Figure). Personal microcredit loans have been more effective than the village banking system. Rates of loan repayment and training completion are high. The greatest impact has been on equity in healthcare access, with marked improvements in contact screening, administration of preventive therapy and the speed with which appropriate therapy is initiated for MDR-TB.
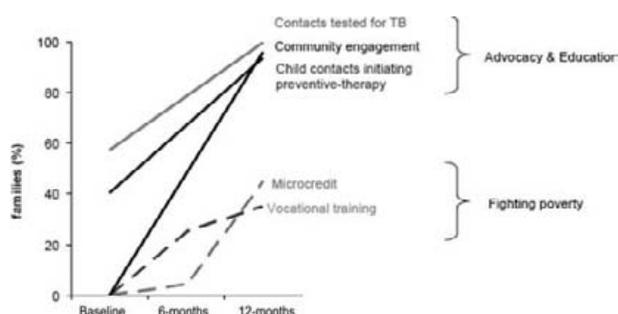
Conclusions: Socio-economic structural interventions have the capacity to reduce poverty-related TB risk factors and improve access to TB care and are being evaluated for reducing tuberculosis treatment failure, recurrence and transmission.

Review of socio-economic interventions for health improvements: reproducibility for TB control?

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Objective: To synthesise data on the health impact of socioeconomic interventions, to evaluate their applicability to TB control; to identify knowledge gaps and map out directions for future research on social determinants of TB.

Data source: Published and unpublished references from low and middle income countries identified from clinical and social electronic databases, grey literature, web sites and experts consultation.

Methods: Systematic search of studies reporting the health impact of: 1) urban-regeneration (including slum upgrading and housing); and 2) poverty reduction strategies. Interventions of interest were identified through a pre-defined conceptual framework

mapping the link between socioeconomic determinants and TB.

Outcomes of interest were: 1) TB; 2) TB surrogates (e.g. respiratory diseases); and, 3) TB mediators (e.g. malnutrition). Interventions applicability was assessed in terms of feasibility, sustainability, transferability and cost-effectiveness.

Results: So far 58 studies met the inclusion criteria. Surrogate and mediating outcomes were the focus of 3 and 55 studies, respectively. No intervention addressing TB was found. 47 of these studies reported positive outcomes; however, the health impact assessment was heterogeneous and largely qualitative. Two interventions based on slum upgrading, one on housing and two on poverty reduction strategies met the criteria for applicability to TB control.

Conclusions: References appraisal is in progress and the preliminary assessment provides evidence that socioeconomic interventions may be applicable to TB control. This review shows that to date these interventions are virtually not existent in the TB field; however, through the secondary analysis of TB trends, it could be still possible to identify those interventions that may have had a positive incidental effect on TB control.

TUBERCULOSIS AND MIGRATION: WE NEED TO DO MORE TO ENSURE TB CARE

A model for achieving continuity of TB care for undocumented migrants

E Zuroweste. Migrant Clinicians Network, Austin, Texas, USA

Background: This study was undertaken to evaluate tuberculosis treatment success among an internationally mobile population when followed by a case management program consisting of a system of record transfer, patient navigation and individual case management.

Methods: A record review was conducted of all detainees who were referred to the Migrant Clinicians Network's TBNet Program by US Immigration and Customs Enforcement (ICE)/Division of Immigration Health Services (DIHS) from May 1, 2005 through February 28, 2008. Detainees from 53 different nationalities were referred prior to deportation and followed until diagnosis was finalized and/or treatment complete. A comparative analysis of cases by TB diagnosis, demographics, and co-morbidities was performed to identify the characteristics of those individuals completing treatment, as well as those lost to follow up.

Results: Of the 929 individuals referred during the 34-month study period, 474 had been diagnosed with clinically active *Mycobacterium tuberculosis* or

started on medication for presumed active TB with cultures pending. Twenty-two cases were removed from consideration either due to reclassification by destination country (20) or death (2). Of the remaining 452 individuals, 383 were reported to have successfully completed treatment yielding an 84.7% treatment success rate for clinically active TB cases.

Conclusion: Detainees with active *M. tuberculosis* who are referred prior to deportation to TBNet's bridge case management program by US Immigration and Customs Enforcement demonstrate a high treatment success rate consistent with the World Health Organization's goal of 85% treatment completion, even though they represent a geographically mobile population crossing international boundaries.

ABSTRACT PRESENTATIONS
SATURDAY
5 DECEMBER 2009

FEATURED ABSTRACT PRESENTATIONS

CLINICAL AND EPIDEMIOLOGICAL TUBERCULOSIS RESEARCH

FA-94080-05   Association between tobacco smoking and active tuberculosis in Taiwan: prospective cohort study

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Background: Previous case-control studies and cohort studies in specific high-risk populations have found an association between tobacco and active tuberculosis, but no cohort studies have been conducted in the general population on this association to date. We conducted a prospective cohort study on smoking and active TB in the general population of Taiwan.
Methods: 17 699 survey participants (⩾12 years old) in Taiwan National Health Interview Survey were followed from 2001 to 2004. Smoking status and other covariates were measured by an in-person interview at baseline. Incident cases of active tuberculosis were identified from the National Health Insurance database. Multivariate logistic regression was used to estimate the association between smoking status and active tuberculosis, adjusting for age, sex, alcohol consumption and other covariates.
Results: Fifty seven new cases of active tuberculosis occurred during the 3.3 years of follow-up. Current smoking was associated with an increased risk of active tuberculosis (adjusted odds ratio 1.94, 95%CI 1.01–3.73). The association was stronger among those under 65 years old (adjusted odds ratio 3.04, 95%CI 1.36–6.82) than those above 65 years old (adjusted odds ratio 0.78, 95%CI 0.26–2.32). We found significant dose-response relations for cigarettes per day (Ptrend = 0.0036), years of smoking

(Ptrend = 0.023), and pack-years (Ptrend = 0.0023). Among never smokers, the adjusted odds ratio comparing persons who were exposed to second-hand smoke at home with those who were not was 1.25 (95%CI 0.57–2.73).
Conclusion: Tobacco smoking was associated with a two-fold increased risk of active tuberculosis in a representative cohort of Taiwan's population.

FA-94107-05   Latent tuberculous infection among close contacts of MDR-TB patients

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Objectives: To evaluate the multidrug-resistant tuberculosis (MDR-TB) transmission status in Taiwan by examining the close contacts of notified MDR-TB patients. With early detection and treatment for latent infections, we aim to reduce the burden of MDR-TB in Taiwan.
Design: We collected the clinical information and demographic data of all close contacts of MDR-TB patients in Chang-Hua Hospital, Department of Health. The close contacts received tuberculin skin tests (TST), QuantiFERON-TB Gold In-Tube (IT) tests, and CXR examinations.
Result: Among the 78 close contacts enrolled into our study, 38 (48.7%) were children of the index cases, and 51 (65.4%) lived with the index cases in the same house. Though 27 (34.6%) of the 78 close contacts had abnormal CXR results, none were suspected of active tuberculosis. Nine (11.5%) had a pulmonary fibrosis lesion, and 23 had other pulmonary diseases. The results of the QuantiFERON-TB Gold IT tests were 15 (19.2%) positives. Thirty-six (46.1%) of the 78 close contacts' TST results were positive. Nine of the 78 had not received Bacillus Calmette-Guérin (BCG) vaccination before and their TST results were 6 (66.7%) positive and 3 (33.3%) negative. Among the other close contacts that had had a BCG vaccination, the TST results for 33 (47.8%) were positive, and for 36 (52.2%), negative.
Conclusion: Among the 78 close contacts, 36 (46.1%) had positive TST results and 15 (19.2%) had positive QuantiFERON-TB Gold IT test results. The infected contacts will likely develop active MDR-TB. In order to control MDR-TB transmission, close follow-up of infected contacts and implementation of the DOTS-plus strategy are required.

FA-94165-05   Molecular epidemiology of multidrug-resistant *Mycobacterium tuberculosis* in Eastern Taiwan

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Settings: Taiwan initiated a multidrug-resistant tuberculosis (MDR-TB) program in May 2007. We analyzed 77 MDR-TB patients enrolled from May 2007 to February 2009 in Eastern Taiwan.

Design: Isolates of 73 (94%) patients were available for genotyping by spoligotyping and mycobacterial interspersed repetitive-unit-variable-number tandem-repeat (MIRU-VNTR) method.

Results: The spoligotyping results indicated a marked prevalence of Beijing genotypes ($n = 48$, 65%), followed by Haarlem H3 ($n = 15$, 20%), T1 ($n = 3$, 4%) and East-African Indian 2 MANILLA ($n = 1$, 1%). The remaining isolates ($n = 6$, 8%) did not match with any spoligotype in the SpoIDB4 database. By applying MIRU-VNTR typing with the full set of 24 loci, 29 unique and 44 clustered isolates (10 clusters) were observed. The results obtained by the two different methods showed that one isolate found to be clustering by MIRU-VNTR has unique spoligotype and was not considered to be clustering, and the final clustering rate by n-1 method was 45.2% (43-10/73). Specific epidemiological links could be established in 19 (44%) of the 43 patients who had clustered pattern strains. The largest cluster included 14 patients, in whom 8 lived in Hsiu-lin Township (with a population of about 1500), and had close relationships (family, relatives, neighbors or colleagues). The second largest cluster is comprised of 6 patients who also had close relationships and all of them lived in He-ping Township (about 1700 inhabitants).

Conclusion: The proportion of MDR-TB patients in Eastern Taiwan infected with clustered pattern stains was high. Early diagnosis and effective treatment of MDR-TB is essential in curtailing transmission of MDR-TB.

FA-94600-05   A randomized clinical trial of efavirenz 600 mg/day versus 800 mg/day in HIV-infected patients

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Background: The concomitant use of efavirenz and rifampicin is common in the treatment of HIV and tuberculosis. The appropriate daily dosage of efavirenz is still unclear. Previous observational studies have shown that efavirenz 600 mg tends to be sufficient to treat an HIV-infected patients receiving rifampicin.

Method: HIV-1 patients co-infected with active tuberculosis receiving rifampicin were enrolled in the 18-month randomized study of 2 INRT plus EFV 600 or 800 mg daily in Abidjan. The primary end point was the proportion of patients with confirmed viral load below 300 copies per mL at 24 weeks. Analyses were done by intention to treat.

Results: Baseline characteristics were comparable in the 130 patients (two groups of 65). At 24 weeks, the average gain CD4 count was +237 cells/mm³ in the EFV 800 mg arm vs +261 cells/mm³ in EFV 600 mg arm ($P = 0.34$).The proportion of patients with undetectable viral load at 24 weeks were similar between the two groups (59% in the EFV 800mg arm vs 70% in the EFV 600 mg arm, $P = 0.38$). The cumulative incidence of serious adverse events was higher in the EFV 800 mg arm 17% vs 7% in the 600 mg EFV arm. The most common severe adverse events were central neurophysic 6%. We observed 5 cases of immune restoration syndrome (5%) including 2 cases of cerebral toxoplasmosis documented brain scan and 3 cases of inflammatory phenomena in the form of an enlarged lymph node satellite.

Conclusion: Our study supports the use of efavirenz 600 mg/day in patients with tuberculosis who are also receinving rifampicin in Abidjan.

FA-94823-05   Interferon-gamma release assays in young children with active tuberculosis in a high-burden setting

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Background: There are limited data on the value of interferon-gamma release assays (IGRAs) for the diagnosis of paediatric tuberculosis disease (TB) in settings highly endemic for TB and HIV. We evaluated the use of IGRAs in children with TB and assessed the effect of disease severity and HIV infection.

Design: QuantiFERON-TB Gold In-Tube (QFT-IT) and T SPOT.TB (T-SPOT), Mantoux tuberculin skin test (TST), HIV testing and CD4 counts were completed in a cross-sectional study of hospitalized South African children with clinically suspected TB. TB disease classification was based on mycobacterial culture (confirmed) and chest radiography.

Results: 58 children (median age: 13 months, range 1–180) were enrolled; 24% were HIV-infected. Eight children had possible, 11 probable, 26 definite TB (12 with pulmonary, 6 combined pulmonary and extrapulmonary and 8 disseminated TB); 13 children did not have TB. T-SPOT was completed in all and QTF-IT in 39 children. The overall agreement between T-SPOT and QFT-IT was 69%. In children with confirmed TB, TST and T-SPOT were positive in 69% (18/26) and QFT-IT was positive in 79% (15/19). In confirmed TB cases agreement between TST and T-SPOT was 62%; agreement between TST and QFT-IT was 68%. In HIV-infected children with confirmed TB ($n = 7$), T-SPOT and QFT-IT were positive in 4 and TST positive in 6 children; HIV-infected children with negative or failed IGRAs had lower mean CD4% than HIV-infected children with positive IGRAs. In children with disseminated TB agreement between T-SPOT (6/8) and TST (3/8) was 25%.

Conclusions: TST and/or IGRA failed to detect 20–30% of confirmed TB cases in young children. In children with disseminated TB, IGRAs may improve diagnostic accuracy compared to TST while in HIV-infected children with confirmed TB IGRAs did not aid the diagnosis. Further studies should investigate the diagnostic accuracy of IGRAs in children with TB disease considering factors such as disease severity, immune status and age.

FA-95036-05   The use of tuberculosis death surveillance to identify program errors and improve database reporting

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Introduction: In 2006, 848 persons died from tuberculosis (TB) in Rio de Janeiro, corresponding to a 5.4/100 000 population mortality rate. No specific TB-death surveillance actions are currently in place in Brazil.
Setting: Two general public hospitals with large open emergency rooms in Rio de Janeiro city.
Objective: To evaluate the contribution of TB-death surveillance for the identification of TB control gaps.
Methods: We conducted a TB-death surveillance from September 2005 to August 2006. Records from TB-related deaths and deaths from undefined causes were investigated. Complementary data were gathered in the mortality and TB-notification databases.
Results: Seventy-three TB-related deaths were investigated. Transmission hazards were identified among firefighters, health-care workers and inpatients. Management errors included failure to isolate suspected

cases, to confirm TB, to correct drug doses in cachectic patients and to trace contacts. As a result of the surveillance, 36 cases not previously notified were included in the National TB-notification database and the outcome of 29 notified cases were corrected (Table).
Conclusion: The surveillance of deaths in patients with proven or suspected TB was able to pinpoint a vast series of deficiencies related with the care of the patients, the prevention of disease transmission and the precise collection of data by the national information systems. A set of specific local and programmatic interventions could be proposed as a consequence, although further studies are needed to assess the effectiveness of these interventions. Through TB monitoring and evaluation, correctable and specific program and hospital-based care errors can be identified and the accuracy of TB database reporting can be improved. Continuous active epidemiological surveillance measures would be a very welcome resource in the currently uphill battle we are facing against this oldest enemy.

Table   Information system findings among 73 TB-related deaths in two hospitals in Rio de Janeiro, September 2005 to August 2006

Information system	n (%)
SINAN (Disease Surveillance System)	
Deaths not found in SINAN	36/73 (49)
Notification related to previous episodes	
(>12 months before death)	8/37 (22)
Outcome 'death' not registered	12/18 (67)
No outcome on 54 notifications (more than one	
notification per patient)	21/54 (39)
Outcome registered as cure in previous event	8/54 (15)
Mortality Information System	
Not found in SIM	13/73 (18)
Possibly not TB-related	4/36 (11)
HIV-related, should not be in TB database	5/36 (14)

FA-95188-05   Utility of TST and QuantiFERON®-TB Gold assay in screening HIV-infected children for TB, Rwanda, 2008

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Background: Tuberculosis (TB) is the leading cause of death among HIV-infected persons in resource-limited settings. World Health Organization recommends TB screening for all HIV-infected persons. TB diagnosis in children is difficult because microbiologic confirmation is often lacking; evaluation focuses

on chronic symptoms or TB contact history. Limited data are available from high-burden settings on the added diagnostic value of Tuberculin Skin Test (TST) and QuantiFERON®-TB Gold In-tube assay (QFT) in HIV-infected children.

Methods: During March–June 2008, HIV-infected children in 3 HIV/AIDS outpatient care facilities in Rwanda were enrolled in a cross-sectional study. We conducted a standardized medical history, physical examination, TST, chest radiography, QFT, and, when clinically indicated, collected specimens for mycobacteriologic testing. TB cases were categorized as definite if confirmed radiologically or by culture, or as clinical based on standardized case definitions and expert review. We calculated sensitivity and specificity of screening, limiting this analysis to definite cases.

Results: Overall, 325 children were enrolled. Median age was 9 years (range 0–14 years); 42 (13%) of 325 were diagnosed with TB with 20 (48%) of 42 with definite TB, including two culture-confirmed cases. Sensitivity of TST alone (55%) or QFT alone (40%) was low. Having any one of the following was 70% sensitive and 67% specific: cough ⩾2 weeks, failure to thrive, or TB contact history. Adding TST increased sensitivity to 80% (specificity 66%). Adding QFT increased neither sensitivity nor specificity.

Conclusions: TB prevalence among HIV-infected children surveyed in Rwanda is high. Adding TST to a TB screening approach based on clinical symptoms and contact history had higher sensitivity, and is feasible to implement in resource-limited settings. QFT had no added diagnostic value. Further studies are needed to evaluate the utility of QFT among HIV-infected children.

FA-95190-05   Design issues of a registration TB drug trial: lessons learnt from the Oflotub Project

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Shortening the duration of TB treatment is recommended by WHO Stop TB as a major target for the improvement of tuberculosis control worldwide. Fluoroquinolones are proposed for shortened treatment of pan-susceptible TB. The OFLOTUB project is the pivotal Phase III trial of a registration portfolio for a gatifloxacin-containing TB regimen. It is a randomised, open-label, multicentre, controlled trial aiming at evaluating the efficacy and safety of a gatifloxacin-containing four-month regimen for the treatment of pulmonary TB compared to the standard WHO-recommended 6-month regimen.

While developing the OFLOTUB trial, key design questions arose: Is superiority, equivalence or non-inferiority design most appropriate? How to minimise non-assessable patients recruited due to patients lost to follow up or invalid outcome measurement? Is blinding appropriate and feasible when treatment duration in test arm is shorter? What should be the primary efficacy outcome? Recurrence vs relapse and re-infection, composite 'unfavourable' outcome? How best to establish diagnosis? What should be the length of patients' follow-up? What are the assumptions for sample size calculation (choice of margin of non-inferiority, selection of appropriate power for both intent-to-treat and per-protocol analyses)?

There is no single right answer for any of these design questions in the context of a TB drug trial. In this presentation, we aim at discussing what guided our choices, so they could best serve in answering the trial objectives, while at the same time satisfying regulatory authority requirements. Patients' recruitment for the trial was concluded on 31st October 2008. A total of 1836 patients have been recruited: 316 in Benin, 452 in Guinea, 200 in Kenya, 358 in Senegal and 510 in South-Africa. By April 2010, all patients will have been in the study 18 months post randomization, and a first preliminary analysis will be carried out.

FA-95563-05   Incidencia reportada y esperada de TB-MDR en Peru, 2005–2008

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Antecedentes : La prevalencia de TB-MDR en casos nuevos y antes tratados en Perú, según vigilancia de 2006, fue de 5,3% y 23,6% respectivamente; 8,3% en todos los casos. La OMS estimó que en 2006 se produjo en Perú, 3972 casos nuevos de TB-MDR, lo que dista de lo reportado por la red de laboratorios. Se busca determinar la brecha entre la incidencia de TB-MDR reportada por el laboratorio con la incidencia esperada según la prevalencia de TB-MDR en la última vigilancia nacional.

Métodos : La red de laboratorios en Perú, desde 2005 cuenta con 6 laboratorios regionales que procesan pruebas de susceptibilidad (PS). Toda cepa con patrón MDR detectada en la red es remitida al laboratorio de referencia nacional (LRN) para completar su susceptibilidad a 11 drogas. Se compara los casos nuevos de TB-MDR que se identificaron en el LRN, de acuerdo al año de emisión de resultado, con los casos por año de TB-MDR esperados de los casos de TB oficialmente reportados.

Resultados : Entre 2005 y 2008 el LRN emitió 17 022 PS a drogas de primera línea y 11 816 PS a drogas de segunda línea. Los casos nuevos detectados de TB-MDR en 2005, 2006, 2007 y 2008 fueron 1019, 601, 1097 y 1152, respectivamente. En el 2006, por problemas logísticos, se disminuyó la capacidad de pro-

ducir PS. Los casos esperados de TB-MDR, para los mismos años, fueron: 2959, 3041, 2866 y 2953. Para el 2008 se promedió los 3 años previos. La incidencia nacional de TB-MDR reportada y esperada, en tasa por 100 000 hab. fue: 3,7 y 10,6 en el 2005; 2,1 y 10,7 en el 2006; 3,9 y 10,4 en el 2007 y 4,1 y 10,6 en el 2008.

Implicancias : A pesar de una alta producción de PS en Perú, sólo se detecta en promedio al 33% de casos incidentes de TB-MDR esperados cada año. Las posibles causas de esta brecha no están esclarecidas. Se cree que no se está solicitando PS oportunamente y no se está reportando pacientes con TB resistente manejados en la práctica privada o en los principales hospitales de la seguridad social.

POSTER DISCUSSION SESSIONS

DOTS IMPLEMENTATION AND EXPANSION

PC-94286-05   Strengthening the capacity of non-laboratory technicians on the quality of smear preparation

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Background: In Cambodia, around 65% of smear-slides are made by non-laboratory technicians (NLTs) at Health Centers (HC). Despite routine external quality assessment for AFB smear microscopy introduced since 2004, the quality of smear-slides made by NLTs was still poor (Cambodia NTP, 2006). Under TBCAP Cambodia project, specific activities aimed at improving the quality of smear preparation were implemented since September 2007.

Objective: To describe the impact of strengthening the capacity of the NLTs on the quality of smear preparation at health center level.

Methods: Data were collected from routine project information, comparing the baseline with the results after the intervention. Period of study: October 2007–December 2008. The project covered five rural provinces with 4 318 498 population (33% of the country population), served by 50 peripheral TB laboratories.

Results: A total of 135 053 smear-slides made by NLT were collected for analysis. Quality of sputum specimen and smear-slides were evaluated by the National Reference Laboratory. Results were compared with baseline information (first semester 2007) for the same provinces. Quality of sputum specimen in-creased from 53.4% to 65.5% and about the quality of smear-slides: adequate thickness increased from 36.5% to 50.7%, correct size increased from 39.2% to 72.2% and appropriate evenness increased from 32.2% to 38.8% respectively.

Conclusion and recommendation: Although the project improved the quality of smear preparation at HC level, the impact is limited. Periodic feedback from the peripheral laboratories to HC staff is crucial to progressively increase the quality of smear preparation; therefore, a follow-up evaluation should be regularly done.

PC-94394-05   Investigation into low TB case detection at Korle Bu Teaching Hospital in Ghana

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Background: One of the key challenges facing the Ghana National TB Control Programme is the low case detection rate, estimated by the World Health Organization (WHO) to be around 27%, far below the 70% target. Despite great improvements in the last decade in rolling out various interventions, case detection rate has not increased as expected.

Study objectives: To quantify the proportion of patients who submit sputum samples to the laboratory for TB diagnosis and do not collect smear results. To assess whether TB cases are being lost due to non recording and tracing of referred cases and if so, determine the magnitude of this problem.

Methods: The study was conducted at Korle BU Teaching Hospital, Accra, Ghana. Using a structured questionnaire data were obtained from the lab register, sputum results forms not collected, the referral books. To investigate traceability, client addresses were classified using six categories.

Results: Of 2741 clients that had their sputum examined during the study period, 208 (8%) did not come back for their results. From these 27 (37.1%) were smear-positive of which 74% had inadequate addresses to permit follow up. In the referral component, 290 smear-positive patients were diagnosed, 236 (81%) were referred. Of 126 referrals followed up, 60% were on treatment at the referral place, 15% were known to be referred to a third place and for 25% it was not clear whether they reported at the referral place and commenced on TB treatment.

Conclusion: TB patients are being missed and not accessing treatment because of poor recording and documentation. This could contribute to the low TB case detection in Ghana. There is a need to establish standard Operating procedure (SOP) for TB case detection in Ghana.

PC-94403-05   A cost-benefit analysis of scaling up tuberculosis control in India

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Background: The aim of this study was to estimate the economic costs and benefits from scaling-up TB control under the Revised National Tuberculosis Control Programme (RNTCP) in India.
Methods: The public cost of TB control was calculated from RNTCP expenditure data and estimates of other health sector costs at the state/district level in terms of clinic visits and hospitalization. The health benefits were estimated on the basis of the Disability Adjusted Life Years (DALYs) gained from treatment, while the economic benefits were derived by applying the Value of Statistical Life Year (VSLY) concept to calculate the corresponding gain in economic wellbeing.
Results: A total of 6.3 million patients have been treated under the RNTCP over the scale-up period from 1997–2006. This has resulted in a total health benefit of 29.2 million DALYs including a total of 1.3 million deaths averted. In the absence of the programme, the health burden of TB measured in terms of DALYs would have been 30% higher over 1997–2006. The total economic gain from scaling-up TB control in India is estimated at US$ 88.1 billion over 1997–2006. In 2006 alone, the economic gain from TB control amounts to US$ 19.7 billion per annum. Total public expenditure on TB control amounts to US$ 768 million over the scale-up phase (or just 1.0% of total government spending on health over this timeframe). This total includes US$ 299 million in RNTCP expenditure and US$ 469 million in other health sector costs. The cost of TB control averaged just US$ 26 per DALY gained over 1997–2006 and generated an average return of US$ 115 per dollar spent.

2006 prices (unit)	1997	2006	Change	10-Yr total
RNTCP expenditure (US$ Million)	6	50	44	299
Other public health costs (US$ Million)	22	78	56	469
Total TB control costs (US$ Million)	27	127	100	768
Patient numbers (000s)	20	1 401	1 381	6 325
Deaths averted (000s)	4	280	276	1 250
DALYs gained (000 life-years)	91	6 540	6 449	29 155
Total economic gain (US$ Million)	273	19 683	19 411	88 140
Cost per DALY gained (US$)	300	19	−280	26
Return per dollar spent (US$)	10	155	145	115

Conclusions: The scale-up of TB control under the RNTCP has been a very cost-effective mechanism in which to improve the health status of India's population whilst the return on investment has been exceptional from the perspective of the Government and Donor agencies.

PC-94430-05   Assessment of accuracy of TB data

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Background: Accurate recording and reporting system are crucial for program evaluation and monitoring. NTP has been collecting quarterly reports from 536 public health facilities (HFs) in Afghanistan. However, there has been no MandE plan for TB control and the accuracy of data have been never assessed before.
Objectives:
• To assess the accuracy of data on quarterly report and data on TB registers
• To assess the knowledge of health worker regarding data management
Methodology and site: The study was conducted in 28 health facility in 8 provinces. For accuracy of individual component of data, data on quarterly reports from health facilities were reviewed. Also discrepancies among four TB registers (suspect, laboratory, TB registers and treatment card) were reviewed. For knowledge of health workers, structured interviews were conducted.
Results: There were recording error for notified cases, sputum conversion rate and treatment outcome in 71%, 33% and 46% of HFs, respectively. Mainly, errors were missing numbers but for treatment outcome; the numbers of cured cases were more than actual cases. Discrepancies among registers were found in 93% HFs. Most frequent discrepancies were for the results of sputum examinations between suspect register and laboratory register. Discrepancy of negative/positive were found in 11% of HFs. 15% HFs in-charge has incorrect knowledge about time period of quarterly data taking.
Conclusion: Strengthening the M&E system and provision of quality training on data management and reporting can improve the data accuracy. And self monitoring by head of clinic.

PC-94569-05   Performance assessment on the financial viability of private DOTS facilities in the Philippines

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Background: Towards the phasing out of Global Fund grant, private-run DOTS facilities need to determine their capacities in carrying out quality DOTS services to communities. Sustaining the operation of these facilities has become a major concern. This study aims to assess the current financial performance of PPMD units using financial and other relevant indicators, analyze cost drivers in their operations, and formulate recommended programs and activities to control the significant cost drivers identified.

Methods: Case study method was employed to assess two private hospital-based PPM DOTS facilities. Information was gathered through interview of personnel, direct observation, and paper-trailing of pertinent documents and records.

Results: This study shows that the major cost drivers of facility operations are attributed to manpower (46.33% of total expenses for facility A and 41.52% for facility B) material resource (20.03%, 31.63%), facility and equipment (8.72%, 7.28%), and other program activities (24.91%, 19.57%). Nonetheless, the sources of revenue are primarily from government, Global Fund grant, hospital, health insurance and user fees.

Conclusion and Recommendations: The private PPM DOTS facilities are heavily subsidized by both government and Global Fund for their operations. The study recommends concrete resource generation and cost reduction strategies for the private-run DOTS facilities' survival. Resource generation is necessary to recover operations cost and ensure continuity and quality of TB services. On the other hand, cost reduction strategies should focus on more efficient use of available resources.

PC-94580-05   Is large-scale, free DOTS sustainable through a private practitioner network?

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Background: In Myanmar, a high-burden TB country, a large percentage of health services for the poor are accessed through the private sector, including over 6000 private doctors. Diagnosis and treatment of TB through this channel was hindered by costs and a lack of skills and knowledge. PSI Myanmar used a 'Social Franchising' (SF) strategy to address these issues. The challenge was to sustain large-scale free services without the fees typical to SF.

Intervention: Selected from an existing SF network, Sun Quality Health (SQH), 100 practitioners were trained annually since 2004. Free drugs in complete-treatment packages and comprehensive case management and reporting forms are provided. SQH franchisees are required to provide free treatment and services (including a weekly consultation) using 'family DOTS'. Sputum microscopy in nearby private or public labs is paid by PSI. Quality control is provided by NTP microbiologists. PSI also pays for X-ray diagnosis in sm-ve suspects. Follow-up and monitoring of SQH franchisees is provided by PSI staff doctors.

Results: SQH now has over 540 TB DOTS practitioners in 123 townships, providing full DOTS treatment to over 10 000 patients per year (10% of national case detection). A 2007 study showed 67% of were from the lowest SES. Current treatment success rate is 85%, up from 82% in 2004. Average case load of each cohort of trained providers is stable over 4 years and the aggregate new case load per provider is 6/quarter. TB-HIV co-infection referral has recently been introduced and well accepted by the network.

Conclusions: Sustained and successful DOTS is possible through SF despite providing no direct monetary benefit to the franchisee. Prior membership in a SF which allows fees for other services, non-economic benefits such as standing in the community and indirect effects such as increased client-flow may explain the sustained effectiveness of this program and should be studied further.

PC-94601-05   Positive smear at two months is associated with poor outcome among new smear-positive pulmonary TB patients

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Setting: New smear-positive pulmonary tuberculosis registered in 7 Fidelis projects of China.

Objective: To assess the association between results of two month sputum examination and outcome of treatment.

Methods: Retrospective review of medical records using a standard data collection form Data were entered into computer using Epidata Entry.

Results: Of the 82 573 new smear-positive pulmonary tuberculosis cases registered, 59 522 (72.1%) cases completed 6 months treatment and had the results of sputum smear examination at end of 6 months. Of the 59 522 cases, 1769 (3%) were smear-positive at 2 months and 57 753 (97%) were smear-negative at 2 months. Patients who remained smear-positive at 2 months were more likely to fail treatment (16.1% vs 0.4%, $P < 0.001$) and die (2.8% vs 0.6%, $P < 0.001$), as compared with those who were smear negative.

Conclusion: In this setting, positive smear at 2 months is associated with poor outcome.

PC-94650-05   Childhood TB case management desk-guide and structured monitoring: an intervention to increase case detection and improve outcome in a district of Pakistan

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Introduction: Since 2006, the NTP Pakistan has been implementing the new childhood TB control policy in district level hospitals. The review of this early experience in selected districts has shown increase in case finding but variation in case management practices including outcomes. The intervention package of childhood TB case management desk-guide and structured monitoring could help NTP in scale-up process.

Objectives: To test the feasibility of the desk-guide by comparing case finding and treatment outcome in an intervention and control district in year 2008.

Method: The study was observational analytic study with a cohort design (prospective). The comparison was the diagnosis and outcome of children with TB in an intervention and control district after the introduction of the desk-guide and structured monitoring. The intervention has been implemented for a period of eight months and was assessed for its feasibility and usefulness by comparing the indicators with the same months previous year to the intervention.

Results: The preliminary results have shown that the number of cases being diagnosed has doubled since intervention $n = 16$ in 2007 to $n = 37$ in 2008. The outcomes has improved with less then 10% default rate and more then 70% improved practices among clinicians since intervention. The final results will be available by August 2009.

Conclusion: The Childhood TB desk-guide tested has led to higher case finding and better treatment outcomes, and will be refined and scaled up in Pakistan.

PC-94663-05   TB microscopy and quality assurance practices in selected rural health centers in Ethiopia

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Aim: To ascertain the current status of TB microscopy services in Ethiopia to provide a platform for the interventions to improve laboratory support for TB diagnosis and case management by USAID's Tuberculosis Control Assistance Program.

Methods: Structured questionnaires were used to interview laboratory staff of 25 health centers, 6 hospitals and 3 regional laboratories. Stored sputum smears ($n = 186$) and TB lab registers were also reviewed.

Results: Three sputum specimens were submitted by 92% of new TB suspects. The majority of labs (26/31) did not grade the smears and 94% (26/31) did not perform internal quality control. Although 70% (22/31) kept slides for blinded re-checking, slides were only collected and re-read from 4% (6/31) of laboratories. Of the 186 smears re-examined, 94% were prepared from good quality specimens, and 96% were well stained. However, 48% of the smears were too thick or too thin, making proper microscopic examination difficult. Of the 93 negative slides re-checked, 2 were falsely reported as negative. There were no false positive results. As there is no inventory and supply chain management system in place, a push system is used to provide sites with stains and other supplies. While sputum containers, slides and stains are present in all facilities, we observed that disinfectants were present in 96% (24/25) of health center laboratories and all hospitals.

Conclusion and way forward: The above findings are symptomatic of poor leadership and lack of essential management systems and processes. There is inadequate capacity at the regional and district levels to support and manage decentralized TB microscopy services in the health centers. Therefore the project has embarked on a program to improve management practices, and increase the quality of microscopy through training of quality officers, revision of EQA guidelines, introduction of an inventory management system, and training of community health workers to prepare sputum smears.

PC-94702-05   Progress report of MDR-TB control project in Beijing metropolis

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Objectives: To control the spread of multidrug-resistant tuberculosis in Beijing.

Methods: From 1 March 2008, a project of MDR-TB control was initiated in Beijing. All tubercle bacillus cultures isolated from suspected MDR-TB cases were tested for drug-susceptibility. Suspected cases included initial-treatment patients whose sputum were still culture-positive after 2 months of regular treatment, and re-treatment patients whose sputum were culture-positive. MDR-TB was diagnosed mainly according to drug susceptivity test (DST) results. Regimen for MDR-TB patients was 6E.Z.Lofx.Pto.Amk/ 12-18 E.Z.Lofx.Pto. Anti-tuberculosis drugs, sputum examination, X ray chest examination, DST and other necessary clinical examinations were free for patients.

Results: From 1 March 2008 to the end of January

2009, 1) 189 suspected MDR-TB cases were registered. 2) 50 MDR-TB cases were diagnosed. Of the 50 MDR-TB cases, 16 didn't receive the project treatment: 1 received treatment in tuberculosis hospital, 7 were excluded for adverse effect. 1 rejected treatment, and other 7 cases had been sputum culture-negative as the DST results reported. 3) Of the remaining 34 cases, 18 (52.9%) were directly observed treated by district/county tuberculosis dispensary health workers, 10 (29.4%) by country and town health workers, and 6 (17.6%) by family members. 4) Of 30 patients who had finished 3 months treatment, 20 (66.7%) had been sputum negative. Of 16 who had finished 6 months treatment, 9 (56.3%) had been sputum negative. 5) Of the 34 cases, 5 paused or changed one kind of drug because of adverse effect, 3 paused all the treatment because of severe adverse effect, one patient were treated irregularly because of adverse effect.

Conclusion: 1) The prognosis in the first 6 months was satisfied. 2) Adverse effects were not as severe as expected. 3) Not all the MDR-TB cases could receive project treatment for such and that reasons.

PC-94938-05 The cost of tuberculosis to patients before starting directly observed treatment in Nepal

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Setting: Thirty-seven randomly selected tuberculosis (TB) clinics in 3 districts (Bhaktapur, Kathmandu, Lalitpur) of the Kathmandu valley. The valley accounts about 7% of the national population and about 18% of national TB burden.

Objective: To describe patients' expenditure incurred before starting of TB treatment.

Methods: A cross-sectional study was conducted in 616 TB patients enrolled for directly observed treatment (DOT) between January and August 2006. Cost details (consultation, diagnosis and medication) were obtained by using a semi-structured questionnaire.

Results: Of the 616 people interviewed, 379 (61.5%) were male and 237 (38.5%) were female. The mean (SD) age of the patients was 32.67 (14.38). The average total cost was calculated at USD 65.22 and it was equivalent to 88.2% of patient's mean monthly income (USD 74.03). Of the 616 patients, 43% visited pharmacy, 27% visited physicians, and 16% visited nursing home at any point prior to DOT. Main reasons delay in reaching TB clinics were lack of money (22%), and busy with work (26%) and lack of awareness about DOT (42%). Patients visited on average 3 health providers. About 44% (269) of the patients lost on average 45 working days.

Conclusion: Collaboration with different providers including private sector could reduce costs. Public awareness programmes should highlight availability and accessibility DOT services.

TB DIAGNOSTICS

PC-94071-05 Effectiveness and impact of a quality assurance system (QAS) in a TB laboratory network

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Setting: The National Tuberculosis Reference Laboratory (NTRL), Research Institute for Tropical Medicine, Philippines.

Background: The Laboratory Network consists of 1) a Central Level Laboratory whose one major function is to provide technical assistance and to monitor and evaluate QAS activities. 2) The Regional TB Laboratories oversees the implementation and provide technical support to Quality Assurance Centers (QAC) and Peripheral Level (PL) Laboratories while the Provincial/City Laboratories act as QAC that implements the External Quality Assessment (EQA) for AFB smear microscopy activities. 3) The PL or Microscopy Centers performs sputum smear microscopy, stores smear slides for rechecking and implements quality improvement (QI) measures.

Objective: To identify factors that affect the implementation of QAS.

Method: Collection of Laboratory Checklist and Data Forms, gathering of provincial EQA data, conduct of on-site visits and Laboratory Consultative Workshop.

Result: Access to laboratory services is limited. The quality of slide assessment is not consistent. Feedback and on-site supervisory visits are inadequate due to lack of administrative support and use of informal laboratory workers. Some hospitals, private, NGOs and commercial labs are not covered. QI is not emphasized, focus is on the slide rechecking. Technical support from the national and regional level is inadequate. Monitoring and evaluation system is narrow in scope while planning for laboratory improvement and expansion is not responsive to program needs.

Conclusion: Availability of laboratory services is good, but access to services is still limited. The QAS is in place but the conduct of activities needs improvement. Management of the laboratory network should be strengthened. Broader private sector involvement should be explored.

PC-94266-05   A system for the identification of mycobacteria and MDR from isolates and sputum samples

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The rapid increase of mycobacterial infections is a matter of serious public health concern. Rapid and reliable identification of mycobacterium species and TB drug susceptibility testing is essential for the prompt initiation of appropriate therapies. Conventional microbiological methods are time-consuming, taking 4 to 8 weeks to complete due to the slow growth of mycobacteria in cultures. A newly developed TB assay system provides a complete diagnosis, encompassing isolate and sputum sample preparation, chip hybridisation, detection and interpretation. One biochip can identify mycobacterium species by 16 rRNA ribotyping and can discriminate amongst TB and 16 kinds of NTM (*M. intracellulare*, *M. avium*, *M. gordonae*, *M. kansasii*, *M. fortuitum*, *M. scrofulaceum*, *M. gilvum*, *M. terrae*, *M. chelonae*/*M. abscessus*, *M. phlei*,*M. nonchromogenicum*, *M. marinum*/*M. ulcerans*, *M. aurum*, *M. szulgai*/*M. malmoense*, *M. xenopi*, *M. smegmatis*). A second chip for detection of drug resistance can determine rifampicin and isoniazid resistance, examining the rpoB, katG and inhA genes. For both assays the whole procedure can be completed within 6 h from the time of sampling. A multi-center evaluation of the two assays in China has been completed, examining 1200 clinical samples for the detection of drug resistance and 1500 samples for identification of mycobacterium species. The concordance rate between the biochip assay and the DNA sequencing results was 100% for both the mycobacterium species identification and the detection of drug resistance chips. Compared to conventional drug susceptibility testing, the concordance rate was 94% for RFP resistance, and 84% for INH resistance, respectively. Part of the results will be reported in the IJTLD. The biochip system provides a simple, rapid, reliable and accurate clinical assay for determination of mycobacterial species and the detection of MDR-TB in a 6 h procedure, diagnosing from either culture isolates or sputum samples.

PC-94643-05   Pyrazinamide susceptibility testing of *M. tuberculosis* strains by the nitrate reduction test

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Objective: Drug susceptibility testing of pyrazinamide (PZA), an important first-line anti-tuberculosis drug, is difficult to perform. PZA needs reduced pH in the medium for optimal drug activity, but the *Mycobacterium tuberculosis* strains have limited or no growth at this low pH. Thus, routine drug susceptibility testing of *M. tuberculosis* for PZA is in many laboratories not performed. The nitrate reduction (NR) test has previously demonstrated a good test performance for rifampin and isoniazid. However, the NR test on Löwenstein-Jensen (LJ) agar has never been evaluated for susceptibility testing of PZA. The aim of this study was to evaluate the inexpensive NR test on LJ-agar for susceptibility of PZA on *M. tuberculosis* strains.
Methods: Nineteen *M. tuberculosis* strains (12 PZA resistant and 7 PZA sensitive) were evaluated for PZA susceptibility by the NR test on LJ-agar with pH 6.0. The isolates were tested with a PZA critical concentration of 100 μg/ml. Strains interpreted as resistant to 100 μg/ml PZA were retested at a higher PZA concentration (900 μg/ml). The BACTEC 460TB system and sequencing of pncA, the gene associated with PZA resistance, were used as reference tests.
Results: The NR test on LJ-agar using a critical concentration of 900 μg/ml PZA had a sensitivity of 83.3% (10 of 12 strains) and a specificity of 100% (7 of 7 strains) when the BACTEC 460TB system was used as the reference test. The sensitivity and specificity of the NR test using pncA sequencing as the reference test were 90% (9 of 10 strains) and 88.9% (8 of 9 strains), respectively. The average turnaround time for the NR test was 8.3 days.
Conclusion: To prevent the further emergence and spread of drug-resistant TB, there is an urgent need to develop and test reliable and inexpensive assays to identify drug resistance. The NR PZA susceptibility test on LJ-agar is inexpensive, rapid and reliable. An evaluation of this test on an extended battery of *M. tuberculosis* strains is underway.

PC-94648-05   Sputum induction for paediatric tuberculosis diagnosis in a resource-limited setting

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Background: The diagnosis of pediatric tuberculosis is challenging because many children are unable to expectorate sputum. Recent studies have shown higher yields for sputum induction than for gastric aspirates (GA). Sputum induction (SI) has the additional advantage of being an outpatient procedure with resultant cost benefits to caregivers and the healthcare system.
Objective: To assess the feasibility of implementing SI in Botswana, a resource limited setting.

Methods/design: The components of the project involved a) training of health care workers in pediatric SI and GA, b) installation of 3 SI facilities, c) operational assessment and d) development of information, education and communication materials to educate the public about TB in children.

Results: From September 2008, 80 health care workers participated in a series of 2 day trainings in pediatric SI. Attendees included 47 nurses, 13 doctors, 7 physiotherapists, 8 auxiliary nurse assistants, 3 nursing lecturers, 1 auxiliary school lecturer and 1 officer from the Botswana National TB Program. Five of the trainees became trainers. SI rooms in the three sites were built to infection control standards and have been fitted with SI equipment. Referral forms for SI capture each patient's clinical features and these will be used with bacteriologic results to create a viable pediatric tuberculosis diagnostic algorithm. To date, 138 children have successfully undergone sputum induction. Of the 27 specimens that have a final culture reading to date, 7 (26%) were AFB and/or culture positive. Complications with the procedure were infrequent (2.7%) and self-limited.

Conclusion: Pediatric SI is feasible in a resource limited setting such as Botswana. It is associated with few complications and has a satisfactory diagnostic yield.

PC-94893-05 Evaluation of TB-Beads, a simple method to concentrate TB from sputum prior to microscopy

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Background: The TB-Beads technology enables sensitive microscopy diagnosis by manually concentrating TB from sputum onto a glass slide without the need for a centrifuge. TB-Beads are paramagnetic beads coated with a chemical ligand that selectively binds mycobacteria and does not bind many other bacteria.

Design and methods: The TB-Beads technology was evaluated compared to centrifugation concentration on a blind panel of 130 sputum samples from the TDR, WHO sputum bank in which the microscopy results after centrifugation concentration were already known.

Results: The correlation between the two concentration methods was very high at 96.1% (124/129). Of the TB negative samples, only one sample was positive by TB-Beads giving a specificity of 96.7% (29/30). Microscopy following traditional centrifugation was 91.8% (78/85) sensitive compared to culture and 78.8% (78/99) sensitive compared to clinical diagnosis. Microscopy following the TB-Beads protocol was 89.4% (76/85) sensitive compared to culture and 77.8% (77/99) sensitive compared to clinical diagnosis. In addition, the TB-Beads method gave a higher microscopy score than samples concentrated by centrifugation indicating that the TB-Beads method results in a more concentrated sample that is easier to read by microscopy.

Conclusion: The TB-Bead protocol is a sensitive, rapid, and simple alternative to centrifugation for the concentration of TB from sputum prior to microscopy. Thus, in those laboratories without access to a centrifuge, the TB-Beads approach should improve case finding and diagnosis. Studies are underway in multiple laboratories to demonstrate that the TB-Beads concentration method results in a higher sensitivity compared to direct smear.

PC-95300-05 MTBDRplus is a useful tool to screen for multidrug-resistant tuberculosis in a national survey

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Background: The World Health Organization requests that countries conduct tuberculosis drug resistance surveys (DRS) every five years to monitor trends of drug resistance and to determine rates of multidrug-resistant tuberculosis (MDR-TB). Zambia conducted its second nation-wide DRS in 2008. The objective of this study is to determine whether the MTBDRplus assay (HAIN), a new molecular assay performed directly on sputum, is a useful tool in conducting a DRS.

Method: Approximately 900 sputum specimens were collected from consecutive smear-positive TB patients throughout Zambia and transported to the TB Reference Laboratory in Lusaka. Specimens were decontaminated and concentrated smears were prepared. MGIT and Lowenstein-Jensen cultures were inoculated. Drug susceptibility testing (DST) was performed on positive cultures. Remaining decontaminated sputum was heat-killed, sonicated and stored at −80°C. The MTBDRplus assay was performed using a 1:5 dilution of decontaminated sputum.

Results: Of the first 340 specimens tested using the MTBDRplus assay, 307 (90.3%) showed no evidence of resistance, while thirty-three (9.7%) showed mutations consistent with resistance: 10 were MDR-TB, 20 were isoniazid (INH) mono-resistant and 3 were rifampicin (RIF) mono-resistant. DST results were obtained from 271 (79.7%) of 340 specimens with a MTBDRplus result. We were unable to obtain DST results from the remaining 69 (20.3%) specimens due to contamination or lack of growth. Thirteen (39.4%) of 33 specimens that showed mutations consistent with resistance in the MTBDRplus assay failed to yield a DST result (6 MDR, 5 INH mono-resistant

and 2 RIF mono-resistant). One sample that showed RIF mono-resistance using the MTBDRplus assay, showed both isoniazid and rifampicin resistance uses the DST.

Conclusion: In our study, the MTBDRplus assay performed directly on sputum was more rapid and cost-effective than culture to screen for MDR-TB.

PC-95385-05   C-reactive protein is a useful marker for the diagnosis of pulmonary TB independently of TST

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Background: The diagnosis of pulmonary tuberculosis (PTB) based on sputum baciloscopy has a low yield. C reactive protein (CRP), an acute phase reactant, is found to be elevated in tuberculosis patients. The Tuberculin Skin Test (TST) cannot be used as a diagnostic tool for tuberculosis disease although it defines latent tuberculosis infection (LTBI).

Objectives: To study the behavior of CRP in patients with known pulmonary TB and controls, and to compare CRP values in TST reactors with and without pulmonary tuberculosis.

Methods: In a randomized case-control study, 221 patients with a recent diagnosis of pulmonary positive tuberculosis and 225 controls (same age, sex, outpatient clinic) with no respiratory symptoms were evaluated between May 2006 and April 2008. The Tuberculin Skin Test (TST) was performed using the Mantoux method (PPD RT23). The transverse diameter of induration was measured 72 hours after injection. TST readings were carried out by two trained nurses. CRP level in the serum was measured according to standard nephelometry (IMMAGE–Beckmann-Coulter, USA), with normal values below 8.00 mg/l.

Results: The mean CRP values in cases and controls were 76.16 ($\pm$57.8) and 12.73 mg/L ($\pm$25.94) respectively. Of the subjects studied 183 cases (82.8%) and 62 controls (27.5%) had a TST reaction of more

Table TST and CRP in patients with pulmonary tuberculosis and controls

	Cases ($n = 221$)	Controls ($n = 225$)
TST		
<4 mm	13	119
5–10 mm	25	44
>10 mm	183	62
TOTAL	221	225
CRP (mg/L)	Cases ($n = 221$)	Controls ($n = 225$)
All patients	76.16 ($\pm$57.83)	12.73 ($\pm$25.94)
TST > 10 mm	Cases ($n = 183$)	Controls ($n = 62$)
	70.93 ($\pm$52.13)	7.43 ($\pm$8.76)

than 10 mm. The CRP in this subgroup had mean values of 70.93 ($\pm$52.1) and 7.4 ($\pm$8.76) mg/L respectively. The CRP values = 20.70 had a sensitivity of 0.91 and a specificity of 0.90 for the diagnosis of tuberculosis (AUC 0.91; $P < 0.001$; IC 0.88–0.94) whereas CRP value = 16.25 had a sensitivity of 0.92 and a specificity of 0.90 (AUC 0.95; $P < 0.001$; IC 0.92–0.98) for patients who had TST > 10 mm.

Conclusion: These results suggest that CRP may be a valuable marker for the diagnosis of pulmonary tuberculosis, with good sensitivity and specificity. CRP value was also useful in discriminating between cases and controls with TST above 10 mm induration.

PC-95395-05   Genotyping methods in tuberculosis transmission in Cracow, Poland

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Rationale: In Poland the incidence of TB in 2008 was 22.4/100 000 and in Cracow city 18.9. High tuberculosis rates are probably due in part to recent transmission.

Aim: To analyse TB transmission in Cracow by genotyping methods and standard epidemiological investigations and to compare the efficiency of them.

Methods: 123 of culture positive cases of TB were diagnosed in Cracow city in 2007 and 2008. All strains isolated from these patients were analyzed by spoligotyping, a PCR based method supplemented by IS6110 Mtb1/Mtb2 PCR. Demographic and clinical data from all culture confirmed TB cases were compared with fingerprints.

Results: A total of 49 distinct spoligopatterns were obtained. 58 isolates were represented by a unique pattern, 65 were clustered in 17 groups. Within 12 spoligopatterns tested by Mtb1/Mtb2 PCR in 8 (T153, H350, H3 746, H147, T252, H1382 and 2 orphans) 24 (19%) isolates were obtained, clustered in groups from 2 to 8 isolates with the same molecular pattern by the latter method. They were assumed to be closely epidemiologically related. By standard epidemiologic investigation we did not find any direct epidemiologic link between patients in clusters but all patients within the same cluster (in the second interview) have lived in the same city district and have used the same public institutions.

Conclusion: Conventional TB contact tracing was limited for epidemiologic investigation in Cracow and should be supplemented by genotyping and second interview. Recent TB transmission took place in Cracow in 2007 and 2008 within 'casual contacts' living in the same city districts.

PC-95401-05 Mycobacteraemia among patients in public hospitals in Johannesburg, South Africa, 2003–2008

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Aim: Mycobacteraemia is an indicator of disseminated disease. We describe the trend of blood specimens submitted for mycobacterial culture over a 6-year period in Johannesburg with emphasis on positivity rate, predominant species and comparison with HIV and CD4 status of patients.

Methods: The laboratory data information system was used to extract culture results for blood specimens submitted to a central mycobacteriology culture laboratory from January 2003 to December 2008, as well as HIV and CD4 counts.

Results: A total of 9966 and 23 702 blood specimens were submitted in 2003 and 2008 respectively. 90% of all specimens were from inpatients of 3 large academic hospitals. The overall positivity rate in 2003 and 2008 was 21.2% and 17% respectively. HIV seropositivity was found in 71%, 92% and 97% of patients with negative-blood cultures, *M. tuberculosis* complex-positive and *M. avium* complex (MAC)-positive blood cultures respectively. The median CD4 count (cells/mm^3) was 122, 33 and 16 for patients with negative-blood cultures, *M. tuberculosis*-positive and MAC-positive bacteraemia respectively. The proportion of blood cultures positive for *M. tuberculosis* and MAC remained unchanged at 87% and 10% respectively.

Conclusions: The number of mycobacterial blood culture requests increased by 138% in 6 years, pointing to a dramatic rise in the burden on the health system due to an increase in suspected disseminated mycobacterial disease. The positivity rate dropped slightly in 2008; this may reflect that fact that antiretroviral therapy became available in the public health care system in 2004. The proportion of *M. tuberculosis* complex remained constant, reflecting the high prevalence of tuberculosis in our setting. Disseminated MAC disease remains a significant proportion of disseminated mycobacterial disease and is found in severely immunocompromised patients.

PC-95525-05 The impact of liquid culture and DST implementation in three programmatic settings

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Background: Well-defined impact measures for implementing rapid diagnostic assays are important in informing scale-up efforts. Foundation for Innovative New Diagnostics (FIND) liquid culture and drug susceptibility testing (DST) demonstration projects evaluated the introduction of routine liquid culture and DST in laboratories that were proficient with solid media.

Methods: Mycobacteria Growth Indicator Tube (MGIT) liquid culture and DST was introduced in 3 laboratories in Nepal, Philippines, and Russian Federation. Laboratory turn-around-times (TAT), time to initiation of appropriate treatment, and time to culture conversion were measured and compared before and after MGIT culture and DST were fully operational.

Results: Laboratory TATs after implementation of liquid culture and DST varied by site. Median culture TAT decreased by between 11 and 30 days and median TAT for culture plus DST decreased by between 29 and 117 days. In two sites, culture plus DST TAT was affected primarily by decreased time from culture positivity to DST inoculation. The impact of MGIT on time to treatment initiation was related to whether empiric regimens were used. In the Russian Federation, the median time to initiation of appropriate therapy was 10 with solid media and 6 days with MGIT. Conversely, MGIT implementation decreased time to treatment initiation by 111 days in the Philippines. Of patients diagnosed with solid culture and DST in the Russian Federation, the median time from diagnostic specimen collection to culture conversion was 119 days, compared to 102 days for patients diagnosed with MGIT culture and DST.

Conclusions: The impact of implementing rapid diagnostic tests in programmatic settings is not only dependent on the time to achieve test results. Evaluation of diagnosis and treatment guidelines, as well as laboratory workflow optimization and integration with the TB program are necessary to maximize the benefits of newer diagnostics.

PC-95611-05   The colorimetric indicator STC facilitates tuberculosis culture diagnosis using the MODS technique

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Background: The Microscopic-Observation Drug-Susceptibility (MODS) broth culture technique sensitively diagnoses TB in 1–3 weeks, but is time-consuming because cultures must be examined microscopically at least thrice weekly to detect TB growth with concurrent drug-susceptibility testing. We sought to increase the efficiency of MODS by adding a colorimetric growth indicator.

Methods: We evaluated the use of the redox indicator STC (2,3-diphenyl-5-(2-thienyl)tetrazolium chloride) for detecting microbial growth in MODS cultures. 969 sputum samples were divided into halves that were cultured (1) in standard MODS as described previously with repeated microscopic examination of culture wells, and (2) in parallel cultures in media containing STC that were examined by naked eye, followed by microscopic examination only if STC formed a colored precipitate. Drug susceptibility was determined concurrently from parallel cultures containing isoniazid and rifampicin.

Results: The indicator STC did not inhibit tuberculosis growth and produced coloration visible by naked eye only in wells that contained microbial growth, obviating repeated microscopy of culture-negative wells. STC-MODS decreased the time required for examination of MODS cultures by approximately 85%. A typical MODS culture plate containing 5 clinical samples normally required an average total reading time of 73 minutes, compared with 10 minutes for MODS with STC (Figure). STC-MODS allowed naked eye detection of growth after a median of 12 days (IQR 9–14) vs. 10 days (IQR 8–14) when all culture wells were examined microscopically.
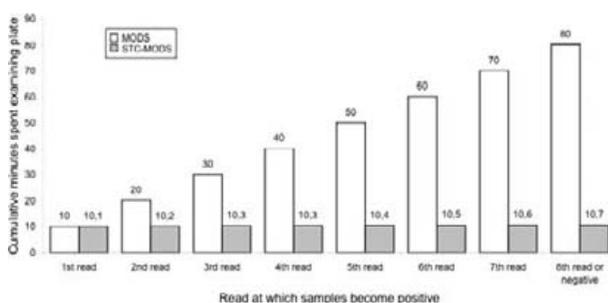

Figure   STC reduces culture reading time for the MODS TB diagnostic technique.

Conclusions: Adding the indicator STC to the MODS culture broth obviated repeated microscopic inspection of negative cultures, reducing sample reading time considerably but delaying diagnosis slightly. In high-throughput settings, the addition of STC is an inexpensive and effective way to increase the efficiency of the MODS assay.

INTERVENTIONS IN DEALING WITH CHALLENGES IN TOBACCO CONTROL

PC-94857-05   Smoking intervention program for male secondary school students in Port-Said City

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This study was concerned with smoking intervention program for male secondary school students. It was conducted for 27 students as study group controlled by another 27 students aged 15–18 years in male secondary schools in Port-Said. Quasi-experimental study was carried out. Students in the study group were divided into 5 groups each group consisted of 5–6 students. The program conducted in two days per week for three weeks in 12 hours, 8 hours theory and 4 hours practice or each group. The pre-post test was applied to evaluate the program. T-test, Chi-square test and Fisher exact test used as statistical analysis. The results found that 77.8% of the study and 66.7% of the control group started smoking at the age 11–15 years, as a result from peer group influence. Also, 3.7% of both groups drink alcohol and take illicit drugs. 74.1% of the study and 96.3% of the control group were moderately dependent on nicotine before the program. An equal percent of both groups (92.6%) had unsatisfactory knowledge about smoking before the program while all of the study had a good knowledge immediate the implementation of the program and 96.3% of them had a good knowledge after 3 months from the program. In the other hand the majority of the control group still had unsatisfactory knowledge. 7.7% of the study succeeds to quit. It could be reasonable to relate the results to the fact that the program was beneficial to the smoker students. Hence the study recommended that more educational programs should be conducted.

PC-94922-05   Corporate social responsibility in India's tobacco industry

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Aim: To study efforts of the India's tobacco industry's relationship and interaction with civil society and media as part of their 'corporate social responsibility' efforts.

Methods: This study mapped leading tobacco industry players (based on market leadership and geographic presence) and reviewed their corporate social responsibility efforts. It also tracked their influence on civil society through funding support, ownership, control and board management participation, and through direct representation in agencies that directly or indirectly influence policy environment. The study used publicly available industry documents, annual reports, tobacco industry documents and interviews with key informants.

Findings: Tobacco industry directly and indirectly influences civil society through various means. Major cigarette, bidi and chewing tobacco manufacturers support local civil society efforts financially. Many companies have set up foundations as an extension of their brand or company name. Tobacco industry also represents in several government and civil society committees and boards through which they influence policy or are able to protect themselves from legal obligations.

Conclusions: Tobacco industry exerts significant pressure through civil society either through funding or by board level participation. Both these offer tobacco companies opportunities to manipulate policy and regulatory landscape through representation in government committees or by weakening civil society efforts. This is widely prevalent both locally and at the national level. There is a need to create awareness in civil society and promote ethical best practices to deter tobacco industry participation in governance of civil society and government process.

PC-94948-05   Results of a tobacco cessation intervention conducted in Benin on tuberculosis patients

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Setting: 5 tuberculosis treatment centres in Benin.
Method: A tobacco cessation intervention of repeated brief advice was offered to all smokers identified among new cases of smear-positive tuberculosis identified in these centers from September to December 2008. The intervention was provided at the first visit for TB treatment and at the 2nd, 5th and 6th months of TB treatment.
Results: During the trial period, among 1437 smear-positive TB patients 85 smokers (6%) were identified; 84 (99%) were male, 55 (68%) had smoked for over 10 years and 37 (43%) smoked 10 or more cigarettes

per day. Point prevalence cessation rates were: 84% at 2 months, 52% at 5 months and 48% at 6 months. One third (33%) of patients were sustained ex-smokers (>3 months) at the end of TB treatment. During the cessation intervention period, TB case detection did not decrease in any of the 5 sites and improved in 2.
Conclusion: High smoking cessation rates were registered among the TB patients in this trial at each follow-up and a third of the smokers enrolled in the trial showed sustained cessation at the final follow-up. The introduction of this new intervention undertaken by the same health staff did not jeopardise the performance of the NTP.

PC-94961-05   Assessment of initial reactions of Iranian smokers to pictorial health warnings label

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Pictorial warnings on cigarette packages are considered one of the most effective ways to convey information on the health consequences of smoking. According to article 5 of the Iranian Comprehensive National Tobacco Control Law, pictorial health warnings labels should cover not less than 50% of each side of the cigarette packet. Ministry of Health in cooperation with other members has prepared 10 pictures for this order. The aim of this study is to assess the initial reaction of smokers to these pictures which are planned to be printed on cigarette packets in future. In this cross-sectional study, 480 randomly selected smokers in Tehran filled a questionnaire including questions about duration of smoking, amount of smoking, the most effective picture and the probable effect of these pictures on their tobacco use. The study sample consisted of 405 men and 75 women with the mean age of 40.1 (age range: 17–74) and 45.6 (age range: 20–67) years, respectively. The mean

of cigarette consumption was 17.15 sticks per day. The results of this study showed that 64% of smokers agreed with the presence of these pictures on tobacco products' packets. Among 10 pictures, picture which compared smokers' lung with healthy lung was considered as the most effective picture by 24.2% of smokers, followed by the picture which was about oral cancer (18.6%). Fifty two percent of smokers reported a probable decrease in their tobacco consumption by these warnings on cigarette packets and 15% reported that they will totally give up. However 33% stated no probable change. Most of smokers agreed with the presence of pictorial warnings on cigarette packets and more than half of them stated a probable decrease or giving up their smoking.

PC-95027-05   Smoking cessation interventions for tuberculosis patients in Anhui, China

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Background: Smoking has been shown to be associated with tuberculosis disease, tuberculous infection, recurrent tuberculosis and tuberculosis mortality. Smoking cessation intervention for tuberculosis patients is recommended by The Union and the World Health Organization.
Objectives: To evaluate smoking cessation interventions by brief advice for tuberculosis patients in Anhui, China.
Methods: All tuberculosis patients were asked whether they smoked, and if yes, brief advice of smoking cessation was provided by asking amount used per day, age start smoking, reason of smoking, any reason to quit, motivation and confidence to quit, and willingness to quit within the month. Brief advice was repeated at month 2 and month 5, if patients

did not want to quit at the beginning of tuberculosis treatment.
Results: Of the 587 TB registered from April to December 2008, 246 (43%) were smokers. 50.9% of smokers start smoking between 20–24 years old. 92.7% of smokers were willing to quit at the beginning of tuberculosis treatment. Of 154 patients at 2 months, 56 (36%) stopped smoking, 95 (62%) continued smoking, and 3 (2%) were not evaluated. Smoking status at month 6, month 9 and month 12 will be evaluated in due course.
Conclusion: Smoking cessation intervention by brief advice is simple, feasible and effective for tuberculosis patients.

PC-95042-05   Children, poverty and second-hand smoke: a qualitative research in Ecuador

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Purpose: Increasing knowledge and awareness of the health effects of SHS on children among several key stakeholders to promote safer environments for the children of Ecuador; identify policies, programs and best practices for reducing any SHS related health risk to children; facilitate a new level of understanding of the cumulative scientific evidence on the effects of SHS on the health of children; effectively advocate to national and local legal reform.
Methods: Qualitative study (focus groups and interviews) to determine children exposition to SHS, that has carried out with children, parents and teachers in three schools from Ambato and three from Quito.
Results: Vulnerability of children related to tobacco increases according their social, economic and cultural context. This is, they are more exposed to tobacco and second hand smoke if they are part of a poverty situation. The poorer a home, it is more likely to have children exposed to SHS emanated from their own parents, their relatives, friends and other individuals, in almost every place. The higher economic position a family has, there is a tendency to protect children from SHS. Deprivation and vulnerability are part of the life of most Ecuadorian children. Vulnerability with regard to threats in their environments, is affecting mainly poor children, not only about tobacco, but alcohol and drug abuse as well.
Conclusions: People need information to change attitudes and made changes in their lives, it is necessary to continue our social marketing campaign and working with local governments to implement article 8 of FCTC.

PC-95056-05   Is academic failure associated with tobacco use among students of low socioeconomic status in India?

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Background: Attendance at government (or public) schools in India may be used as a surrogate measure for low socioeconomic status. We examined whether academic failure was associated with tobacco use and related psychosocial risk factors among government school students in Delhi and Chennai, India.

Methods: Project MYTRI (Mobilizing Youth for Tobacco Related Initiatives, 2004–2006) was an intervention trial to reduce tobacco use among 6th to 9th graders in India. This study is a cross-sectional analysis of data collected in 2006 through self-administered surveys from students of seven government schools in control condition ($n = 3799$, age 11–16 years). Academic 'failure' was assigned for those students who remained in the same grade level for two or more consecutive years during the project period ($n = 583$). Mixed-effects regression models were used to examine differences in tobacco use and risk factor scores by academic failure.

Results: Students who had failed reported nearly 2–4 times higher rates of tobacco use compared to those who progressed, for all tobacco products, especially bidis [Table]. Analyses of risk factor scales showed that students who failed were at greater risk for tobacco use. Compared to those who did not fail, for

Table   Prevalence of tobacco use by academic status (progress vs. failure), Project MYTRI control students, Delhi and Chennai, India, 2006 ($n = 3799$)

	Academic status – Progress (n=3216)		Academic status – Failure (n=583)			
	Prevalence %[1]	95% Confidence Interval	Prevalence %	95% Confidence Interval	Prevalence Ratio[2]	p-value
Ever Use						
Any kind of tobacco*	5.66	4.30 – 7.41	13.81	10.18 – 18.46	2.44	<0.001
Chewing tobacco*	3.86	2.83 – 5.25	12.05	8.63 – 16.59	3.12	<0.001
Bidis*	2.07	1.28 – 3.31	8.67	5.38 – 13.69	4.19	<0.001
Cigarettes*	3.15	2.28 – 4.34	7.04	4.78 – 10.25	2.23	<0.001
Past year use						
Any kind of tobacco*	2.37	1.63 – 3.43	4.49	2.79 – 7.16	1.89	0.005
Chewing tobacco	1.12	0.79 – 1.59	1.50	0.80 – 2.78	1.34	0.395
Bidis*	0.61	0.25 – 1.46	2.08	0.83 – 5.11	3.41	<0.001
Cigarettes	0.78	0.48 – 1.27	1.20	0.61 – 2.34	1.54	0.183
Current year use						
Any kind of tobacco*	1.63	1.22 – 2.18	3.20	2.05 – 4.95	1.96	0.006
Chewing tobacco*	0.65	0.41 – 1.03	1.37	0.71 – 2.62	2.11	0.038
Bidis*	0.50	0.28 – 0.88	1.98	1.04 – 3.72	3.96	0.001
Cigarettes	0.88	0.58 – 1.34	1.50	0.81 – 2.76	1.70	0.089

[1]Prevalence estimates generated using mixed-effects regression models adjusted for age and gender using ever, past year and current tobacco use as dependent variable and academic status (progress vs. failure) as independent variable. [2]Ratio represents the ratio of prevalence among those who failed/ prevalence among those who progressed.
*: Statistically significant difference. Level of statistical significance set at p-value<0.05.

example, they reported greater intentions and susceptibility to use tobacco and had less knowledge about harmful effects of tobacco.

Conclusion and recommendations: Academic failure in government schools is associated with tobacco use among youth from low socioeconomic background in this study. Further research is needed to identify effective tobacco control strategies and youth development interventions in this setting.

PC-95281-05   Smoking cessation: whose responsibility is it?

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Aim: To increase awareness among administrators in national and local health agencies, and health professionals of their combined responsibility to increase quit attempts and subsequent long term quitting rates among the general population, and patients accessing healthcare services.

Method: A brief review of current international models of public health quit programmes integrated with smoking cessation support systems within a range of health services has been conducted. Examples of best practice models will be presented and discussed. Public health programmes have largely included all aspects of tobacco control except smoking cessation, addiction services have included alcohol and other drugs but not tobacco, and clinicians have believed that smoking cessation is not their responsibility. More recently health professionals have been identified as those who should be responsible for providing cessation support, and most developed countries are currently moving towards integrating the provision of routine cessation support within health services. However, smoking cessation support is still very often provided in isolation, and dependent more on the individual commitment of health professionals, rather than a mandatory requirement to provide routine support. Effectively integrating smoking cessation support into existing health systems, and incorporating into public health quit programmes will be discussed. Low- and middle-income countries are currently grappling with implementing smokefree health facilities including the identification of patients who smoke, provision of brief advice to quit smoking, and the provision of cessation support. They need models from developed countries to translate for implementation in their countries.

Result: Public health experts and clinicians need to collaborate to ensure high level government support, and the integration of public health quit programmes and clinical services.

PC-95485-05   Smoke-free Chandigarh: a case study

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Background: India was one of the first signatories of FCTC and even the Indian tobacco control legislation was passed in 2003 before the FCTC process was even completed. Despite being one of the earliest signatory and the legislation, none of the states in India had enforced the law till 2006 when innovative approach resulted in complete compliance of the law and produced Chandigarh as the first smoke-free State in India.

Methods: The smoke-free Chandigarh process was assessed through various documents, correspondence, legal papers, pictures and media reports. It was found that innovative and new methods were tested to facilitate smoke-free campaign. Besides the regular educational activities to generate public support; the power of independent judiciary, other legislations like Right to Information Act, legal innovation, help from the media, etc. were used to achieve success. Compliance to the provisions of FCTC was also assessed.

Results: Innovation in strategic war against tobacco resulted in Smoke-Free Chandigarh. The compliance with smoke-free legislation and the provisions of FCTC reached over 85 percent within six months of the initiative. Nearly 1800 warning boards as prescribed under the Indian tobacco law were installed within six months and hundred percent hotels and educational institutes became smoke free.

Conclusions: Innovative use of laws and judicious mix of various form of activism can bring out good results and compliance to FCTC. Even the civil society can bring in a change and built momentum, independent of the government. The results depend on a strategic combination of various activities.

PC-95526-05   Monitoring of second-hand smoke exposure in public places in Ahmedabad, India

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Background: India is the second most populous country in the world and has a prevalence of tobacco use that has been reported to 57% in men. Despite comprehensive Tobacco Control Act (COTPA) 2003, violations are rampant. Between June 23 and July 1, 2008 air nicotine monitoring was conducted in indoor places in Ahmedabad, India to get a baseline characterization of SHS exposure in public workplaces, which will be used to promote clean indoor air policies and programs and monitor and evaluate the progress of ongoing and future smoke-free initiatives in Gujarat, India.

Methodology: Study design—a cross sectional exposure survey. Secondhand smoke was estimated by passive sampling of vapor-phase nicotine using a filter badge treated with sodium bisulfate. The following types of buildings were visited: hospitals, colleges, government offices, restaurants, and entertainment venues by convenience sampling. Within each building, monitors were placed in areas which people frequently occupy for 7 days. Of the 132 air monitors received, results from 105 monitors from 36 buildings are reported here after excluding blanks, duplicates, erroneous, and ripped ($n = 3$) monitors.

Result: In hospitals, government buildings, restaurants, and entertainment venues, all monitors recorded detectable levels of air nicotine. In colleges, 8 out of 18 monitors (44%) recorded detectable levels of air nicotine. The highest median levels of air nicotine were found in entertainment venues (0.63 $\mu g/m^3$), followed by restaurants (0.13 $\mu g/m^3$). Measurable levels of air nicotine were found in government buildings and hospitals.

Conclusion and Recommendations: Detectable levels of nicotine were found in all venues monitored in Ahmedabad. There is no safe level of exposure to SHS. Complete prohibition of smoking in all indoor environments and effective implementation of the same is the only intervention which can effectively protect people from the harm of SHS.

PC-95635-05   Factors related to awareness of tobacco advertising and promotion among adults in six cities in China

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Objective: To examine levels of awareness of tobacco advertising and promotion among smokers and nonsmokers and to examine factors associated with smokers' reported awareness of tobacco advertising and promotion in six cities in China.

Methods: Data from Wave 1 of the International Tobacco Control (ITC) China Survey (April–August 2006) were analyzed. The ITC China Survey employed a multistage sampling design in Beijing, Shenyang, Shanghai, Changsha, Guangzhou, and Yinchuan. Face to face interviews were conducted with a total of 4763 smokers and 1259 non-smokers. Multivariate logistic regression models were used to identify factors associated with awareness of tobacco advertising and promotion.

Results: Overall 40.3% smokers and 25.3% nonsmokers reported noticing things that were designed to encourage smoking in the last 6 months. Television (34.5%) and billboards (33.4%) were the most commonly channels that smokers noticed tobacco advertisements. The most commonly reported tobacco promotional activities was free gifts or special discount offers on other products when buying ciga-

rettes (22.5%). About half of the smokers held the positive attitude to the tobacco companies and their promotional activities. Compared to smokers in Beijing, smokers in Changsha were more likely to notice advertisements ($P < 0.001$) and sponsorships ($P < 0.001$).

Conclusion: A significant proportion of smokers and non-smokers in the six cities reported noticing the tobacco advertising in the last 6 months. The disturbingly high levels of reported exposure to Television, newspapers and other channels that have been banned of tobacco advertising demonstrate an ineffective enforcement of existing laws and regulations in these cities.

TUBERCULOSIS: BASIC SCIENCES

PC-94089-05   Dissecting bactericidal and sterilising activities of rifampin, isoniazid and pyrazinamide

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Background: Rifampin (R) and pyrazinamide (Z) are the key drugs for short-course chemotherapy because they kill persisters much more rapidly than isoniazid (H). On the other hand, H is the bactericidal drug of excellence because of its potent early bactericidal activity (EBA). Although the RHZ combination is the backbone of treatment for TB in humans, RZ is much more active than RHZ in mice, suggesting antagonism between H and RZ. The aim of the present study is to dissect the relations between H, R and Z.
Materials and methods: Balb/C mice, female, 6-wk old, aerosol infected with Mtb H37Rv. R, 10 mg/kg; Z, 150 mg/kg; H, twofold doses ranging from 1.56 to 50 mg/kg. All drugs are given by gavage 5 days a week. Cultures onto selective 7H11 agar.
1st experiment: mice ($n = 450$) infected with 4.54 ± 0.10 log10 CFU of Mtb and treated 2 wk later (log10 lung CFU count, 7.89 ± 0.25) for 8 wk with H at twofold doses ranging from 1.56 to 50 mg/kg either alone or in combination with RZ.
2nd experiment: mice ($n = 215$) infected with 3.90 ± 0.11 log10 and treated 2 wk later (log10lung CFU counts, 7.08 ± 0.16) for 8 wk with R alone, Z alone, RZ, and H at 3.13, 12.5, and 50 mg/kg either alone or combined with R or Z.
Results: H exhibited dose-dependent activity over the range 1.56 to 12.5 mg/kg with lesser benefit beyond. After 2 weeks of treatment, the log10 reduction in CFU counts is about 1.0, 0.2, 0.6, 0.9, and 0.3 with 12.5 mg/kg H, R alone, RZ, RH, and ZH, respectively, while CFU counts increased by 0.6 log10 with Z alone. In the following weeks, activity decreased for H and increased for R, RH, and RZ.

Conclusion: H alone has a dose dependent activity, and in combination with RZ has a dose-dependent antagonism. H and R have additive effect but not H and Z.

PC-94298-05   7H9 broth is an ideal tuberculosis culture medium for resource-limited countries

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Growth detection of *M. tuberculosis* is still indispensable since culture is more sensitive than microscopy and conventional drug susceptibility tests require viable organisms. The introduction and routine application of commercially available broth-based culture systems might not be applicable or affordable for laboratories in resource-limited countries. Therefore, a prospective study was organized to evaluate the performance of the inexpensive, home made 7H9 broth for the recovery rate and time to detection of *M. tuberculosis* and to compare the results with those of the MGIT 960, BACTEC 460TB and Lowenstein-Jensen (LJ) media. The 7H9 tubes were weekly centrifuged, an aliquot stained, and considered positive when cord formation was detected. A total of 106 *M. tuberculosis* isolates were recovered from 136 clinical specimens from known TB patients. The rates of recovery of *M. tuberculosis* were 99% with 7H9, 85.6% with both the MGIT 960 and the BACTEC 460TB, and 70.5% with the LJ. The mean time to detection of *M. tuberculosis* in smear-positive specimens was 8.8 (4–18) days for 7H9, 9.4 (2–24) for MGIT 960, 8.3 (2–19) for BACTEC 460TB, and 21.3 (14–35) for LJ, and in smear-negative specimens, it was 14.0 (4–42) days for 7H9, 14.2 (6–18) for MGIT 960, 16.3 (2–53) for BACTEC 460TB, and 26.0 (14–35) for LJ. In conclusion, the 7H9 broth can be considered a viable alternative to shorten the TAT for growth detection while increasing the yield of *M. tuberculosis* compared to LJ, BACTEC 460, and MGIT 960 in resource-limited countries.

PC-94380-05   Second-line drug susceptibility testing of *Mycobacterium tuberculosis*

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The accurate treatment of tuberculosis (TB) cases due to multidrug-resistant and extensively drug-resistant *Mycobacterium tuberculosis* emphasizes the necessity of new tools for rapid detection of these strains in

clinical laboratories. Minimal inhibitory concentrations (MICs) by MGIT960 and the colorimetric microplate method using MTT (M-MTT) were determined for the following drugs (μg/ml): amikacin (AMK): 2.0, 4.0, 8.0; kanamycin (KM), capreomycin (CPM), ethionamide (ETH): 2.5, 5.0, 10.0; cycloserine (CS): 15.0; ofloxacin (OFX) and linezolide (LZ): 0.5, 1.0, 2.0; and moxifloxacin (MOX) 0.25, 0.5, 1.0. MICs were performed on 94 clinical isolates. The proportion method on Middlebrook 7H11 (PM) was used as gold standard. Inoculated MGITs were incubated in the instrument for no longer than 21 days. A strain was considered resistant if a positive signal flagged from the drug-containing tube within 5 days of the positive control tube. Microplates of the M-MTT were incubated for an average of 8 days. Statistical methods were applied to define drug-resistant strains on the basis of the comparison between results obtained by MGIT960 and M-MTT (average 8.0 days) to the PM. The following critical concentrations were identified (μg/ml): AMK: 4.0; CPM, ETH and KM: 5.0; CS: 30.0; LZ: 1.0; MOX: 0.5; OFX: 2.0. Accuracy of MGIT960 and M-MTT was 100% for AMK, CPM, OFX, MOX and LZ.

PC-94716-05   Rapid low-cost identification of *M. tuberculosis* complex using the resazurin microplate assay

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A rapid test for the differentiation of *Mycobacterium tuberculosis* complex from non-tuberculous mycobacteria (NTM) was developed using *P*-nitro-benzoic acid (PNB) as inhibitor and the resazurin microplate assay (REMA) for detection of growth. One hundred and fifty-one *M. tuberculosis* strains and 36 NTM were evaluated. Using a cut-off of 250 μg/ml of PNB, all *M. tuberculosis* strains were correctly differentiated from NTM; only two NTM strains failed to be correctly identified with this procedure. The time to obtain results was 8 days compared to 28 days ore more with the conventional method. The use of REMA and PNB represent a rapid and inexpensive procedure that could be used in laboratories in low-income settings for the rapid differentiation between *M. tuberculosis* complex and NTM.

PC-94740-05   Molecular versus classic methods for diagnosing fluoroquinolone resistance in *M. tuberculosis*

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Rationale: Fluoroquinolones (FQ) are now widely used to treat multidrug-resistant tuberculosis (i.e., MDR-TB, resistance to isoniazid and rifampin). As a consequence, resistance to FQ linked to mutations in DNA gyrase (GyrA2GyrB2) emerged leading to extensively drug-resistant TB (XDR-TB, i.e., MDR strains resistant to FQ and amikacin or kanamycin or capreomycin).

Objectives: To evaluate the interest of gyrA and gyrB sequencing for rapid diagnosis of FQ resistance in *M. tuberculosis* and to assess the contribution of the biochemical study of the impact of mutations in gyrA or gyrB on FQ *M. tuberculosis* DNA gyrase affinity.

Methods: Comparison of gyrA and/or gyrB sequences performed routinely on suspected MDR strains received from 2004 to 2008 at the French National Reference laboratory versus susceptibility to FQ of whole bacteria and purified DNA gyrases.

Results: Among 567 strains, including 41% MDR strains with 9 XDR, gyrA sequencing was performed for 567 and gyrB sequencing for 275. 44 strains carried mutations in gyrA and 12 in gyrB. Among strains carrying a mutation in gyrA and/or gyrB for which susceptibility to FQ was available, 20 were susceptible (mainly harbouring silent polymorphisms) and 29 were resistant to FQ. 14% of strains resistant to FQ carried a single mutation in gyrB. The biochemical analysis of the FQ-DNA gyrase interactions for the mutant gyrases revealed that some of the mutations are not involved in FQ resistance, while others are implicated in hypersusceptibility to FQ.

Conclusion: We demonstrated that 1) it is necessary to sequence both gyrA and gyrB to investigate FQ susceptibility in *M. tuberculosis*, 2) resistance to FQ cannot be systematically inferred from presence of mutations in gyrA and/or gyrB, 3) the molecular approach is complementary to but not yet able to replace the standard susceptibility testing on solid media and 4) biochemical analysis is essential to improve our molecular comprehension of the mechanisms of resistance to FQ.

PC-94746-05   Evaluation of the nitrate reductase assay for detection of MDR- and XDR-TB

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Aim: To evaluate the Nitrate Reductase Assay (NRA) for detection of multidrug-resistant (MDR) and extensively drug-resistant (XDR) *Mycobacterium tuberculosis* strains.

Background: The NRA is a rapid and low-cost drug susceptibility test for *M. tuberculosis* based on its ability to reduced nitrate to nitrite. The NRA uses the detection of nitrite as growth indicator that can be visually detected by a colour change after adding chemical reagents usually available in any TB laboratory.

Methods: In this study, NRA was compared to BACTEC 460 for the detection of resistance against isoniazid (INH), rifampicin (RIF), ofloxacin (OFX) and kanamycin (KAN). Selected *M. tuberculosis* clinical isolates (190) from the Honduran National Reference Laboratory and the Swedish Institute for infectious Disease Control were used in this evaluation. Thirty-nine were MDR-TB strains and twenty-one were XDR-TB isolates.

Results: The majority of the NRA results (79%) were available at day 10 after inoculation. An excellent agreement was seen for the first-line drugs (see attached table). In contrast, we observed a lower sensitivity to detect OFX and KAN resistance. The specificity was high, between 96% and 100% for these drugs. Of the 39 MDR strains, 32 (82%) were correctly identified by NRA. For the XDR-TB isolates, NRA detected 10 out of 21 (48%) mainly due to false KAN-susceptible strains.

Conclusions: NRA is a reliable option for detection of MDR-TB, especially suited for low and middle-income countries. Our study shows that it is a promising diagnostic tool for detection of resistance also to second-line drugs. Further studies are needed to improve NRA sensitivity, especially for kanamycin.

Table Performance of the NRA compared with BACTEC 460 for detection of resistance to first and second line TB drugs

	INH	RIF	OFX	KAN
Concentration (μg/ml)	0.2	40	2	30
n	190	190	149	86
Sensitivity (%)	98	95	86	56
Specificity (%)	100	100	98	100

PC-95159-05   Preliminary results of the Namibian National TB drug resistance survey

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Background: Tuberculosis (TB) is major public health problem for Namibia, compounded by HIV/AIDS. The country faces challenges of drug-resistant TB, including extensively drug-resistant TB (XDR-TB). Namibia embarked on its first national TB drug resistance (TB-DR) survey from May 2008. Patient enrollment ended in December 2008 and data collection ended in March 2009. Data analysis will be concluded by end of April 2009. We present here a summary of the preliminary findings.

Objectives: To establish the prevalence of TB-DR in sputum smear-positive (SSP) pulmonary TB (PTB) patients. It also aims to investigate the association between HIV and TB-DR.

Design and analysis: This is a prospective study. All hospitals in Namibia were included. All TB suspects had a survey form completed and sputum samples collected from 1 May 2008 to 31st December 2008. Specimens found to be SSP were included in the survey and had TB culture and drug sensitivity testing (C/DST) and an HIV test performed on the sputum. Smear negative patients were not included. Double data entry was performed in Epidata version 3.1 and analysed in Epidata Analysis V.2.0.3.129.

Results: 1702 patients were enrolled onto the study. Of these 786 (46%) were HIV positive. 1204 (71%) had never been treated for TB, 415 (24%) were previously treated and 83 (5%) had no recorded prior treatment status. *Mycobacterium tuberculosis* (M.tb) was isolated in 1024 (85%) new cases and 291 (70%) previously treated cases. 39 (3.8%) new cases and 48 (17%) previously treated cases had MDR-TB. No cases of XDR were found. There was no significant association between MDR-TB and HIV (Odds Ratio = 0.49, 95%CI: 0.24–0.99).

Conclusions and recommendations: TB-DR among new SSP PTB patients is still low in Namibia, but resistance among those previously treated is high. This justifies the current practice of performing TB C/DST for re-treatment cases. These results are only applicable to the SSP PTB patients.

PC-95213-05   Systematic approach to establish cut-off for classification of rpoB mutants using molecular beacons

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Background: Multidrug-resistant TB (MDR-TB) is a frequent cause of treatment failure, with detection based on culture methods taking ⩾2 weeks. Rifampicin (RIF) resistance is a hallmark of MDR-TB, and detection of mutations in the rpoB gene of *Mycobacterium tuberculosis* using molecular beacon (MB) probes with real-time quantitative PCR (qPCR) is a novel approach that takes approximately 2 days. However, qPCR classification of strains with mixed RIF-susceptible (RIF-S) and RIF-resistant (RIF-R) bacteria is operator-dependent. The aim of this study was to develop an objective method to define rpoB mutants using qPCR with MBs.

Methods: DNAs from 107 *M. tuberculosis* clinical isolates with known sensitivity to RIF by culture-based methods were obtained from Texas and Colombia. *M. tuberculosis* CDC1551 was used as reference RIF-S strain. Mutations within the 81bp hot-spot region of rpoB were established by qPCR with five MBs spanning this region. Visual and mathematical approaches were used to establish whether the Ct of the experimental strain was significantly higher (mutant) compared to the reference strain. qPCR performance was compared to either RIF-R based on culture methods, or mutant detection based on DNA sequence.

Results: Visual classification of MB qPCR had 100% sensitivity and 94.6% specificity versus culture methods, and 98% sensitivity and 100% specificity versus mutant detection by DNA sequence. Receiver-operator curves (ROC) identified Ct cut-off values for each MB, with 94% sensitivity and 97% specificity versus culture, and 96% sensitivity and 100% specificity versus DNA sequence.

Conclusions: Classification of RIF-R based on visual and mathematical approaches had a similar and excellent performance for strains from two distant geographical regions. The mathematical approach is superior given the ease for implementation in any laboratory using an excel template to eliminate reader bias and conduct high-throughput analysis, particularly for mixed RIF-R and RIF-S isolates.

PC-95315-05   Molecular detection of rifampicin- and isoniazid-resistant *Mycobacterium tuberculosis* isolates

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The aim of the study was to compare two molecular methods, the Genotype MTBDR plus, Hain Lifescience, Nehren, Germany and a multiplex allele-specific PCR assay (MAS-PCR) used to confirm resistance to isoniazide and rifampicin and detect mutation involved. The drug susceptibility of 48 clinical *Mycobacterium tuberculosis* isolates (25 multidrug-resistant strains, 1 strain resistant only to rifampicin, 18 strains resistant to isoniazid and 4 susceptible) is tested using proportion method and two molecular methods, the Genotype MTBDR plus, Hain Lifescience, Nehren, Germany and a multiplex allele-specific PCR assay (MAS-PCR). The resistance to rifampicin is detected in 24 cases (22 MDR) using the Genotype MTBDR method and in 25 cases using MAS-PCR (23 MDR). The 531 mutation is found to be the most frequent. Among the 43 strains resistant to isoniazid, 38 cases were detected using the Genotype method and 39 using MAS-PCR. As expected, the mutation in the codon 531 of katG gene is found to be the most frequent. It is detected in 79% of cases by MTBDR method and in 74, 4% by MAS-PCR. The mutation in inhA regulatory region is involved in 20.9% cases using the MAS-PCR and only in 4.6% cases using the MTBDR method. 8 strains are found susceptible to both drugs using the MTBDR method and 7 by MAS-PCR. The correlation between the molecular method is 96% and 97% in detecting rifampicin and isoniazid resistance, respectively. Comparing to the gold standard proportion method, the correlation is 90.1% with Genotype method in detecting resistance to rifampicin and isoniazid drugs, and 93.2% with MAS-PCR method. MAS-PCR seems to be more sensitive than Genotype MTBDR method, essentially in detecting mutations in the inhA gene. The molecular methods offer a rapid detection of resistant strains and improve management of MDR tuberculosis. Whereas, they are less sensitive than the proportion method, which remains the gold standard.

PC-95490-05   Sputum vital stain microscopy to predict sputum culture results and infectiousness

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Background: Assessing whether patients remain an infection risk requiring isolation after commencing tuberculosis therapy is difficult because decisions are based on culture results from sputum samples collected many weeks previously. We therefore optimized and validated fluorescein diacetate (FDA) vital staining for predicting tuberculosis culture results.

Methods: A protocol was optimized to stain live but not dead bacilli in decontaminated sputum samples dried onto microscopy slides using fluorescein diacetate staining and standard fluorescence microscopy. The reliability of fluorescein diacetate slide microscopy in predicting quantitative culture results was compared to that of auramine microscopy. Fluorescein diacetate was assessed in two blinded experiments: 1) validation—combination dilutions of live and sterilized, boiled sputum from untreated patients were mixed in different proportions, and 2) evaluation—sequential sputum samples from treated patients were collected before and after 3, 6, and 9 days of first-line tuberculosis treatment.

Results: Fluorescein diacetate slide microscopy took 40–60 minutes and required basic skills and only a microscope. Quantitative culture took 3–6 weeks and required a biosafety cabinet, centrifuge, vortex, incubator and moderate laboratory expertise. In the validation experiments, FDA-microscopy accurately reflected the proportion of live tuberculosis in each sample. In the evaluation experiments, FDA-microscopy reliably predicted quantitative culture results ($r^2 = 0.77$). In contrast, auramine microscopy did not reliably predict quantitative cultures ($r^2 = 0.33$ before treatment and $r^2 = 0.26$ during treatment).

Conclusions: As compared to weeks of information lag when using quantitative cultures, fluorescein diacetate microscopy reliably predicts future cultures results in minutes, allowing for a dynamic, real-time approach to infection control.
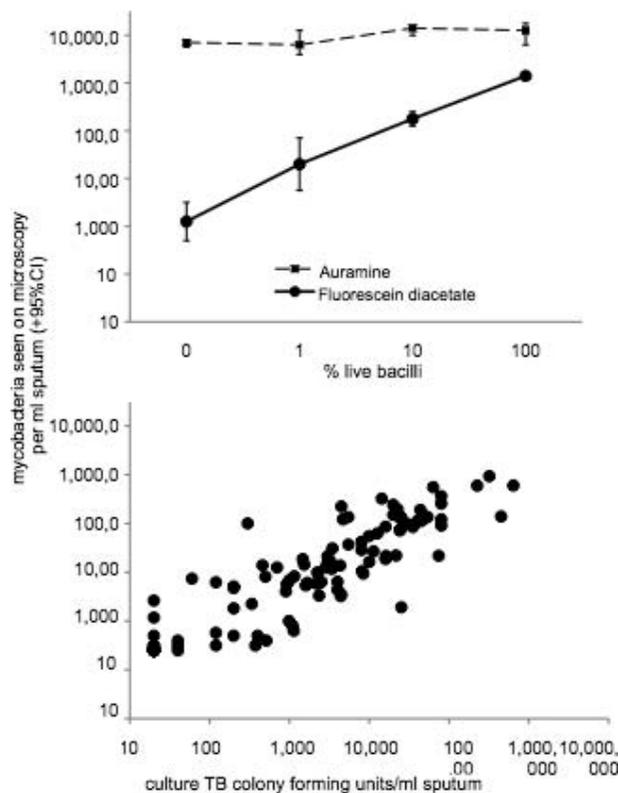

Figure Validation experiment (top): FDA and auramine microscopy in live/heat killed combinations of bacilli (shown: results from decontaminated 3+ bacilli). Evaluation experiment (bottom): Correlation of FDA to CFU in sputum samples of patients before and after treatment.

PC-95416-05   Direct detection of tuberculosis and related antibioic resistances in raw sputum samples

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Aim: Here we present feasibility and performance studies for tuberculosis diagnostics, including sample preparation and assay development activities for a range of mycobacteria and related antibiotic resistances.

Methods: A one-tube lysis procedure was combined with a silica membrane DNA purification. Multiplex endpoint PCR was performed to specifically amplify unique target regions for the detection of different species of the *Mycobacterium tuberculosis* complex and different MOTTs, as well as assays for antibiotic resistance against rifampicin, isoniazid, aminoglycosides, streptomycin and fluoroquinolones.

Results: The one-tube lysis procedure has been tested with over 100 native sputum samples, showing excellent liquefication performance even in cases where very viscous sputa or sputa with high amounts of solid particles were used. Inhibition tests showed that the isolated DNA does not show any inhibitory effect

on the subsequent PCR amplification. Assay evaluation tests have been performed to determine the performance of the multiplex assays with different sample types. In these blinded evaluation studies, 42 TB DNA isolates of mostly MDR strains were used. Analysis of these isolates showed that the analytical performance of the multiplex assays exceeded the expected coverage of the panel. Additionally, 31 mycobacterial strain lysates were used to evaluate the performance of the multiplex panel. All markers showed a specificity of 100%. Coverage of the panel exceeded the expected ranges. For the strain lysates more than 96% were correctly profiled for resistances. A third evaluation study was performed with 46 sputum leftovers. The sputum leftovers were treated with the one-tube lysis protocol and analyzed with the multiplex panel. The sensitivity for smear-positive sputum samples was above 80%. Resistance profiling was correct for all strains, except for 3 strains classified false positive for resistance against streptomycin.

PC-95540-05   Evaluation of molecular testing of stool samples for pulmonary TB diagnosis and drug susceptibility

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Background: Pulmonary tuberculosis diagnosis is difficult when patients cannot produce sputum. Most sputum is swallowed and tuberculosis DNA can survive intestinal transit, so we evaluated stool specimens for detecting tuberculosis originating from the lungs.
Methods: 159 paired stool and sputum samples were collected from 89 patients with sputum culture-proven pulmonary tuberculosis. 47 control stool samples were collected from patients without tuberculosis symptoms. The diagnostic accuracy of the polymerase chain reaction (PCR) in stool was compared with sputum testing by PCR and culture. A hemi-nested IS6110-PCR was used for tuberculosis detection and IS6110-PCR positive stool samples then had rifampicin sensitivity-testing by heteroduplex-PCR.
Results: For newly diagnosed pulmonary tuberculosis patients, stool IS6110-PCR had 86% sensitivity and 100% specificity compared with sputum culture. Stool PCR had similar sensitivity for HIV-positive and HIV-negative patients. The agreement between rifampicin susceptibility-testing by sputum culture vs. stool heteroduplex-PCR was 98% for diagnostic samples and 96% considering all samples. Stool heteroduplex-PCR at the time of diagnosis correctly predicted multidrug-resistant tuberculosis in 100% of

cases. Tuberculosis detection and drug susceptibility-testing by stool PCR took 1–2 days compared with an average of nine weeks for traditional culture-based testing. Considering all 159 stool samples from patients, stool PCR was more sensitive for patients with sputum microscopy-positive tuberculosis ($P < 0.001$) and remained positive for most patients for more than one week of treatment.
Conclusions: Stool PCR is a sensitive, specific, rapid and relatively biosecure technique for the diagnosis and drug-susceptibility testing of pulmonary tuberculosis and should be considered when sputum samples are unavailable.
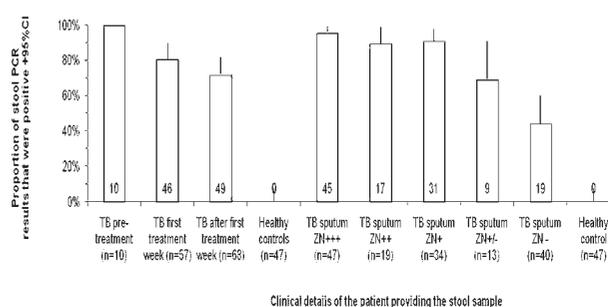

Figure Evaluation of molecular testing of stool samples for pulmonary TB diagnosis and drug susceptibility testing.

POSTER DISPLAY SESSIONS

TB CONTROL IN PRISONS AND OTHER SPECIAL POPULATIONS

PS-94296-05   Improving information technology in TB sputum microscopy defaulter tracing

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Objective: To assess the effect of using cell-phone technology to trace pulmonary tuberculosis suspects who 'default' at diagnostic level, to estimate the cost of tracing a single patient on the same, and to establish whether involving patients volunteered friend in the exercise would facilitate the tracing.
Design: Operational research carried out in period of 6 months (July 2006 to December 2006).
Setting: The exercise was carried out in the Western Province Referral Hospital, one of the leading sputum AFB-microscopy centers in Kenya.
Methods and intervention: All patients suspected of PTB were referred to the laboratory for sputum microscopy. The suspect's cell phone numbers, spouses plus patient volunteered friends were written on patients' pathological request forms and retained with first sputum in the laboratory. Any patient who took

more than 48 h (2 days) before delivering the subsequent specimens or collecting the results of the first sputum report were defined as defaulters for the purpose of this research. Those patients were engaged systematically starting with own cell phone number before trying the rest.

Results: Six hundred and eighty two cases were seen during the period of study, of which 180 subjects defaulted at the laboratory level (26.4%). The positivity rate in defaulter samples were 20 patients (11.1%), patients traced by the use of cell phone were 162 (90%) the cost of tracing a single patient was approximate 0.64USD. The patients volunteered friends traced 82 patients (48.3%).

Conclusions:
—Cell phone use is an effective means of tracing defaulters and case holding.
—The cost of using a cell phone is minimal compared to the traditional methods of using public health officers.
—The involvement of patient's volunteered friends has a great multiplier effect.

PS-94393-05   Prevalence of active pulmonary tuberculosis among prisoners at Kamiti Maximum Security Prison, Kenya

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Background: Tuberculosis (TB) is one of the leading causes of mortality in Kenyan prisons. No systematic studies have been done to determine the prevalence of TB in this population. This study set out to determine the prevalence of active pulmonary TB in the largest prison in Kenya.
Methods: A survey involving all the 3650 inmates at the Kamiti Maximum Security Prison was done between November 2007 and May 2008. Each block in the prison was visited and enquiry made for prisoners with a cough for ≥2 weeks duration. Those with a cough for ≥2 weeks were recruited into the study after giving an informed consent. Their demographic characteristics were recorded. Those with a productive cough submitted 3 sputum specimens for smear microscopy. If microscopy was negative for *Mycobacterium tuberculosis*, sputum culture and chest radiography were done. For those with dry cough, a chest radiograph was done. Depending on the outcome of these tests, the prisoners were either classified as having or not having active pulmonary tuberculosis by active case finding. The data for active pulmonary TB by passive case finding was abstracted from the TB notification summaries available at the

prison clinic. Statistical Package for the Social Sciences version 14.0 was used for data analysis.
Results: By passive case finding, the prevalence of TB was 1425/100 000 population. Active case finding strategy yielded an extra 931/100 000 with active pulmonary TB. The overall prevalence of active pulmonary TB in this prison was 2356/100 000. Only age was found to have a statistically significant association with a prisoner's TB status ($P < 0.05$).
Conclusion: The prevalence of active pulmonary TB in this Kenyan prison was 7 times the national prevalence. Interventions to control TB in this prison are therefore urgently needed. A larger study is also needed to document the prevalence of TB in the whole prison population in Kenya.

PS-94559-05   Adherence to self-administered tuberculosis treatment in Homa Bay, Kenya

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Background: Efficiency and feasibility of Directly Observed Therapy (DOT) under routine program conditions have often been questioned. In Homa Bay (Kenya), self-administered therapy (SAT) was introduced by Médecins sans Frontières as an alternative to DOT. In addition to treatment outcomes, we assessed patients' adherence to SAT and performance of simple tools for monitoring adherence.
Methods: We conducted a cross-sectional survey amongst new TB cases receiving 6 months of standard TB chemotherapy with fixed dose combination under SAT, weekly drugs collection for first 2 months, and monthly for the last 4 months. Adherence was assessed at home with urine testing for Isoniazid (INH), interviewer-administered questionnaire and visual analogue scale (VAS). Agreement of adherence between different tools was measured.
Results: In November 2008, out of 139 eligible patients 32 were excluded: 5 never started treatment, 8 defaulted, 4 were dead, 13 could not be located and 2 refused, resulting in 107 inclusions. Median age was 29 years, 56% were female, 87% had pulmonary TB, 77% were HIV-positive (one third under antiretroviral). Median treatment duration at the date of the survey was 96 days. Urine INH test was positive for 98% of the patients. Ninety-five patients (89%) reported never having missed tablets during their treatment. On the VAS, all patients rated their adherence as least 80%. Amongst 77 patients who had a treatment outcome at the time of analysis, 4 defaulted, 1 died and 71 were treatment success.
Conclusion: Preliminary results suggest adequate

treatment adherence using SAT in Homa Bay. Given the small sample size, an extension of this survey, using same methodology, will be conducted in May 2009. Combined results, including concordance between different monitoring tools, will be presented.

PS-94624-05   Implementing collaborative TB-HIV activities in Cameroonian prisons

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Setting: Central and principal prisons in Cameroon.
Objective: To assess the implementation of collaborative TB-HIV activities in nine myor prisons in Cameroon.
Design: Descriptive and retrospective study. Prison registers, TB registers, HIV/AIDS registers, and activity reports in the target prisons for collaborative TB-HIV activities were analysed for the year 2008.
Results: Since 2005, a comprehensive package of TB and HIV/AIDS prevention and treatment comprising peer education, systematic medical screening of new inmates and provider initiated HIV counselling and testing, CD4 count, ART, as well as active TB detection and treatment has been implemented in Cameroonian prisons, covering at the end of the year 2008 a target group of almost 11 000 inmates or 40% of the prison population. During 2008, >6000 new inmates were screened and about 7500 were tested for HIV (mean prevalence 6.5%). 469 (>90%) of HIV-seropositive inmates were put on prophylactic CTX. For nearly 400 of the latter CD4 counts were performed, and 70 inmates were put on ART. About 180 (1.6%) of inmates were put on anti-TB treatment (country-wide estimated TB prevalence 0.18%). Despite the intervention, the crude mortality in the prisons covered by the activities remained at 21.9 p.m. or at least two times as high as in the comparable civil society group.
Conclusions: Prison inmates in Cameroon constitute a high risk population for TB and HIV infection and disease. The implementation of comprehensive TB-HIV prevention, care, and treatment services is feasible. But mayor obstacles conditioning optimal functioning of these services persist: extreme overpopulations and consequent crowding; lack of infrastructures and equipment; a manifest lack of skilled personnel; a yearly turnover of the prison population of up to 70%; for not to mention the huge difficulties related to the collection of complete and reliable data for monitoring and evaluation.

PS-94696-05   Tuberculosis control in prisons in Bangladesh

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Background and challenges: Bangladesh adopted DOTS strategy in 1993 and achieved 85% treatment success rate in 2003. But case detection was low. So in DOTS expansion plan prisons/jails were included. In Bangladesh there are 67 jails (11—central and 56—district/sub-jails). The number of inmates residing in these prisons is nearly 3 times of the actual capacity 76 517 Vs 28 198 as on 01/03/2009. A survey in Dhaka central jail revealed significantly higher TB prevalence among the inmates. This paper is to highlight the TB problem and TB services in prisons in Bangladesh.
Response: Through a collaborative approach of NTP, and its partner, TB case detection and treatment services were introduced among the prisoners in 2005 after providing training, ensuring uninterrupted supply of drugs and other logistics. The TB services in the jails were also linked to the general TB referral network for proper diagnosis, treatment, and follow up. Data were collected from NTP database and other secondary sources.
Results and lesson learned: In 2005, TB services were made available in 15 prisons, the number increased to 44 by 2008. Of these 44 prisons, 20 reported directly to NTP and others reported jointly with nearby DOTS centre. Analysis of data from these 20 prisons reveals that during this period a total of 1705 cases were registered; 70.6% NSP, and 16% NSN. Out of 894 new smear-positive cases registered during 2005–2007, 64% were successfully treated while 34% were transferred out.
Conclusion and recommendation: By collaborative approach TB control activities can effectively be implemented in prisons. The referral linkage to evaluate the transferred out patients needs to be strengthened.

PS-94719-05   Tuberculosis burden in Kinshasa prison, DRC

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Tuberculosis (TB) is considered worldwide as a major cause of illness and death in prison. The penitentiary center of Kinshasa is the largest prison in DRC. It received prisoners and people in pre-trial coming nationwide. Even collected, no TB data analysis have been performed to assess the importance of the problem in DRC prisons. Organizational model of TB ser-

vices is fully decentralized in DRC. Since 2004, National Tuberculosis Program/DRC implemented the DOTS programmes in this prison clinic. The study objectives were to determine the magnitude and the distribution of TB in this prison and to assess the treatment outcomes in order to evaluate the DOTS programmes and to identify problems compromising its overall success. We did a retrospective review of all records reported by the prison clinic to the provincial TB coordination (CPLT) from 2004 through 2008. From cases notification gathered, and the prison population per year, we did estimate the prevalence. From TB registers, we performed a cohort analysis to evaluate the treatment outcomes. Among 21769 prisoners incarcerated during the five years, 416 TB cases were notified to the CPLT. Of 416 cases, 14 (3%) are female and 402 (97%) are male. The estimated prevalence of TB (all TB forms) is 1900 per 100000 prisoners. The 20–29 age group represents 39% of all TB cases. According the cohort analysis, only 60% of prisoners-patient have been evaluated. The cure rate in Kinshasa penitentiary prison is 36%. More than 40% of patients are lost to follow-up. TB prevalence in Kinshasa penitentiary center is over three times higher than in the civilian population. This result does illustrate the magnitude of the problem in prison. The prisoners-patients are composed predominantly of men aged 20–29 years. The low cure rate is correlated to the high lost to follow up observed. An integrated and linked civilian-prison TB services are fundamental to enabling prisoners released on treatment to complete it.

PS-94993-05   Evaluation of bacteriological response in tuberculosis treatment with four drugs in different combinations

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Setting: Treatment of tuberculosis requires 3 or 4 drugs. Segregated ministration of these drugs may derive in the risk of discontinuation and resistance. The WHO recommends innovating strategies to ensure cure.
Objective: To assess the bacteriological response (bacilli load) in two groups of patients with pulmonary TB who are receiving treatment in different pharmacological presentation and measure treatment success in Orizaba, Veracruz, Mexico, 2005–2007.
Method: From 2005 to 2007, all cases with pulmonary tuberculosis aged over 15 were selected. Clinical and bacteriological information were obtained (identification, isolation, drug-susceptibility tests). In com-

pliance with the Mexican norm, DOTS was administered with primary drugs (H, R, Z, E) in two groups: group 1 with combined HRZE combination and group 2 with combined HRZ and E alone. A monthly follow-up was performed to assess clinical and bacteriological evolution and completion of treatment.
Results: 115 patients were recruited. Group 1 included 64 patients and Group 2, 51. Respectively 66% and 87% were diagnosed with bacilli loads + and + +. In the first 3 months, respectively 95% and 90% of each group showed negative results, with Group 1 showing faster negative results. Success of treatment was the same for both groups, 82%, with less default in Group 1. There was 29% and 37% resistant in groups 1 and 2 respectively, and 62% were cured with primary treatment.
Conclusions: The effect of single dose combination therapy achieves favorable evolution in the control of tuberculosis. Treatment was successful, better even than the results reported by the National Control Program; the same was found for patients with resistance. Further studies to asses the efficacy, efficiency, adverse events, relapses and risk of discontinuation must be conducted.
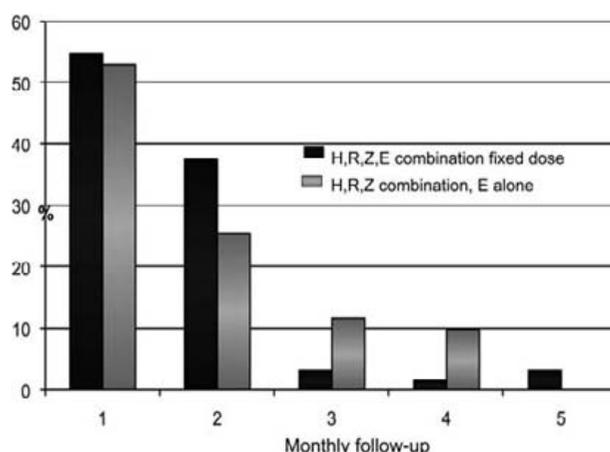

Figure Case proportion of tuberculosis cases with negative smear sputum during treatment.

PS-95077-05   Factors associated with health system delay for the diagnosis of pulmonary tuberculosis in Brazil

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Introduction: Tuberculosis (TB) diagnosis delay increases disability, mortality and transmission of the disease. Patients in developing countries are often diagnosed with severe, advanced disease. Delay in diagnosis of TB may be due to delay in seeking for medical help or to health-care system issues. The objective

Table   Time (days) to the diagnosis of pulmonary tuberculosis since care-seeking by patients

Characteristics	Time (days) Median (IQR)	P value*
Sex		
Female (*n* = 79)	34 (14–72)	**<0.001**
Male (*n* = 139)	17 (5–34)	
Age		
<35 (*n* = 99)	23 (10–45)	0.905
≥35 (*n* = 119)	21 (7–49)	
Schooling		
None (*n* = 29)	15 (4–45)	
Primary (*n* = 103)	23 (12–48)	
Unfinished High School (*n* = 21)	21 (8–34)	0.062
Finished High School (*n* = 53)	25 (11–49)	
University (*n* = 12)	38 (0–47.5)	
Household size		
Living alone (*n* = 25)	29 (21–48)	
2–4 (*n* = 143)	21 (8–51)	**0.038**
≥5 (*n* = 50)	16.5 (1–35)	
Household monthly income before diagnosis (US$)†		
<$55 (*n* = 40)	22 (13–44)	
55–222 (*n* = 64)	23.5 (6–57)	0.906
222–444 (*n* = 49)	21 (6–48)	
>444 (*n* = 65)	20 (9–42)	
Formal work		
No (*n* = 105)		
Yes (*n* = 83)	23 (10–48)	0.524
Missing/non-applicable (*n* = 30)	20 (7–41)	
Co-morbidities		
No (*n* = 146)	23.5 (10–48)	0.538
Yes (*n* = 72)	19.5 (7.5–43.5)	
Cough		
No (*n* = 11)	13 (–28)	0.115
Yes (*n* = 207)	22 (10–48)	
Sputum		
No (*n* = 55)	26 (10–47)	0.749
Yes (*n* = 163)	21 (8–49)	
Hemoptysis		
No (*n* = 152)	23 (11–47)	0.250
Yes (*n* = 66)	17.5 (4–48)	
Fever		
No (*n* = 52)	23 (10.5–44.5)	0.565
Yes (*n* = 166)	20 (9–48)	
Fatigue		
No (*n* = 48)	19.5 (4–35.5)	0.097
Yes (*n* = 170)	22.5 (11–52)	
Weight loss		
No (*n* = 34)	19.5 (4–34)	0.364
Yes (*n* = 18)	22.5 (10–48)	
History of previous TB treatment		
New case (*n* = 187)	23 (11–48)	0.093
Retreatment (*n* = 31)	14 (1–37)	
Type of first searched facility		
Public Primary Care Unit (*n* = 69)	19 (8–41)	
Pharmacy (*n* = 21)	29 (17–37)	
Hospital (*n* = 84)	20 (6.5–48.5)	0.527
Private Clinic (*n* = 41)	26 (10–62)	
Others (*n* = 2)	51 (13–89)	
DOTS in area of residence		
No (*n* = 94)	25 (11–58)	0.082
Yes (*n* = 124)	18.5 (7.5–40.5)	
Time to reach healthcare unit		
<80 min (*n* = 112)	17.5 (7.5–39.5)	0.081
≥80 min (*n* = 106)	24 (11–52)	
Health Insurance		
No (*n* = 184)	21 (10–45.5)	0.828
Yes (*n* = 34)	27.5 (6–53)	
Hospitalization		
No (*n* = 189)	21 (10–46)	0.620
Yes (*n* = 29)	21 (8–51)	

* From Kruskal-Wallis or Wilcoxon non-parametric tests, as appropriate.
† At the time of interviews, US$1 = R$1.8.
IQR = interquartile range.

of the present study was to evaluate factors associated with health system delay in the diagnosis of TB. **Methods:** We conducted a questionnaire-based survey among 218 patients with bacteriologically confirmed pulmonary TB in 21 health posts distributed in 8 cities of Rio de Janeiro state (RJ), Brazil. Previously trained medical students interviewed patients in the 2nd month of treatment who signed an informed consent.

Results: Median delay was 21 (IQR = 8–47) days. Female sex and living alone were significantly associated with longer delay (Table). Although not statistically significant, there was a trend for longer delays in places where DOTS was not implemented, among those with higher education and those who take longer time to reach the health-care unit from home. Conversely, retreatment cases had a trend a shorter time to diagnosis.

Conclusions: Overall health system delay for TB diagnosis was high. Female health vulnerability, previously demonstrated in developing countries, was confirmed. Since TB is more frequent among male and the poor, doctors may fail to think promptly of TB among women and highly educated subjects. This adds to patients' fear for stigma and denial, which causes delay in help-seeking. Living alone has been recognized as a risk factor for unfavorable outcomes, and delayed diagnosis may explain more advanced disease. DOTS seems to be effective in reducing this delay. Other interventions are needed in order to reduce delay to TB diagnosis especially for women.

PS-95234-05   Comparison of periods before and after directly observed treatment: dispensary study for 12 years

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Aim: Directly observed treatment (DOT) was initiated in April 1st, 2000 in our dispensary. In this study comparison of pre- and post DOT period TB control activities are made.

Method: In 12 year period (1996–2007) TB treatment initiated in 1165 patients in our dispensary: pre-DOT 458, DOT period: 707. Smear-positive cases were 190 and 308 respectively. Records of 32 transferred out cases (31 of them from pre-DOT period) were not found. Only demographic data of them are present. Statistics were made by *t* test and χ^2 test.

Findings: 74 cases were found from contact investigation. Median age was 40.7 years, females were 26.7%, new cases were 91%. Sputum smear was not done only 4% of the pulmonary TB cases. In DOT period 96% of the cases were given treatment with

observation. DOT was given 40% by dispensary personnel, 27% by primary health care personnel, 11% in different instutions and 22% by a family member. Treatment duration was 9.1 months in pre-DOT and 6.9 months in post-DOT periods. Bacteriological conversion time was 2.4 and 1.8 months in pre and post-DOT periods ($P = 0.000$). Treatment success was 94% and 95% in these two periods. Cure rates among smear-positive pulmonary cases were 82% and 91%, respectively ($P = 0.006$). Defaulters were 2 and 1 cases in two periods, respectively. Death rates were 4.2% and 3.4%; treatment failures were 1.1% and 0.4% respectively. Follow-up periods were 63 and 31 months in these two periods and relapse rates were 3.7% in pre-DOT and 0.8% in post-DOT period ($P > 0.002$).

Conclusion: As a pioneering dispensary for DOT, we had health personnel DOT more than 67%. When compared with the pre-DOT period, in DOT period, bacteriological conversion time and cure rates of smear-positive cases were increased and in all cases relapse rates decreased.

PS-95245-05   Tuberculosis in prisons: epidemiological study in the State of Paraiba from 2000 to 2005, Brazil

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Introduction: In the last years, tuberculosis (TB) has been demanded direct and indirect alternatives for its control. Lately, TB is considered of easy infectiousness and transmissibility it has addressed major attention to the prison population as much by existing a resolution of Ministries of Health and Justice endorsing The National Health Plan for Penitentiary System as presenting major contamination probability in absolute numbers of people from a positive acid-fast bacilli (AFB) who can exceed the number of infected among those prisoners began from this first case.

Objective: To evaluate the TB situation in the prison system in the State of Paraiba.

Methods: By TB Notification Information System (SINAN-TB) of Ministry of Health, it was notified 165 new TB cases with both gender and over 25 years old into the prisons of Paraiba State. It was made AFB-smear, X-ray and anti-HIV test and consequently, treatment under Ministry of Health pattern (DOTS strategy).

Results: From 2000 to 2005 it was detected 165 TB cases with a variation of incidence rate from 593.7 to 1058.3 by 100 000 inhabitants. Among men, 47.8% from 25 to 34 years-old were compromised. From 57 anti-HIV tests done, 6 of them were positive and from 154 AFB-smear, 99 were positive and 55 were negative. It was demonstrated in the cohort study

rates 80.0% of cure, 19.4% of default and 0.6% of failure.

Conclusion: A TB Control Program needs to be established in the Paraiba State prison system. Aside from noble care it is necessary to offer among prisoners and their families an effective control, avoiding sequelae of disease.

PS-95309-05   TB in prisons: a remaining challenge for a tertiary care hospital in El Salvador

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Setting: El Salvador reported in 2006 13 cases of TB per 100 000 inhabitants in the general population. For the same year the rate of TB in the prison population was 66 per 100 000 inhabitants. Hospital Nacional Rosales is the only tertiary care hospital in the country and is entrusted with serving the largest prison in the country.

Objectives: We were interested in assesing the demographic and clinical characteristics of TB cases diagnosed at the hospital, the presence of TB-HIV coinfection as well as access to diagnosis and treatment for both conditions.

Method: The medical records of 10 cases of TB diagnosed at Hospital Nacional Rosales from the years 2003 to 2008 were reviewed.

Results: All 10 cases were male, 23 years old on average. 7 cases were Pulmonary TB, 2 Lymph node TB and 1 Pleural TB. 5 of the 7 cases of Pulmonary TB were sputum positive. 5 cases were TB-HIV coinfected. On average time from admission to treatment for TB was 16 days for all cases. In those with HIV, on average the interval from diagnosis of HIV and qualification for retroviral therapy and treatment was 88 days.

Conclusion: There is unacceptable delay in diagnosis and treatment for TB in the prison population served by our hospital, a tertiary care facility equipped with tools for diagnosis of TB like any other in the country. This delay is without doubt contributing to the high rate of TB in the prison population of El Salvador. This review also points out to problems of early access to retroviral therapy in the prison population.

PS-95594-05   Barriers of access to the diagnosis of tuberculosis in prison units. Joao Pessoa, Paraiba, Brazil

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Introduction: The national plan of health of the Brazilian penitentiary system previews that the diagnostic

and treatment of the tuberculosis be done by health teams of the prison unit.

Objectives: It was aimed to verify under the view of the prisoner the access to the diagnostic of tuberculosis in the Prison Units of João Pessoa, Paraíba, Brazil. It is a descriptive research with quantitative approach that used a questionnaire as instrument of collection of data.

Methodology: The sample was constituted of 30 (thirty) prisoners with TB, hospitalized in units of state reference of the Paraíba.

Results: The results show that by occasion of appearing of symptoms, 37% look for the ambulatory of the prison unit from two to three times, 20% from four to six times and 20% more than six times. About the local of the first appointment, 70% were investigated in unit of hospital reference and only 23% evaluated by the team of health of the prison system; 44% of the cases informed that live with the diagnostic of the disease from 1 to 2 years; 100% said that the biggest difficulty for the diagnostic has been the lack of access to the medical appointment inside the carcerary institutions.

Conclusion: It was checked that the suspect cases have not been investigated by the prison unit, causing late diagnostic of the disease. It is imperative to beat the organizational, logistic and political difficulties so that the adequate execution of the official prescription determined by the National Plan of Health be done, assuring the access of the carcerary population to the precocious diagnostic of the tuberculosis.

PS-95606-05   Integral strategy of tuberculosis treatment of immigrant applicants to US

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Introduction: To guarantee the treatment of TB under strict Directly Observed Therapy (DOT) to every applicant with active TB diagnosis it is necessary they stay at Juarez, Chihuahua, Mexico. We have opened a treatment center with integrated attention to the patients during their stay in the treatment center in this city (DOTMANIA) we provide, stay, meals and treatment free of cost.

Objective: To provide treatment and integrated attention to the immigrant applicants to US diagnosed with active TB.

Method: Between October 1, 2007 and December 31, 2008, 53 applicants were diagnosed with active TB. 32 of them are on treatment in DOTMANIA, diagnoses are done by CXRs, clinical assessment and mycobacterial cultures and susceptibilities (in addi-

tion to smears). Patients are evaluated by an internist physician to integrate their TB care with any other medical problems they may present. Patients who are treated at DOTMANIA are assigned a private room with an air extractor system.

Results: The first 2 weeks of isolated treatment, is an adjustment period which is very stressful for the patients, staff and other patients provide intensive support and they receive phone calls from relatives. After the isolation period, patients are allowed to mix with the general population and are more fully integrated. Through out the treatment, there is a need to provide emotional support. They are fully informed of their progress by the physicians and nurses, to let them see there is a positive end to their treatment and confinement. Our end of treatment success has been of 100%.

Conclusion: The integrated attention to the TB patients who live outside of their place of origin is an extreme challenge. However, the strong support by staff at all levels, other patients and family is crucial. Patients and family need to be treated in a humanistic, respectful and loving manner. The project success is dependant on its holistic approach and the information we give to our patients.

PS-95615-05   Tuberculosis active case finding in two prisons, Guarulhos, Sao Paulo, Brazil. Preliminary results

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Introduction: Sao Paulo State has an estimated population in prisons of 145 401 prisoners. It has 146 prisons distributed in 248 209. 42 km² of the state. Two prisons are located in the municipality of Guarulhos, metropolitan area of Sao Paulo and had about 2480 prisoners in February 2009.

Objective: To evaluate different tuberculosis strategies of active case finding in three prisons in the municipality of Guarulhos.

Method: A survey using a questionnaire by an interview with trained staff and supervised collection of sputum specimen of all prisoners at the moment of 23 visits done in the three prisons. Those specimen samples were sent to three certified laboratories with quality control for complete bacteriological examinations. A radiological screening with a mobile car is finished in one of the prisons.

Results: Were interviewed 2435 prisoners. Those 32.2% had cough and 15.3% referring symptoms for two weeks and more. From 12.3% of those who had cough for more than two weeks had also expectoration. Laboratorial data of 2007 routine showed that 12.0% of prison population was examined by acid fast bacilli (AFB) at prison system. The symptomatic

respiratory prevalence in those prisons (15.3%) was superior, therefore to the value found on routine of 146 units (12.0%), but the AFB positivity was 5.2% on routine and 0.6% on research, showing the active case finding was broad. Were diagnosed 16 TB patients where 11 were discovered by culture only. Mycobacteria other than tuberculosis (MOTT) were detected in 5 prisoners. Culture added 68.7% for AFB.
Conclusions: Cultures are essential for active case finding. There is the necessity to complete the research to find out the better strategy, under technical and operational point of view, for case finding at prison system in the State of Sao Paulo regarding the high number of prisons and distance between them.

MDR-TB TREATMENT

PS-94014-05 Treatment outcome of pulmonary and extrapulmonary tuberculosis patients in northwest Ethiopia

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Background: DOTS as a strategy was introduced to the tuberculosis control programme at Gondar University Hospital in 2000. The World Health Organization (WHO) has proposed that treatment outcome is an important indicator of tuberculosis control programs. Therefore, the aim of this study was to assess treatment outcome of tuberculosis patients at Gondar University Hospital.
Methods: A total of 4000 tuberculosis patients registered at Gondar University Teaching Hospital from September 2003 to May 2008 were included in this study. Treatment outcomes and tuberculosis types were categorized according to the national tuberculosis and leprosy control program guideline.
Results: From the total of 4000 patients, 1133 (28.3%) were extrapulmonary, 2196 (54.9%) smear negative and 671 (16.8%) were smear-positive pulmonary tuberculosis cases. Of all patients, 1181 (29.5%) were successfully treated, 730 (18.3%) defaulted, 403 (10.1%) died, 6 (0.2%) treatment failure and 1680 (42.0%) were transferred out. Males were more likely to die or to default than females, and the elderly were more likely to die than younger patients. The proportion of death rate during the study period was steadily decreased across the years from 146 (13.9%) to 27

(5.1%). However, default rate was increased across the years from 97 (9.2%) to 228 (42.9%). Being female patient, age group 15–24 years, smear-positive pulmonary tuberculosis and being urban resident were associated with higher treatment success rate.
Conclusion: The unsatisfactory outcome of tuberculosis treatment at Gondar University Teaching Hospital highlights the necessity of strengthening DOTS strategy and improving case holding to reduce treatment interruption.

PS-94036-05 Resistencia primaria y secundaria en El Salvador, 2007

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Diseño/Metodos : Bajo protocolo establecido se capacitó a los encargados de programa de todos los establecimientos de salud del Ministerio de Salud e Instituto Salvadoreño de Seguro Social para que de 1o. de enero del 2007 al 31 de diciembre del mismo enviaran a su laboratorio de Referencia una muestra de todos los pacientes diagnosticados con esputo positivo ya fuesen nuevos o antes tratados para realizarles las pruebas de sensibilidad y resistencia y todos los datos fueron procesados en un Software adaptado para este y avalado por la organización Panamericana de la Salud de donde se obtuvieron todos los resultados.
Resultados : Se procesaron un total de 713 muestras de las cuales 639 eran nunca antes tratadas y se obtuvo una resistencia a la rifampicina e isoniacida de 0.0 (resistencia primaria); y 74 muestras de paciente con antecedentes de tratamiento previo, obteniendo una MDR de un sólo caso (1.4% resistencia secundaria), obteniendo una resistencia general de ambas de 0.1.
Conclusion : La multidrogoresistrencia en El Salvador no representa un problema de Salud Pública en este momento, ya que (0 primaria y 1.4 secundaria) muestran el impacto de aplicar un DOTS de calidad en todo el país; así mismo el patrón de monoresistencias ha aumentado comparado con el estudio del 2001 por lo que el tratamiento adecuado para la polifarmacoresistencia deberá ser una prioridad para evitar el aparecimiento de la MDR-TB a futuro.

PS-94098-05 Simple measures improve success rates for tuberculosis treatment in rural Cameroon

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Background: Despite improving tuberculosis (TB) control efforts, the goal treatment success rate of

85% for new smear-positive cases remains elusive in many parts of the world. In 2005, the Africa region had a 76% success rate and 63% cure rate, compared with 84.7% and 78% worldwide, respectively. St. Elizabeth Hospital in rural Northwest Cameroon reported a 53% success rate and 28% cure rate for 2004.

Intervention: Major changes were instituted at the hospital in early 2005 in the handling of TB patients. A single medical officer was placed in charge of the TB Unit and coordinated inpatient and follow-up activities. Patients were urged to remain in the ward for the first month of intensive phase treatment, where they were seen three times a week on rounds. During this time, social rapport was established between the physician and the patients, education about the diagnosis was reinforced, and outpatients at later stages of treatment provided encouragement. At the time of discharge, strict dates were assigned for follow-up, and containers were given in advance for streamlined processing of control sputum specimens. Modest funds were applied to offset transport fees for those who couldn't afford them and to track non-compliant patients by cell phone.

Results: Over a two-year period, significant improvements were noted in outcome measures, and by the end of 2006 the treatment success rate rose to 79% and cure rate to 78% ($P < 0.001$). Patients lost to follow-up declined from 9.3% to 1.3%. In 2007, a nurse trained by the medical officer assumed responsibility for the TB Program, and success rates remain high.

Conclusions: Addressing barriers to health care both economic and social in areas with high burdens of disease and poverty is paramount for effective TB control. Alleviating transport costs, ensuring that efficient follow-up and testing is free, tracking compliance, and destigmatizing illness can significantly improve patient outcomes.

PS-94113-05   Efficiency of treatment of TB patients with multidrug resistance

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In the Kyrgyz Republic, as well as in the whole Central-Asian region, there was an intense TB epidemiological situation. Our country takes the second place on TB incidence rate among the countries of Central Asia entering into CIS. A serious obstacle in the problem decision of TB incidence is its social conditionality; more than 90% of patients have no constant source of income. Except the adverse social and economic conditions, one of the main causes of preservation of the unstable period of TB spread in our republic, as well as in other countries, is growth of number of cases with drug-resistant tuberculosis. The aim was to study efficiency of treatment of TB pa-

tients with multidrug resistance (MDR) in the Kyrgyz Republic. Results of chemotherapy of 60 MDR-TB patients are included in the analysis, enrolled in treatment in IV quarter of 2005 and I–II quarters of 2006, receiving therapy under the standardized scheme, recommended by WHO, and have completed treatment courses by duration of 18–24–30 months. Presence of MDR-TB has been confirmed by bacteriological method at all patients. Treatment of patients of the basic group was spent under the standardized scheme: in injection treatment phase patients received 6 anti-TB drugs (Capreomycin, Ofloxacin, Prothionamide, Cycloserine, Pyrazinamide and PAS) within 6 months after sputum smear conversion; in continuation phase patients continued treatment within 18 months without Capreomycin. Efficiency of chemotherapy with use of standardized treatment scheme among patients was enough high. The treatment interruption for the various reasons has made 26.7%. The main reason of treatment interruption by patients was a social factor (left on earnings to another country). At direct observance of chemotherapy regimen it is possible to achieve the termination of bacterioexcretion at more number of patients (93.6%) and favorable treatment outcomes at 58.3% of patients.

PS-94571-05   Outcomes of multidrug-resistant TB patients on ambulatory treatment in Nepal, 2005–2006

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Aim: End-of-treatment outcomes for multidrug-resistant *M. tuberculosis* (resistance to at least isoniazid and rifampicin; MDR-TB) patients in Nepal.

Methods: Data on pulmonary MDR-TB patients enrolled on the Green Light Committee (GLC)-approved National TB Programme between September 2005 and 18 October 2006 were studied. Standardized regimen was used (8Z-Km-Ofx-Eto-Cs/12Z-Ofx-Eto-Cs) for a maximum of 32 months. Culture was done every 30 days in the intensive phase (first 8–12 months) and 60 days thereafter. Management was ambulatory and drugs for adverse effects were provided throughout treatment. Over one half (63%) of patients were in centres in and around Kathmandu and the rest in 8 centres in another four regions. Multivariable analysis was used to explain treatment success as a function of age, sex, initial body weight, previous treatment history, and region (term for interaction between age <30 y and sex included).

Results: A total of 184 laboratory-confirmed MDR-TB cases had outcomes reported. Most cases had

failed a Category 2 first-line regimen (88%) or a Category 1 regimen (5%); 1.6% were previously untreated contacts of known MDR-TB cases and 5% were unspecified. Male cases (62%) were on average older than females (36y vs 31y; age-range all patients: 14–69y). Success was reported among 70% of patients (67.4% cured + 2.2% completed), 8% died, 5% failed treatment, 18% defaulted/transferred. At logistic regression, success was independently associated with female sex [Adj.OR = 4.9; 95%CL 1.5–16.4], age <30y [Adj.OR = 3.2; 95%CL 1.2–8.6], incremental body weight [Adj.OR = 1.1; 95%CL 1.1–1.2 for each unit increase in weight]. In one region, cure was significantly lower than the reference [Adj.OR = 0.2; 95%CL 0.1–0.5].

Conclusion: Outcomes for the first cohort of MDR-TB patients in Nepal suggest that standardized, ambulatory treatment is effective in low resource settings. The determinants of unfavorable outcome should be targeted to maximize likelihood of success.

PS-94592-05 Some aspects of Cfz and Amx/Clv use in the treatment of MDR-TB in prisons of Azerbaijan

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Setting: Specialized Treatment Institution, Ministry of Justice, Azerbaijan.

Objective: To examine interim outcomes of treatment of the patients, who received Cfz and Amx/Clv in complex treatment with 2nd line drugs.

Methods: We observed the results of culture conversion of the patients who received Cfz and Amx/Clv among other 2nd line TB drugs. These drugs were prescribed to patients whose DST showed resistance to some other 2nd line drugs. Sputum smear, culture and DST were performed on all patients at the beginning of treatment and thereafter according to treatment protocols. 15 patients have received both medications (2–8 months), 10 only Cfz (1–14 months), 17 patients only Amx/Clv (1–8 months).

Results: See Table.

Treatment regimen with	Patients n	Patients whose culture converted, clinical and radiological improvements occurred n (%)	Patients whose culture became positive again after stopping drug intake n (%)
Cfz + Amx/Clv	15	12 (80)	4 (33)
Cfz	10	8 (80)	4 (50)
Amx/Clv	17	11 (65)	6 (55)

Conclusion: Despite the fact that a combination of Cfz and Amx/Clv were used for a short period for DR-TB patients, the obvious positive effect of treatment is possible to observe. Deterioration of bacteriological, clinical and radiological condition after stopping the drug intake proves the effectiveness of this combination one more time. Longer and more in depth analysis should be carried out. However, in our case it was impossible because the supply of these two drugs was stopped and future availability is uncertain.

PS-94595-05 Interim outcomes of MDR-TB treatment in Azerbaijani prisons

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Setting: Specialized Treatment Institution, Ministry of Justice, Azerbaijan.

Objective: To evaluate smear and culture conversion of DR-TB patients integrated in treatment with 2nd line anti-tuberculosis drugs.

Methods: DOTS-plus treatment in Azerbaijani prisons has started in 2007 within the framework of GFATM Grant agreement. Sputum smear, culture, DST and radiological examinations were performed on all patients according to treatment protocols.

Results: From April 2007 to February 2009, 120 MDR-TB patients in Azerbaijani prisons have been integrated to the DOTS-Plus treatment with the 2nd line anti-TB drugs. 87 patients out of them (72.5%) had TB in both lungs, 33 patients (27.5%) had TB in one lung. Seven patients (6%) had infiltrative, 113 (94%) had cavitary TB. Interim outcomes of first 66 patients are shown in the Table.

Conclusion: Sufficient efforts should be put to achieve sputum conversion during the first 6 months of treatment as the rate of conversion improves mostly by that time. These outcomes need a long-term follow up.

	6 months of treatment	9 months of treatment	12 months of treatment
Total # of patients at	85	82	66
Sputum smear conversion	66 (78%)	63 (77%)	50 (76%)
Culture conversion	62 (73%)	61 (74%)	49 (74%)
X-ray results improvement	58 (68%)	57 (69%)	46 (69%)

PS-94609-05 Revised CAT II regimen as an alternative strategy for re-treatment of CAT I regimen failure

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Background and aims: Re-treatment Success rate with CAT II in CAT I treatment failures and defaults

is nearly 50%. Therefore, we tried to find another strategy with higher success rate.

Material and methods: From January 2004 to November 2007, 105 patients with pulmonary TB, who failed prior CAT I regimen or with more than one course of irregular anti TB treatment, included in this study. Drug susceptibility testing, for first line anti TB drugs, and PCR were performed. By the time of availability of DST that took 3–4 months, a pilot protocol consisted of Isoniazid, Rifampin, ethambutol, Ofloxacin, Cycloserine and Amikacin started. Then therapeutic regimen adjusted based on four categories of DST pattern: sensitive, non-MDR pattern, MDR pattern, Culture negative. Treatment outcomes were categorized and analyzed.

Results: 48 patients with prior CAT I treatment failure and 52 with more than one irregular treatment courses included in analysis. 72% subjects assigned to good outcome and 28% assigned to poor outcome group. 17% were culture negative. Regarding DST pattern, 13% isolated strains were completely sensitive to first line drugs. 53% strains were MDR, 10% Monodrug and 7% Polydrug-resistant. There was no significant association between DST pattern and outcome. (*P* value = 0.13) (47% vs. 27% *P* value = 0.102). Of 100 patients, 72% were cured, 5% abandoned treatment, 12% died, 6% were classified as treatment failure, 1% relapsed and 5% were transferred out. Of 53 patients with MDR-TB 33 subjects were cured and 7 died. All together, successful outcome was in 62.2%, 76%, and 76% of MDR-TB, non-MDR-TB, and completely sensitive case.

Conclusion: Re-treatment strategy based on DST and replacing the Category II regimen with intermediate regimen called revised CAT II may improve clinical outcomes.

PS-94701-05   Predictors of treatment outcome among MDR-TB patients enrolled in PETTS in the Philippines

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Background: Preserving Effective TB Treatment Study (PETTS) is a multi-country prospective study that aims to determine the frequency of, risk factors for and consequences of acquired resistance to second-line TB drugs (SLDs). The Tropical Disease Foundation (TDF) is implementing PETTS in the Philippines. Demographic and clinical data obtained from patients enabled us to identify predictors of treatment outcome among MDR-TB patients on SLDs.

Design/methods: From March 2005 to June 2008, we enrolled consecutive, consenting adults with pulmonary MDR-TB and viable baseline isolates starting SLDs. We analyzed standardized demographic and clinical characteristics of patients in relation to treatment outcome using WHO standard outcome definitions. Cure and treatment completion were considered good outcomes while failure, death and default were considered poor outcomes. Univariate and multivariate analyses were performed (significance set at $P < 0.05$).

Results: Of 458 patients enrolled, 228 had treatment outcomes by February 2009, and 148 (65%) had good outcomes. Good outcomes were significantly associated with: 1) a BMI > 18 kg (72.4%, vs. 57.1% for BMI ⩽18 kg); 2) a history of > 2 episodes of previous TB treatment (73.1%, versus 52.7% for 1–2 episodes); and 3) culture conversion within the first 3 months of treatment (69.7%, vs. 42.9% for conversion beyond 3 months of treatment). 4) Any culture reversion during the course of treatment was significantly associated with poor treatment outcome (69.2%, vs. 40.7% in the absence of reversion).

Conclusion and recommendations: Four patient characteristics were significantly associated with treatment outcome. Further investigation is underway to explain why patients with >2 previous treatment episodes had better outcomes. Results of the analysis are to be used by TDF to improve the MDR-TB program in the Philippines.

Table   Univariate and multivariate analyses for predictors of treatment outcome among 228 MDR-TB patients

| | Pts n | Pts with good outcome % | Crude odds ratios | | Multivariate regression | |
			OR (95%CI)	P value	Adjusted OR (95%CI)	P value
Employment prior to TB treatment						
Unemployed	98	57.1	0.6 (0.3–1.0)	0.05	0.6 (0.4–1.1)	0.13
Employed	130	70.8				
Number of prior TB episodes						
1–2	93	52.7	0.4 (0.2–0.7)	0.002	0.4 (0.2–0.7)	0.003
>2	134	73.1				
BMI						
>18	116	72.4	2 (1.1–3.6)	0.02	2 (1.1–3.6)	0.02
⩽18	112	57.1				
Culture conversion						
1–3 months conversion	195	69.7	3.1(1.3–7.4)	0.01	2.5 (1.2–5.6)	0.02
4 months and longer	28	42.9				
Culture reversion						
Yes	27	40.7	0.3 (0.1–0.7)	0.001	0.4 (0.2–0.9)	0.02
No	198	69.2				

* Sex, age group, educational attainment, marital status, diabetes, AFB smear and DST results of sputum for diagnosis, radiographic results, waiting time to treatment, admission to TB housing, hospitalization were not significantly associated with outcome in univariate or multivariate analyses

PS-94777-05   Therapeutic effect of rifamycin-containing regimen on central nervous system tuberculosis

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Objective: To study the therapeutic effect of rifamycin-containing regimen on central nervous (CNS) system tuberculosis.

Methods: 39 patients with CNS tuberculosis were treated by 3HAKRsZ/9HRZ regimen (H: isoniazid, AK: amikacin, Rs: rifamycin sodium, Z: pyrazinamide, R: rifampin), while another 40 cases were treated by 3HRAKZ/9HRZ as control group. The cure rates of these two groups were compared.

Results: In rifamycin therapy group, 34 were cured (87.2%) with 4 better, 1 dead and 4 with sequelae after the completion of regimen while in control group 21 were cured (52.5%) with 15 better, 4 dead and 7 with sequelae. The difference between the cure rates of the two groups were significant ($P < 0.01$).

Conclusion: Using rifamycin sodium intravenously as a substitute for rifampin during the initial phase of regimen can significantly improve the cure rate of CNS tuberculosis.

PS-94968-05   Early treatment response predicts MDR-TB, treatment failure and mortality

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Aim: Worldwide, patients are usually only tested for MDR-TB if they survive failing to respond to 4–8 months of empiric first-line therapy. The resultant delay in MDR-TB diagnosis risks transmission, drug-resistance amplification, morbidity and mortality. We therefore assessed early predictors of treatment failure and MDR-TB to identify a high-risk group for early focused MDR-TB testing.

Methods: Unselected patients who adhered to DOTS for pulmonary TB in Peruvian shantytowns were included. Treatment failure was defined as death or lack of cure during 6 months of treatment. In the first community, weight change and sputum microscopy results during early treatment were used to define risk factors for treatment failure. These factors were then evaluated in patients in a nearby shantytown for predicting treatment failure, 5-year outcome (failure, death or recurrence) and MDR-TB.

Results: Treatment failed to cure 9.1% of 460 patients. The best predictors of failure were weight loss or positive sputum microscopy. After 1-month of therapy, 23% of patients had these risk factors, which included 65% of patients whose treatment later failed. By 2-months therapy, 30% of patients had these risk factors, including 74% of treatment failures. When these risk factors were evaluated in a sec-

ond population, after 1-month they were positive for 26% of 411 patients, including most patients with MDR-TB or poor outcome. By 2-months of therapy, these risk factors defined the third of patients who had 3-times the hazard of poor 5-year outcome (graph, $P = 0.0003$) and who included 74% of treatment failures and 80% of MDR-TB.

Conclusion: Weight loss or positive sputum microscopy during the first 2-months of TB therapy are risk factors that identify approximately a quarter of patients, including three-quarters of those whose treatment will fail and 80% of MDR-TB. Thus, patients with these risk factors during early TB treatment should receive enhanced care including early and rapid MDR-TB testing.
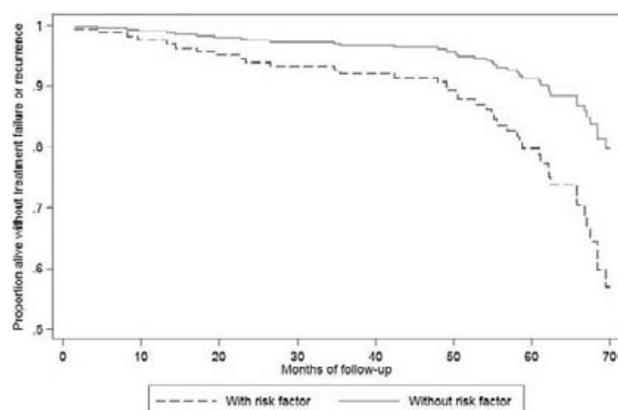
Figure Weight loss and sputum microscopy predict TB outcome.

PS-94994-05   Unfavorable outcome observed in two different TB treatment regimens: 2HREZ/6TH and 2HREZ/4(RH)3

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Setting: The Damien Foundation Bangladesh is involved in TB control for a population of 27 million through 165 diagnostic and treatment centers. The Directly Observed Therapy (DOT) is ensured through community based DOT providers. These are regularly supervised by the programme staff.

Methods: Retrospective analysis of data for new smear-positive patients registered in the cohorts 2000 (treated with 2HREZ/6TH) and 2004 (treated with 2HREZ/4R3H3) to see their ultimate treatment outcomes (initial treatment outcome plus further outcome of those re-treated as failures, relapses and defaulters from same cohort). Data were also analyzed to see the proportion of chronic cases (failures after re-treatment regimen) produced by both regimens.

The relapse rate was analyzed over a three-year follow-up after initial outcome of both cohorts.

Results: During the year 2000 and 2004, totals of 8378 and 9398 new smear-positive TB patients were registered, respectively. Analysis of the treatment outcome of both cohorts it showed that for the cohort 2000 the ultimate cure rate was 90%, default rate 3.6%, death rate 5.4% and chronic case was 0.19%. The outcomes for the cohort 2004 were 91%, 3.7%, 3.52% and 0.23% respectively. The relapse rate was 2.39% and 1.56% respectively for the cohort 2000 and 2004.

Conclusion: The ultimate cure rate and chronic cases produced by both the regimens have no significant difference but the death rate and relapses are higher among patients who received the 8-month regimen than that of those who received the 6 month-regimen.

PS-95128-05   Tuberculosis multi-drogorresistente en el estado de San Luis Potosi

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Antecedentes : La tuberculosis (TB) es un problema de salud pública en México. La TB multidrogoresistente (TB-MDR) causa una mortalidad elevada, gastos considerables en su tratamiento, además de la potencial transmisión. Para poder considerar nuevas estrategias para su prevención, es importante conocer las características de los pacientes con TB-MDR en nuestra población,

Métodos : Se realizó un estudio retrospectivo, observacional y descriptivo con el objetivo de describir las características sociodemográficos y clínicas de una cohorte de pacientes con TB-MDR en el Estado de San Luis Potosí. Se incluyó a todos los con diagnóstico comprobado de TB-MDR mediante cultivo, drogosensibilidad y tipificación que fueron identificados durante los años 1998–2008.

Resultados : La edad promedio de los pacientes fue de 47,3 años. La principal comorbilidad asociada fue diabetes mellitus [11 casos (39%)], seguida del tabaquismo [8 casos (29%)] y desnutrición [6 casos (21,4%)]. El nivel socioeconómico predominante en esta población fue bajo [23 casos (83%)]. Al momento del diagnóstico de TB-MDR los pacientes habían recibido, en promedio, 2,9 tratamientos previamente. En 18 de ellos (64%) se reportó fracaso en el primer tratamiento. 16 de los pacientes (57,1%) han fallecido.

Conclusiones y recomendaciones : Los pacientes con TB-MDR cuentan con comorbilidades frecuentemente. En la mayoría de los pacientes la respuesta del primer tratamiento no fue favorable. La vigilancia estrecha de la respuesta al tratamiento, particularmente en pacientes con enfermedades subyacentes,

podría resultar en detección temprana de pacientes con riesgo de desarrollar TB-MDR y, potencialmente, tener un impacto positivo en la curación y prevención de complicaciones.

PS-95222-05   Second-line tuberculosis drugs lack sterilizing activity

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Three different activity of anti tuberculosis drugs are described: early bactericidal activity, preventing the emergence of drug resistance and sterilizing activity. Sterilizing activity is mostly seen in rifampisin and pyrazinamide, so this two drugs decreased treatment period to 6 months. We observed treatment interruption in some tuberculosis patients receiving second line treatment (SLT) and some of them became smear/culture positive again in short durations. We wanted to share this experience. Retrospectively we reviewed the files of these patients. All patients presented here were treated with standard first line regimens for 5 to 24 months and all failed. Seven of these 8 patients were multidrug-resistant tuberculosis (MDR-TB). They all received amikacin, ofloxacin, PAS, prothionamid and cycloserine as SLT. Data of the 8 patients are presented in the Table. First patient received SLT for 12 months and continued as smear negative after interrupting treatment for 12 months. Second patient received SLT for a short duration (3 months) and after 5 months without drugs he became culture positive. Third patient received 5 months of SLT and became culture positive after a long period of (12 months) stopping treatment. Patients 4 to 8 received SLT for 4.5 months and more; culture conversion was seen in the first month (4 cases) and second month (1 case); after short duration of pause of the treatment (15 to 51 days) they all became culture positive; 4 of them heavily positive. These findings, especially the results of patients 4–8 show the lack of sterilizing activity of second line TB drugs. This implies that, SLT should be given under strict observed treatment and treatment duration should be kept long.

Patient number	Resistant first line drugs	Second line treatment duration (months)	Culture conversion (months)	Duration of treatment interruption	Culture after interruption
1	HRSE	12	?	12 months	−
2	HR	3	2	5 months	++
3	HRSE	5	1	12 months	++
4	HRS	4.5	1	24 days	+
5	None	4.5	1	30 days	++
6	HRSE	5	1	51 days	++
7	HRSE	6	2	19 days	++
8	HR	10	1	15 days	++

PS-95291-05   Drug-resistant tuberculosis management: Egypt experience

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In Egypt, multidrug resistance tuberculosis (MDR-TB) was 2.2% among newly diagnosed cases and 38.4% among retreated cases according to the last drug resistance survey in 2002. Application to the Green Light Committee to establish a DR-TB management project was approved and patient enrolment started July 2006 applying standardized treatment regimens.

This study aimed at describing the cohort of the 127 patients enrolled and evaluating the treatment outcome of the 27 who finished treatment by September 2008.

The descriptive analysis of the 27 patients included socio-demographic characteristics, type of patient (new/retreated), presence of other co-morbidities, the treatment regimen used, side effects, time of direct smear and culture conversion.

27 patients completed their treatment regimens, achieved 66.7% cure rates. Mortality rate was 18.5%, treatment failure 11.1%, and 3.7% defaulted.

By the 5th month, direct sputum smear conversion was 100% and culture conversion 74%. Out of the studied factors that could affect treatment outcome; female gender, younger patients' age, negative history of previous intake of second-line anti-TB drugs, and the short duration of illness before starting treatment with the second-line drugs were significantly associated with favorable treatment outcome.

PS-95372-05   Effect of second-line drug resistance on treatment outcome among MDR-TB patients in PETTS Study

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Setting: 'Preserving Effective TB Treatment Study,' PETTS, is a prospective, observational study of consecutive MDR-TB patients enrolled in 9 countries, 2005–2008: Estonia, Latvia, Peru, Philippines, Russia, South Africa, South Korea, Taiwan and Thailand.
Objectives: The overall objectives of PETTS are to determine the rate of, risk factors for, and consequences of acquired resistance to second-line drugs (SLD) in MDR-TB patients. The focus of this analysis

is to examine the treatment outcomes of patients enrolled in 2005–6 in 6/9 participating countries.
Methods: Sputum specimens are cultured for mycobacteria at the start of treatment and monthly. *M. tuberculosis* isolates are shipped to CDC where drug susceptibility tests (DSTs) for 12 first- and SLDs by the proportion method on Middlebrook 7H10 agar. 'Plain' MDR was defined as resistance to at least isoniazid (INH) and rifampicin (RIF) but no SLDs. XDR was defined as resistance to INH, RIF, a fluoroquinolone (FQ), and an injectable SLD (INJ: amikacin, capreomycin, kanamycin). Cure and completion were considered favorable outcomes; death, failure, and default, unfavorable. CDC and participating country IRBs approved this research, funded in part by USAID.
Results: As of 03/2009, 411/799 MDR-TB (51%) patients enrolled in PETTS, 2005–06, had baseline DST completed. Eight patients transferred and were not evaluated. Of 403 patients, 210 had a favorable outcome (52.1%), 160 unfavorable (39.7%), and 33 were continuing treatment (8.2%). Of 216 patients with no SLD resistance, 77 (35.6%) had a poor outcome. Relatively more patients had poor outcomes among those who had resistance to an INJ (26/48, 54.2%), a FQ (15/27, 55.6%), or both (17/21, 81%) (*P* < 0.05) (Table).
Conclusions: Compared with 'plain' MDR-TB, patients whose baseline isolates were resistant to an INJ or a FQ (but not both) had ~1.5-fold increased risk and resistance to both drug classes conferred ~2.3-fold increased risk of a poor outcome.

Resistance pattern	Total	Outcome, *n* (%)		RR, 95% CI
		Unfavorable	Favorable	
All	370	160 (43.2)	210 (56.8)	
Plain MDR, no SLDs	216	77 (35.6)	139 (64.4)	Ref
MDR + ETA or PAS*	58	25 (43.1)	33 (56.9)	1.2 (0.9,1.7)
Any INJ, no FQ	48	26 (54.2)	22 (45.8)	1.5 (1.1,2.1)
Any FQ, no INJ	27	15 (55.6)	12 (44.4)	1.6 (1.1,2.3)
XDR-TB	21	17 (81.0)	4 (19.0)	2.3 (1.7,3.0)

* Ethionamide, p-aminosalicylic acid.

PS-95379-05   Treatment outcomes in MDR-TB patients: the Peruvian National Control Program experience

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Background: Multidrug-resistant tuberculosis (MDR-TB) is an important problem in public health with changing programmatic approaches over the last decade.

Objective: To describe the outcomes of MDR-TB patients included in a large national Peruvian cohort.

Methods: Outcomes of patients included in the National Program-based cohort of subjects treated for MDR-TB who started treatment from January 1996 to September 2006 were analyzed. Diagnosis of MDR was done in a clinical and microbiological basis. Final outcomes were classified as cure, failure, lost of follow up or death. Treatment schemes were categorized as empiric (based on the drug susceptibility of the MDR contact), standardized based on 5 drugs, standardized based on 7 drugs and individualized (based on available susceptibilities).

Results: During the study period, 11148 patients were included in the program for MDR-TB from which 2233 were excluded from the cohort due to incomplete data. 9402 patients were included in the final analysis. The overall cure rate was 49.8%. For individualized treatments, the overall cure rate was 63.6%. Standardized treatment based on 7 drugs reduced significantly the proportion of failures compared to the 5 drugs based standardized scheme (23.7 vs 6.8; $P < 0.01$); however the overall cure rates were similar (41.6 for both) and the lost of follow up was higher. Empiric schemes had 57.6% cure rate. The overall mortality was 11.5%.

Conclusions and recommendations: The introduction of individualized treatments based drug susceptibility represented a landmark in the treatment of MDR-TB patients improving significantly the cure rate. Lack of adherence still represents an important issue. From a national program basis, we propose that efforts must be done to include early results of drug susceptibility in the treatment decisions to optimize the outcomes in resource-constraint settings.

Regimen	Cured	Failure	Death	Lost to follow up	Total
Individualized	1820 (63.66)	125 (4.37)	405 (14.17)	509 (17.8)	2859
Standardized 5 drugs	1998 (41.8)	1132 (23.68)	487 (10.19)	1163 (24.33)	4780
Standardized 7 drugs	444 (45.92)	66 (6.83)	107 (11.07)	350 (36.19)	967
Empiric	178 (57.61)	15 (4.85)	28 (9.06)	88 (28.48)	309
Total	4440 (49.8)	1338 (15.01)	1027 (11.52)	2110 (23.67)	8915

PS-95405-05   Risk factors for treatment failure in MDR-TB patients from the Peruvian National TB Control Program

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Introduction: During MDR-TB treatment it is important to early recognize risk factors for treatment failure in order to decide preventive interventions.

Materials and Methods: During 1996–2008, among the patients treated at the National TB Program, a total of 1368 MDR-TB patients failed to treatment and 4542 patients cured. The probability of failure was modeled with a multiple logistic regression by comparing 'failure' vs. 'cure'. As predictor covariates we tested baseline and follow-up covariates corresponding to the first and third month of treatment. In order to control for confounding, adjusting for registered covariates, interactions and second order effects were assessed.

Results: The addition of cycloserine and PAS to the old 5-drugs standardized scheme reduced the probability of failure in 53%. The standardized scheme was associated to an overall risk of failure 24 fold higher compared to the individualized scheme. The empiric scheme had a 4 fold higher risk of failure compared to the individualized scheme. A positive initial sputum smear and a positive culture at the first month of treatment increased the risk of failure 1.7 and 2.8 fold respectively compared to a negative bacteriology. An unfavorable clinical and an unfavorable X-ray evolution at the 3rd month of treatment were associated with 3 and 13 fold increased risk of failure compared to a favorable evolution (Table).

Conclusion: It is possible to determine early indicators of treatment failure to design preventive interventions. The early switching to an individualized scheme reduces 24 fold the risk of treatment failure in average.

Recommendations: Efforts should be done to offer individualized treatments to all patients with MDR-TB. It is also important to access to a fast report of early longitudinal variables in order to determine more precisely high risk groups of patients for treatment failure.

Predictor covariate	Multiple logistic regression		
	3rd month OR (*P* value)	1st month OR (*P* value)	Baseline OR (*P* value)
Sex	1.15 (0.411)	1.11 (0.417)	1.04 (0.663)
Age	0.99 (0.095)	1.00 (0.711)	1.00 (0.150)
Stand 5 vs 7	0.47 (0.028)	0.47 (0.005)	0.54 (0.001)
Bk init.	1.65 (0.050)	1.74 (0.007)	2.22 (0.000)
Cult 1st m	2.76 (0.000)	3.29 (0.000)	NE
Prev retreat	2.39 (0.006)	2.16 (0.002)	1.66 (0.004)
Clin evol 3rd stationary	3.10 (0.000)	NE	NE
Clin evol 3rd Unfavorable	2.71 (0.032)	NE	NE
X-ray evol 3rd station.	1.95 (0.001)	NE	NE
X-ray evol 3rd unfavor.	13.13 (0.000)	NE	NE
Standard. scheme	23.54 (0.000)	17.92 (0.000)	12.57 (0.000)
Empiric scheme	3.89 (0.046)	3.43 (0.021)	2.42 (0.024)
	$R^2 = 0.36$	$R^2 = 0.26$	$R^2 = 0.20$

PS-95407-05   Impact of medication adherence on culture conversion during treatment of MDR-TB in Tomsk, Russia

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Background: There are limited data available regarding the impact of adherence levels on culture conversion during treatment of multidrug-resistant tuberculosis (MDR-TB). Many MDR-TB management programs encounter problems keeping patients adherent to an 18–24 month course of treatment. The aim of this study was to identify the impact of adherence on MDR-TB culture conversion.
Methods: We analyzed data from all patients who were enrolled for MDR-TB in Tomsk, Russia between September 2000 and November 2004. We measured the proportion of missed doses (non-adherence) from the beginning of treatment until culture conversion or until the end of treatment (among non-converters). Using logistic regression we examined the association between adherence and failure to achieve culture conversion with other known predictors of culture conversion such as bacteriological culture load, resistance to fluoroquinolones (ofloxacin) and injectables at the beginning of treatment, body mass index, unfavorable initial X-ray, long duration of TB, and the presence of alcohol and/or drug dependence.
Results: Out of 636 patients, 529 had a positive culture at the beginning of treatment and were eligible for this analysis. Among patients with high adherence (median of 2.4% missed doses), 256/262 (97.7%) patients achieved culture conversion, versus 199/267 (74.5%) among those with low adherence (>2.4% of missed doses). In multivariable logistic regression, low adherence (adjusted odds ratio [AOR] 12.5, 95%CI 5.1–30.7) and resistance to ofloxacin (AOR 4.1, 95%CI 1.6–10.6) were strongly associated with the failure to achieve culture conversion.
Conclusion: In the Tomsk MDR-TB treatment program, there is a strong association between adherence level to medication and the odds of culture conversion during treatment. More efforts and resources should be devoted to improve adherence among patients.

PS-95450-05   Successful treatment of multidrug-resistant tuberculosis in Kampala, Uganda

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Introduction: We previously reported the detection of multidrug-resistant tuberculosis (MDR-TB) in patients treated at the Mulago Hospital in Kampala, Uganda. As treatment for MDR-TB was not previously available in Uganda, we implemented a treatment program with second-line drugs to assess the feasibility of treating MDR-TB in this resource-limited setting.
Methods: We retrospectively reviewed records to collect data on demographics, HIV status, time to culture conversion, toxicity, relapse and mortality.
Results: MDR-TB patients were selected for treatment on the basis of ability to comply with directly-observed therapy and with follow-up in our clinic; all resided within the greater Kampala area. All patients were treated with an individualized regimen guided by drug-susceptibility testing using BACTEC cultures. All received levofloxacin orally and amikacin intramuscularly as well as other first and second line drugs. Twelve patients (5 women and 7 men; mean age 33.1 years; S.D. 9.6) initiated treatment for MDR-TB. All patients had cavitary disease with a large bacillary load [median AFB smear 4 (range 1–4); mean BACTEC days-to-positive 3.1 days (SD 1.9)]. Two patients were HIV-positive, one with a CD4 count >400 and one receiving anti-retroviral medication. All patients completed 24 months of therapy except for one patient who died from non-TB causes during month 3 of treatment after sputum culture conversion. The mean time to culture conversion was 2.67 months (SD 1.23). There were no relapses identified at follow-up 24 months after completion of treatment. The major adverse reaction to the treatment regimen was pain associated with the intramuscular injections of amikacin, probably related to the volume.
Conclusion: Treatment of MDR-TB in this resource-limited setting is feasible and relatively well-tolerated. Treatment outcomes after two years are good in spite of the presence of cavitary disease and the lack of access to surgical resections.

PS-95463-05   Retrospective analysis of mortality from TB based on the data of tuberculosis hospital of the city

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Kazakhstan is a high burden country in terms of morbidity and mortality from TB, however, there is no data about social groups of population which has TB and dies from it.

We undertook retrospective analysis of 100 autopsies (including 11 females at the age from 23 to 54, and 89 males at the age from 21 to 72) from tuberculosis hospital which treats patients from narcologic center.

The results were the following:

— In 39 cases, different TB forms were diagnosed during the morphological analysis

— In 93 cases, the cause of death was from aggravation of TB, including 6 cases of pulmonary hemorrhage;

— In 14 cases, patients were alcoholics, and in three cases the death was a result of massive hematemesis

— In 30 cases, there was cachexia

— In 13 cases, there were traces of narcotics in blood (in three cases HIV was diagnosed).

During morphological analysis we found changes in internal organs that indicated presence of two and more chronic diseases (in addition to TB) at the stage of decompensation.

During the analysis we revealed secondary TB:

Central caseation and peripheral fibrosis (47 cases),

Caseous pneumonia (9 cases).

Moreover, we observed systemic miliary tuberculosis affecting three and more systems (6 cases), and tuberculous meningitis (3 cases).

Conclusion:

Social factors play important role in the structure of morbidity and mortality in Kazakhstan (because of combination of TB with chronic alcoholism, drug addiction and cachexia).

Unfavorable course of TB is connected with presence of grave conditions, which can be considered as competing conditions (alcoholic cirrhosis with massive hematemesis; malignant tumours with metastasis; arterial hypertension with cerebral hemorrhage; and diabetes mellitus).

Development of hilar lymph nodes with caseation can be considered as morphological feature of secondary TB with central caseation and peripheral fibrosis.

PS-95504-05   Comparison of characteristics of XDR-TB survivors with those of non-survivors in rural KwaZulu-Natal

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Background: The initial 53 XDR-TB cases reported in 2006 from Tugela Ferry had rapid and high mortality. Since then, 468 patients (pts) have been diagnosed and a growing number of survivors have emerged. We compare demographic, clinical, and treatment characteristics of survivors and non-survivors.
Methods: Retrospective review of hospital records and TB registers of XDR-TB cases from Tugela Ferry, South Africa. Survivors were defined as alive >6 months (mos), and non-survivors as having died <6 mos, from sputum collection.
Results: From 2005–2008, 63/468 XDR-TB pts (14%) survived. Of the initial 31 survivors and 30 non-survivors reviewed, 65% and 73% were female; median age 33 and 34 years. At time of review, survivors lived a median 16 mos (IQR13–24) after sputum collection, while non-survivors died after a median 2.9 mos (IQR1–4.6). Sputum smears were positive in 39% of survivors and 70% of non-survivors ($P = 0.01$). 100% of survivors and 90% of non-survivors were HIV coinfected, with median baseline CD4 counts of 166 cells/mm^3 (IQR76–313) and 103/mm^3 (IQR56–169), respectively ($P = 0.13$). 84% of survivors and 40% of non-survivors received antiretroviral therapy (ARVs) ($P = 0.001$). 50% of deaths occurred prior to referral for XDR therapy while all survivors initiated standardized XDR treatment (ethambutol, pyrazinamide, ethionamide, PAS, cycloserine/terizidone, capreomycin). 59% of survivors had sputum culture conversion after 12 mos of therapy and 79% achieved undetectable VL with median rise of 160 CD4 cells/mm^3 (IQR86–175).
Conclusions: Mortality from XDR-TB and HIV coinfection remains extremely high, but a growing number of survivors have emerged. In this preliminary analysis, these pts were more likely to receive ARVs, AFB smear-negative, and receive treatment for XDR-TB, compared to those who died within 6 mos. Earlier diagnosis and ARVs may improve survival from XDR-TB; further study should investigate the role of ARVs and XDR-TB therapy for coinfected pts.

PS-95586-05   Extended susceptibilities of 281 XDR-TB and 5589 MDR-TB strains from patients in Peru

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Background: Tuberculosis drug resistance has increased in Peru from 3% of all cases in 1999 to 8% of all cases in 2006 and Peru has diagnosed more than 200 XDR-TB cases. We therefore studied MDR-TB and XDR-TB extended sensitivities in order to guide treatment.

Methods: All 5589 MDR-TB strains from 3870 patients and 281 XDR-TB strains from 173 patients identified by the Peruvian National reference laboratory system from January 2005 until December 2008 had extended drug-susceptibility testing by the proportions method (7H10 agar), with pyrazinamide susceptibility testing using the Wayne technique. The proportion of strains that were resistant (95% confidence intervals) are stated in the text and shown in the graph.

Results: MDR-TB patients were mainly male (61.6%) and 77.8% were from Lima. Most MDR-TB strains were also resistant to pyrazinamide or ethambutol. Two thirds of MDR-TB was resistant to streptomycin. Of the MDR-TB strains, 8.0% (7.2–8.8%) were resistant to ciprofloxacin and 5.0% (4.7–6.1%) were XDR-TB. 26.0% of MDR-TB strains were fully sensitive to all other drugs tested. 64% of XDR-TB patients were male and 93% were from Lima. Most XDR-TB strains were resistant to most drugs including ehtionamide or kanamycin or capreomycin. In contrast, amongst the XDR-TB strains, only 4.6% were resistant to cycloserine and 21.5% were resistant to PAS.
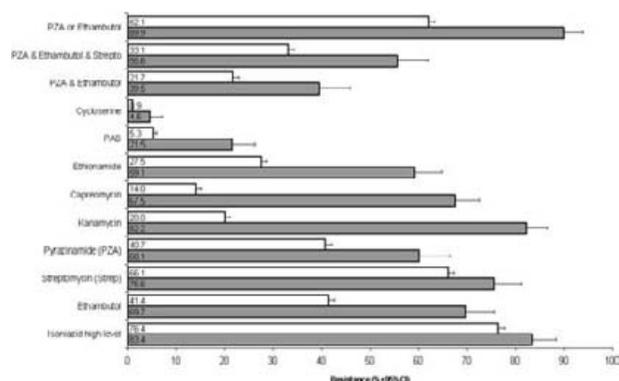
Figure   MDR-TB (white) and XDR-TB (gray) resistance patterns.

Implications: Resistance to streptomycin was frequent. Most MDR-TB was also resistant to ethambutol or pyrazinamide and therefore requires specific therapy and should not be treated with first-line drugs alone. MDR-TB resistance to ciprofloxacin was rare and MDR-TB and XDR-TB resistance to cycloserine

and PAS were uncommon. These resistance profiles should be used to guide appropriate therapy for patients awaiting drug-susceptibility testing results.

TB TREATMENT, ADVERSE REACTIONS AND SUPPLEMENTAL THERAPY

PS-94030-05   Weight loss is an important risk factor for interruption of anti-tuberculosis medication in hepatotoxicity

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Aim: Drug-induced hepatotoxicity (DIH) is an important complication of treatment of tuberculosis (TB); if severe, it may necessitate interruption of anti-TB medication. Because malnutrition might be a risk factor in DIH, we aimed to determine its contribution to interruption of anti-TB medication.

Methods: Retrospective observational study of 192 TB patients consecutively admitted in a third-line Tuberculosis Center in the Netherlands, 2005–2008. The outcome measure for DIH was defined as necessitating interruption of TB drug treatment. Multivariate logistic regression analysis on interruption of anti-TB medication was performed, with age, gender, nutritional status, tuberculosis disease severity, drug resistance, co-morbidity including baseline liver functions, anti-TB medication regimen, co-medication and addictions as independent risk factors.

Results: Anti-TB medication was interrupted in 31 patients (16.1%) of the population studied. The most important risk factor was weight loss of 2 kg or more within 4 weeks during TB treatment (OR = 211, CI = 36.0–1232). Other independent risk factors were infection with hepatitis C (OR = 19.6, CI = 2.4–164), age over 60 years (OR = 18.5, CI 2.3–151) and multidrug-resistant TB (OR = 8.2, CI 1.3–53.6).

Characteristics of the study population	$n = 192$ (100%)
Age, mean ± SD	39.8 ± 16.6
Female	44 (22.9%)
Non-European, origin	124 (64.6%)
Body mass index, at start treatment, mean ± SD	20.3 ± 3.9
Weight loss ⩾2 kg after start treatment	28 (14.6%)
Pulmonary TB	135 (70.3%)
Multidrug resistance TB	15 (7.8%)
HIV positive	15 (7.8%)
Hepatitis B positive	3 (1.6%)
Hepatitis C positive	11 (5.7%)
Alcohol abuse	67 (34.9%)
Drugs abuse	50 (26.2%)

Conclusions: Weight loss during TB treatment was the most important risk factor for DIH necessitating interruption of anti-TB medication. Future studies on prevention of weight loss are needed to demonstrate a causal relationship.

PS-94049-05   Anti-tuberculosis drug complications in patients with pulmonary tuberculosis

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A retrospective study was performed on 102 smear-positive pulmonary tuberculosis (TB) patients hospitalized in TB ward of Masih Daneshvari Hospital during a one-year period (2007). Demographic data including age, gender, race and some factors like type of treatment group, anti-TB drug complication, duration of drug use, history of underlying disease, addiction, co-administration of other drugs and management method of drug complication were evaluated in this study. Forty (38.7%) out of 102 patients had anti-TB drug complications of which 21 (20.5%) were male and 10 (18.6%) were female. Mean age of patients was 50.6 ± 20.2 yrs (range, 8–81 yrs). Eighty-one (79.4%) cases were included in treatment group 1 and 21 (20.5%) were included in treatment group 2. Twenty-six (25.5%) had minor complications and 14 (13.5%) had major complications. Major complications were clinical hepatitis, vestibular system involvement, generalized seizure and thrombocytopenia which were detected in 10 (9.8%) cases, 2 (1.9%), 1 (0.9%) and 1 (0.9%), respectively. Minor complications included hyperuricemia in 7 cases (6.8%), arthralgia in 7 (6.8%), increased transaminase levels without clinical jaundice in 6 (5.8%) and GI complications in 6 cases (5.8%). Anti-TB drug complications were detected in all patients 3 or 6 weeks after their initiation. Regarding high incidence of anti-TB drug complications we found in this study, it is recommended as follows:

1 Performing more clinical trials using newer anti-TB drugs with less complications.
2 Careful monitoring of patients, para- or clinically, for evaluation of minor and major complications during the anti-TB treatment course.
3 Education of patients before initiation of anti-TB therapy.

PS-94187-05   Adherence to LTBI treatment in homeless and illegal immigrants

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Background: Treatment of latent tuberculosis infection (LTBI) in immigrants from endemic countries is an asset to control and eliminate tuberculosis (TB) in western countries. Metropolitan areas are the main destination of new immigrants, thus the best setting to implement targeted LTBI testing and treatment.
Methods: Data about all immigrants undergoing a LTBI treatment were extracted from an electronic database recording all subjects treated for LTBI enrolled prospectively from January 1992 to December 2008 at the Villa Marelli Institute, Niguarda Hospital, Milan Italy. Treatment completion rate was evaluated and a sub-analysis was performed for subjects not holding a visa to stay in Italy or applying for shelters.
Results: Of 11 122 subjects treated for LTBI, 7968 immigrants were recorded in the study period. The overall completion rate in immigrants was 67.3%, lower than among Italians (77.2%, $P > 0.01$). Among immigrants with visa but applying for shelter, a statistically lower completion rate was recorded (51.8%) compared with subjects without visa but able to rent a place to stay (72.2%, $P < 0.01$).
Conclusions: Our data show that implementation of LTBI treatment among immigrants can be a feasible and successful intervention; special consideration should be given to immigrants without a place to stay, due to their higher rate of defaulting to treatment

PS-94326-05   Shift from private health facility to government health facility under the RNTCP programme

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Background: Studies have revealed that private health providers (PPs) were the preferred choice of contact by chest symptomatics/TB patients for diagnosis and treatment. However after the initiation of the Revised National TB Control Programme (RNTCP) it has been found that there is a shift in this health seeking behaviour among chest symptomatics/TB patients. It has been observed that patients who have been initiated on treatment at private facilities frequently switch over to the public health facility.
Aim: To find out the perceptions of patients on private/government health facilities and reasons for shifting treatment from private facility to government health facility.
Methods: All the patients (1311) diagnosed and registered for TB treatment in government Tuberculosis Units (TU) both in rural and urban areas, between June and December 2005were considered for the study. A screening form was used to enlist private patients (104) who had shifted their treatment to gov-

ernment health facilities. A semi-structured interview schedule was used to collect data.

Results: The perceptions among patients regarding private facilities was proximity (84%) reported more among urban patients than rural patients ($P < 0.05$). Reasons for discontinuation of treatment from PPs and moving to government facilities was due to financial problems (63%), availability of free treatment (49%) and referred by PPs themselves (43%). Satisfaction with government facilities was expressed by 94% and 84% of patients reported that even if the drugs were provided by PPs free of cost they would prefer a government facility.

Conclusion: This study has reflected that while private facilities are approached initially, there is a shift to government facilities for treatment. Overall satisfaction of patients towards the government health facilities has been reported. More advocacy programmes are required to sensitize patients on the availability of free and quality health care at government heal facilities.

PS-94406-05   Understanding the socio-cultural determinants of delays to diagnosis of TB: a study from Chennai, India

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Background: Globally, notified cases of tuberculosis in men exceed that in women significantly. They are often attributed to issues of accessibility of health services, socio-economic and socio-cultural factors and health system weaknesses. Understanding these determinants is crucial for TB control. This study conducted in Chennai India was part of a multi-centered study and used a cultural epidemiological approach to identify the role of gender and illness-related socio-cultural determinants of problem delay with reference to the interval from symptom onset to diagnosis of TB.

Methodology: The study consisted of four components: Situation assessment of the health system, review of TB programme data from the records of 18 Microscopy Centers in the city, Individual, in-depth semi-structured interviews with men and women TB patients (127 patients) and survey of new TB patients (1000 patients).

Results: Overall, there was a steady decline in the Female:Male ratio from the Out Patient stage (0.71), through Laboratory testing (0.61) to Treatment initiation (0.37). More women (64%) than men (47%) went to a private medical practitioner first incurring an avoidable expenditure. The mean stigma score was higher for women (21.72) compared to the men (18.55) more women had a successful outcome to

treatment compared to men (92% vs 86%), Death was higher in women (4% vs 2%) whereas failure of treatment was higher in men.

Conclusion: There is a gender pattern in health seeking, investigation and treatment for TB showing more males than females at every level. We believe that women delayed the crucial step leading to diagnosis possibly due to poorly understood sociological and economic reasons. Delays in initiating treatment could again be considered both from the patients' perspective as well as from the provider's viewpoint.

PS-94411-05   The prevalence of vitamin D deficiency in adult TB patients at a central hospital in Malawi

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Aim: Vitamin D deficiency is associated with impaired macrophage function and impaired immunity to mycobacterium. Clinically, vitamin D deficiency (VDD) is associated with susceptibility to Tuberculosis (TB). The main objective was to assess the prevalence of Vitamin D deficiency in adult TB patients at a teaching hospital in Malawi. A secondary objective was to investigate associations of vitamin D deficiency.

Methods: This was a cross sectional study. A structured questionnaire was administered to all adult TB patients (in- and out-patients) receiving care from the hospital during July/August 2008. A single blood sample for vitamin D measurement was collected and analysed using an IDS 25-hydroxy vitamin D (25 (OH)D enzyme immunoassay.

Results: 161 patients were enrolled, 74.5% (120/161; 95%CI 67.1–81.1) had hypovitaminosis D (25 (OH)D $\leq$ 75 nmol/L), 42.2% (68/161; 95%CI 34.6–49.8) had VDD ($\leq$50 nmol/L) and 11.2% (21/161; 95%CI 6.3–16.1) had severe VDD ($\leq$25 nmol/L). VDD was more common in in-patients: 49/102 (48%) vs 19/59 (32%); OR 2.83 (95%CI 1.27–6.34; $P = 0.01$). No relationship was established between BMI and vitamin D status, however, BMI was lower in in-patients 19.0 (18.4–19-6) vs. 20.5 (19.7–21.2), $P < 0.004$. All patients were black Malawians. No association of VDD with admission period, HIV status, age, gender, type of TB or TB frequency was found.

Conclusion: This population is representative of urban, adult TB patients in Malawi. Hypovitaminosis D was highly prevalent, in particular in in-patients. No association was found with any of the other factors investigated although the relatively small sample size may have obscured some associations.

Recommendations: To carry out a larger cross sectional and prospective study to determine the associations of hypovitaminosis D and effect on outcome. If an association between hypovitaminosis D

and TB risk or poor treatment outcome is established to carry out an intervention study of vitamin D supplementation.

Variable	Frequency	%	Mean (SD) 25(oh)d Nmol/l
Gender			
Male	82	51	58.4 (28.3)
Female	79	49	61.1 (29.2)
Age distribution, years			
18–30	58	36	57.9 (25.9)
>30–50	89	55	61.0 (13.3)
>50	14	9	59.3 (30.5)
Education			
None	1	0.6	
Primary	96	59.6	
Secondary	58	36	
Tertiary	6	3.7	
Occupation			
Unemployed	62	37.6	
Employed	43	29.9	
Self employed	56	35	
Admission status			
In-patients	102	63.4	56.0 (28.3)
Out-patients	59	36.6	66.0 (28.4)
TB frequency			
1st episode	93	57.8	62.4 (30.4)
2nd	63	39.1	56.5 (26.5)
3rd or more	5	3.1	49.9 (18.0)
HIV status			
Positive	106	65.8	58.0 (27.4)
Negative	23	14.3	55.4 (28.9)
Unknown	32	19.9	68.4 (31.8)

PS-94461-05   Adverse effects in long-term full dose linezolid treatment in patients with intractable MDR-TB

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Background: Although in vitro studies have shown good activity of linezolid against MDR, its long-term use may be limited by its serious adverse reactions.
Objective: To correlate certain variables (age, gender, body mass index, co-morbidity and prophylaxis with pyridoxine) with side-effects caused by prolonged full-dose linezolid treatment in patients with untreatable MDR-TB.
Methods: 26 MDR-TB patients unresponsive to at least three cycles of treatment with second-line drugs were treated with linezolid (600 mg twice a day) in combination regimens for a minimum of 12 days up to a maximum of 480 days (median 60 days). All strains were sensitive to linezolid with MIC < 1 mg/l. The association between the variables and side effects was evaluated by χ^2.
Results: In 14 (53.8%) on 26 patients treated with linezolid the cultures become negative. Serious adverse events were observed in 17 patients (65%) out to the 26, without any association between the vari-

ables analyzed. Peripheral neuropathy was reported in 7 patients (41%) out of these 17 and anemia was reported in 9 patients (53%). Both adverse events were observed in only one patient. In all patients with hematological abnormalities the bone marrow function normalized after cessation of linezolid but was not observed regression of peripheral neuropathy.
Conclusion: Although clinical and microbiological evidence suggests that linezolid may be an effective therapeutic option in untreatable MDR-TB its side-effects remain a major limitation to its use in the long term therapy, particularly peripheral neuropathy. Since no association was observed between the variables analyzed and the occurrence of drug-related side effects, an electromyography and serial neurological clinical examinations before and during treatment with linezolid may be only way to detect the early development of neuropathic injury in order to interrupt linezolid therapy and avoid irreversible adverse reactions.

PS-94517-05   The detoxification protein gene polymorphisms in adverse drug reactions among TB patients

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Background: The three phases of detoxification are oxidation, conjugation, and transportation. The oxidation reaction is mainly catalyzed by cytochrome *P* 450 (CYP), while UDP-glucuronosyltransferase (UGT) is the major enzyme involved in the conjugation reaction, with a number of proteins responsible for the transportation of toxic metabolites. Conjugation and transportation are newer areas of research focus in the 21st century. This study investigate the relationships between detoxification protein (UDP-glucuronosyltransferase, UGT) gene polymorphisms and adverse drug effects of anti-tuberculosis disease drugs.
Methods: 100 TB infected cases with adverse drug effects and 150 TB infected cases without adverse drug effects were included. 222 TB infected cases (80 cases and 142 controls) are included in analysis and some samples are exclude due to the incompetence of demography data. Total genomic DNA was isolated from peripheral blood cells (K3EDTA as anticoagulant) using the blood DNA isolation kit (Maxim Biotech Inc, San Francisco, CA, USA). PCR amplification was performed in a thermal cycler (Perkin-Elmer Cetus, Norwalk, CT, USA). The genotypes of UGT1A7 were identified with the restriction fragment length

polymorphism (RFLP) method and confirmed by DNA sequencer.

Results: Genotypes of UGT 1A7*2/*3 may increase the risk and severity of anti-TB drug-induced hepatitis as the odds ratio (OR) are 2.52 (95%CI = 1.05–6.03). This study indicated that the UGT 1A7 polymorphism may correlate the drug-related adverse drug effects among TB patients in Taiwan.

Conclusions: Checking liver enzymes and detoxification genotype before treatment and regular monitoring liver enzymes during treatment are highly recommended. Application of pharmacogenetics or pharmacogenomics, such as assessing UGT genetic polymorphism, may help prevent this hepatotoxicity.

PS-94521-05   Rifabutin for the treatment of tuberculosis in patients intolerant to rifampicin

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Purpose: Rifabutin containing regimen was as effective as the rifampicin containing regimen for the treatment of tuberculosis in HIV or non-HIV TB patients. Rifabutin was also well tolerated by the HIV and non-HIV TB patients. Many experts recommended to use rifabutin if rifampicin was intolerable. But the success rate had not ever been reported.

Materials and methods: Chart review was done in Chest Hospital between 2006 March and 2009 January. If the patient was intolerant to rifampicin, rifabutin-containing regimen was tried except patient had severe thrombocytopenia, leucopenia, shock or total bilirubin over 10. We define success as patient could continue rifabutin over one month. Failure was defined as patient should be stop rifabutin due to the same or other side effect during the treatment course.

Results: There were 127 patients had ever been treated with rifabutin in this period. There were 22 patients used rifabutin for MDR-TB (14), XDR-TB (1), RIF-resistant TB (3), AIDS-TB coinfection (2) and MAC infection (2). There were 105 patients used rifabutin for rifampicin intolerable adverse effect including 31 patients drug allergy with skin rush (31.3%), 35 patients hepatitis (35.4%), 28 patients GI upset like nausea, vomiting, poor appetite (28.3%), 1 patient flue-like syndrome, one leucopenia, one red-eye and 6 cases unknown cause. The success rate was 41.9% (13/31) in skin rash group, 59% in hepatitis group (19/32) and 74% in GI upset group (17/23). The overall success rate was 58% (52/89).

Conclusions: There were high success rate with rifabutin-containing regimen used in rifampicin intolerable TB patient. In order to increase the cure rate and shorten the treatment course, we suggest the trial with rifabutin-containing regimen for all TB patients if the rifampicin-containing regimen was intolerable.

PS-94565-05   Introduction of reducing of reimbursement from NHI to improve the inadequate regimen for TB control

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Background: Nearly one-third of regimens for TB care were not standardized in intensive phase of treatment in a study performed in Taiwan, 2007. Common problems include using non-standardized regimen (less than 4 drugs in intensive phase), insufficient dose, or inappropriate frequency. The coverage of National Health Insurance (NHI) is up to 95% in Taiwan.

Materials and methods: TB controllers in county or city level keep a name list of physicians who prescribe inadequately. Application sheets for fee of medication and clinical care from hospitals providing care to TB cases were selected according to this name list. Taiwan CDC cooperated with Bureau of NHI to perform review process by an expert committee since March, 2008. Hospitals received no reimbursement if the applications were viewed as inadequate regimens by the committee.

Results: There were 199 charts reviewed by the committee. Overall, from the selected applications, 50.3% (100) were appropriate and the reimbursement was paid. Among the 99 inappropriate prescriptions, 28.3% (28) were non-standardized regimen, 32 (32.3%) were inadequate dosage, and 19 (19.2%) were inappropriate frequency. Nine applications (9.1%) were considered to have other obstacles so that they did not fulfill the standard treatment for TB. Some applications had more than two errors in their regimens. Four (4%) had inadequate dosage combined with inappropriate frequency. Two (2%) had inappropriate frequency combined with non-standardized regimen. Four (4%) had inadequate dosage combined with non-standardized regimen. One (1%) had three of the errors in the regimen.

Conclusions: Adequate regimens for TB care recommended by international standard of TB care should be broadcasted to physicians and all health providers by all means. However, if the quality of regimen is still not good enough, cooperation between governmental apparatuses may achieve the goal to correct inadequate prescriptions by reducing or cutting reimbursements.

PS-94574-05   Antituberculosis drug-induced hepatotoxicity in children: a literature review

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Setting: Antituberculosis drug-induced hepatotoxicity (ADIH) is often considered unusual in children, perhaps because relatively lower dosages of antituberculosis agents recommended in children. A literature review explored ADIH in children associated with essential agents, isoniazid (INH), rifampicin (RMP and pyrazinamide (PZA).

Chemoprophylaxis: 18 studies recorded INH usage in 11 128 children (dosages 4–6, 10 and 10–20 mg/kg). Hepatotoxicity symptoms occurred in 70 (0.63%) children, jaundice in 1 (0.01%). There was no relationship to INH dosage; 5 studies enrolled children and adults; no ADIH occurred amongst children. In 969 children transaminase values were assessed and increased in 98 (10.1%). RMP and INH or PZA was used in 1580 children; 13 experienced ADIH symptoms, none developed jaundice; treatment was stopped in 1 (0.06%).

Treatment of TB disease: 51 papers record the use of INH, with RMP and other agents, in 8947 children. ADIH symptoms occurred in 31 (0.35%) and jaundice in 82 (0.78%); 48 cases of jaundice were recorded in 3 papers. Liver function tests in 380 children found transaminase values increased in 380 (9.9%). In 7 selected papers giving details of 1123 adults transaminase values were increased in 244 (22%). 19 papers described 717 children with tuberculous meningitis (TBM); jaundice occurred in 72 (10.8%). In 329 children with TBM LFT were evaluated and transaminases increased in 174 (52.9%). In several studies INH dosages > 15 mg/kg, together with RMP, were associated with an increased jaundice incidence. Slow acetylators of INH were more likely to experience increased transaminases but RMP dosage did not influence ADIH occurrence. Several papers document infectious hepatitis in association with ADIH.

Conclusion: Children experience a lower incidence of ADIH than adults except when higher dosages of INH are used in conjunction with severe forms of TB such as TBM. Infectious hepatitis may be an important precipitating factor.

PS-94657-05   People's perspective on accepting treatment for latent tuberculosis infection

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Background: Successfully treating latent tuberculosis infection (LTBI) is essential in reducing the overall impact of TB. However, levels of acceptance and completion of LTBI treatment are consistently low in our institution. This study was conducted to explore people's perspectives regarding the LTBI treatment and to identify their perceived barriers and facilitators to initiating the treatment.

Methods: English or Mandarin-speaking subjects who were diagnosed with LTBI and offered the 9-month isoniazid regimen were eligible for this study. Individual semi-structured interviews were conducted and an interview guide was used to facilitate all interviews. Participants were invited to discuss their knowledge and awareness about TB, LTBI and isoniazid regimen, the important reasons motivating treatment-taking or barriers preventing them from initiating the treatment. All interview data were audio-taped, transcribed and analyzed qualitatively.

Results (preliminary): A total of 9 eligible subjects were interviewed so far. Their mean age was 42.3 years (range 20~71) and 5 people were male, 7 were Asian or Pacific Islanders and 2 were Canadian Aboriginal. Concerns about family/friends and perceived risk of progression to active TB is the major reason to initiate the treatment. Trust on the care provided by health care providers that the safety of the treatment would be closely monitored is another important reason for treatment-taking. Among those declined the LTBI treatment, most did not want to take medications while they are healthy and normal. Other reasons included the low risk of developing TB in the future, problem with the time commitment due to school or work, perceived drug side effects, doubt about the accuracy of the TST and the belief that they could not adhere to the regimen.

Conclusions: Shorter regimen with fewer side effects might improve LTBI treatment adherence. Building a trustful relationship between HCP and patient may also help.

PS-94754-05   Zinc cream augments paediatric tuberculin skin test reactions

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Background: The tuberculin skin test is an important tool for diagnosing childhood tuberculosis (TB), but groups at highest risk can have false-negative results due to impaired cellular immunity. Zinc deficiency is an important cause of suppressed cellular immunity and zinc supplementation can augment anti-mycobacterial immune responses. We therefore investigated whether zinc cream increased the reliability of tuberculin skin testing in children living in an area with high TB incidence.

Methods: We recruited children being assessed for suspected TB infection or disease. A baseline tuberculin skin test was injected in the right forearm and read 48–72 hours later. Then a second tuberculin skin test was injected in the left forearm with zinc cream or placebo cream applied under an occlusive dressing until reading 48–72 hours later. Zinc cream or placebo allocation was randomized 2:1 and all procedures were double-blind.

Results: The baseline tuberculin skin test result was positive (>5 mm) in 46% (77/166) of participants. Second tuberculin skin tests to which cream was applied were completed for 71 children and the median diameter of the second tuberculin skin test (see graph) was larger for those with zinc cream than placebo cream (5.0 mm vs. 1.0 mm respectively, $P = 0.005$). Zinc cream caused significant augmentation of the second tuberculin skin test compared with the first, such that the median increase in size was 5.0 mm with zinc cream vs. 0.0 mm with placebo cream ($P = 0.02$). Zinc cream caused tuberculin skin test conversion from negative to positive (>5 mm) in 64% (27/42) of children vs. 19% (4/21) with placebo cream ($P = 0.001$).

Conclusion: The application of zinc cream caused a clinically significant increase in the size of tuberculin skin test reactions in children with suspected TB. This implies that false-negative tuberculin skin tests were common and that the diagnostic sensitivity of the tuberculin skin test was increased by zinc cream.
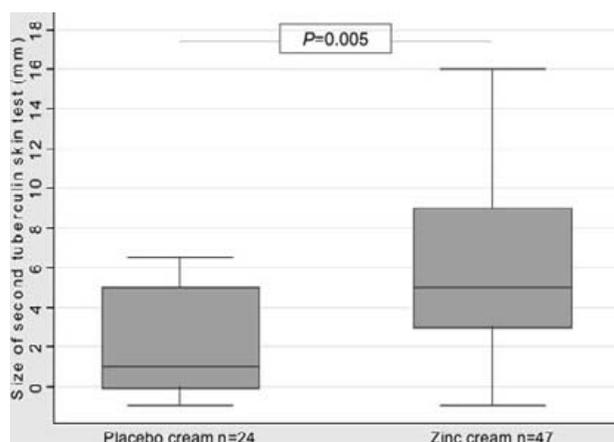
PS-94758-05   Burden of childhood TB in hospitals and clinics in Java Island, Indonesia

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Background: Despite significant achievement in tuberculosis (TB) control program, childhood TB has been relatively neglected. Its burden remains unknown due to lack of surveillance data. This study aimed to determine the caseload of childhood TB in lung hospitals and lung clinics in Java Island, Indonesia.

Design/methods: A cross-sectional study to 7 lung hospitals and 24 lung clinics was carried out in Java Island from August 2006 to May 2007. Two lung hospitals and 5 lung clinics which performed childhood TB recording and reporting routinely was selected and data were analyzed descriptively.

Results: Of 13 520 TB cases reported in DOTS register, 1388 (10.2%) were childhood TB and 51.2% of those were <5 years old. Selected study sites treated most cases (1195, 86.1%) in which childhood TB comprised 20.9% of their total TB cases on average. Among 1195 childhood TB cases, 99.2% were new cases and 97.7% diagnosed as pulmonary TB. The result of smear sputum examination were positive in 17 cases (1.4%), negative in 777 cases (65%) and not done in 402 cases (33.6%). All positive cases were cured. Cases with treatment completed, default and transferred were 914 (76.4%), 235 (19.6%) and 30 (2.5%) respectively.

Conclusion and recommendation: Burden of childhood TB in lung hospitals and lung clinics with routine reporting of childhood TB is high, with suboptimal treatment completion and high default rate. National TB Program in Indonesia should strengthen childhood TB management within the Public-Private Mix initiatives involving lung hospital and clinics.

PS-94787-05   The short-term effect of applying a regimen of OK-432, rifamycin and levefloxacin to MDR-TB

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Objective: To explore the therapeutic effect of patients with multidrug-resistant pulmonary tuberculosis with synthetical therapeutic regimen (include ok-432, rifamycin sodium, levefloxacin).

Methods: 31 cases of multidrug-resistant pulmonary tuberculosis were treated with OK-432, rifamycin sodium, levofloxacin regimen, and combined with drug sensitivity test and add other sensitivity drugs from January 2006 to January 2007. The regimen is 3DRsAKVZE/6DVZE+OK-432: Salverine). Examine sputum smear and X-ray at 3,6,9 month, and examine liver function, kidney function and blood routine very month. Detect T cell subgroup separatively before and at the end of the therapy.

Results: The sputum negative conversion rate was 96.7% (30/31), 93.7% (29/31), 93.7% (29/31) in 3,6,9 month. T cell subgroup examination: CD4/CD8 have become distinctive better after therapy than before therapy. Complication: liver function damage 1 case, allergic dermatitis 1 case, drug fever 1 case.

Conclusion: The recent therapeutic effect of this

regimen is satisfied and the side effect of drug is little, patents have good compliance. This regimen is worthy to be spreaded.

PS-94831-05   Anti-tuberculosis drug-induced hepatotoxicity: management and outcome

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Objectives: To evaluate the occurrence of anti-tuberculosis drug-induced hepatotoxicity, the clinical management and outcome of cases.
Methods: A retrospective study was performed at the State University of Campinas' Hospital, São Paulo, Brazil; 121 TB cases reported, from January to December, 2006 were evaluated. Definition of hepatotoxicity: a rise to five times the normal levels AST and/or ALT for asymptomatic patients or two times the normal values for symptomatic individuals and/or bilirubin dosage higher than twice the normal limits, with the exclusion of other causes of liver toxicity.
Results: The initial regimens were R (rifampin), H (isoniazid), Z (pyrazinamide) in 101 (83.5%) patients, R, H, Z, E (ethambutol) in 19 (15.7%) cases and E, S (streptomycin) for 1 (0.8%) patient. HIV co-infection was detected in 29.9% patients (36/117); anti-HCV positive and HBsAg positive were diagnosed in 26.2% and 7%, respectively, among 61 individuals tested. Hepatotoxicity was observed in 11 (9.1%) cases, at a median period of 13 days since the beginning of therapy (min 4, max 61 days). There was AST elevation in all of cases studied (max 1195 U/L), ALT in 9 of them (max 1541 U/L) and bilirubin in 5 cases (max 10.3mg/dl). The drugs possibly associated with toxicity were Z in 7 cases and R in 2 (it's not possible to determine the drug involved for the other 2 cases). HIV infection was associated with hepatotoxicity, whereas viral hepatitis and alcoholism were not. RHZ was reintroduced in 4 (36.4%) cases, Z was changed by E in 5 (45.4%) (regimen RHE) and ES and ofloxacin were introduced in 2 (18.2%) of cases. Death was more frequent among patients with liver toxicity (45.5% x 13.6%, $P = 0.0216$), at a median period of 30 days after the beginning of the treatment.
Conclusion: Hepatotoxicity occurred at a small number of cases with standard regimens. HIV co-infection and death were more frequent in patients with hepatotoxicity.

PS-94879-05   Coadjuvant surgery for treatment of multidrug-resistant tuberculosis: report of 410 cases

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Background: Treatment for pulmonary Tuberculosis (TB) is drug-based but the emergence of drug-resistance has decreased its therapeutic efficacy. Pulmonary surgery is an important beneficial adjuvant strategy for MDR-TB treatment. We present our experience in Peru, where the availability of infrastructure and limited technical and financial resources necessary to have a working surgical program still present a challenge.
Methods: Between May of 1999 and January of 2008, a team of surgeons from the Peruvian Ministry of Health performed pulmonary surgery on 410 patients. We describe the types of surgical procedures performed and summarize the clinical characteristics and evolution of these patients.
Results: A total of 414 surgical interventions were performed on 410 patients. Most cases were male (57.9%) and the mean age was 31.3 years. Patients were resistant to a mean of 6.5 drugs. Cavitary lesions were the most common (90%) and lobectomy was the most commonly performed surgical procedure (68.11%). Postoperative morbidity occurred in 11.6% of cases. Bronchopleural fistula, empyema and prolonged air leak were the most common postoperative complications. Postoperative mortality occurred in 1.4% Patients were followed post-operatively for a maximum time of 79.3 months and culture conversion was achieved in 352 (85%) cases.
Conclusions: Pulmonary adjuvant surgery on MDR-TB patients is an effective alternative in culture conversion. This strategy should be included as part of treatment programs.

PS-94945-05   Zinc and vitamin A as co-adjuvants for the treatment of pulmonary tuberculosis

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Background: Several observational and a few experimental studies have established a strong relationship between micronutrient deficiencies and Tuberculosis.
Aim: To assess the efficacy of zinc and zinc plus vitamin A as adjuncts for the treatment of PTB.
Methods: A double-blind, placebo-controlled clinical

trial of patients >15 years old with cough >2 weeks duration and acid-fast bacilli (AFB) in sputum. In addition to anti-TB treatment, patients were randomly allocated to receive weekly supplements of zinc, zinc plus vitamin A or placebos. Clinical, demographic and biochemical data were collected from each patient.

Results: 350 patients were enrolled. The mean time for the sputum to become AFB-negative was shorter for patients receiving zinc or zinc plus vitamin A than placebos. (3.1 and 3.5 weeks versus 4.1 weeks, respectively $P = 0.03$). Supplemented patients had earlier resolution of clinical symptoms and improvement of laboratory markers, but these differences were not statistically significant. Patients receiving zinc and vitamin A supplements had higher mortality than patients receiving placebo (9/117 and 9/117 versus 1/117, $P = 0.01$).

Interpretation: The difference in the mean time to become sputum AFB-negative is small would not be of clinical significance for the management of patients. The higher mortality of patients receiving micronutrient supplements needs to be further investigated.

PS-95089-05   Malnutrition and zinc deficiency in patients with pulmonary TB

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Introduction: Malnutrition is one of the factors that contribute to the susceptibility of the TB disease and, followed by the need of micronutrients, can be a predisposing factor for infection and severe disease.

Methodology: Patients with TB admitted in two hospitals in Rio de Janeiro were assessed in three periods, within a two-month period. The anthropometry was evaluated through arm muscular area (AMA) and triciptal skin fold (TSF), these being compared to the percentiles according to Frisancho (1989). The zinc was evaluated by atomic emission spectophotometry. The reduced levels were considered as low values as 0.85 mg/L and the normal values above 1.2 mg/L. The reactive C protein (RCP) was dosed by nephelometry and the cut point was 0.03 mg/dL.

Results: 40 patients were assessed. According to the TSF, there was the prevalence of severe malnutrition (SM) in the follow up: 84%, 82% and 72% of the patients, in the 0-, 30- and 60-day periods, respectively. The SM was also prevalent concerning the AMA classification: 87%, 79% and 69% in the three periods respectively. As for the zinc, 86.5%, 87.5% and 89.5% of the patients showed low levels and 13.5%, 12.5% and 10.5% had normal levels in the 0-, 30- and 60-day periods, respectively. All patients showed RCP levels over 0.03 mg/dL.

Discussion: According to the RCP levels, this group is in an acute phase response, which leads to a decrease in the muscle and fat mass characterizing the SM found. Amongst these patients, 83% showed zinc deficiency, a contributing factor for a possible decrease in the immune response.

Conclusion: A protein-caloric malnutrition observed in these patients admitted with TB as well as the deficit of micronutrients such as the zinc must be considered when defining the diet to be offered.

PS-95307-05   Using traditional healers, 'Sangomas', to improve TB-HIV treatment success in South Africa

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Background: South Africa (SA) has one of the highest TB incidence and lowest TB treatment and cure rates, contributing to rising DRTB. Combined with high HIV co-infection, TB is the leading cause of death in SA. Despite a reported 100% DOT coverage, SA continues to fall short of global and National TB targets. In SA, 80% of patients seek care from a Traditional Healer (*Sangoma*) before going to a clinic or hospital. However, no systematic integration of healers has been attempted to strengthen TB or HIV services.

Methods: In 2006, an NGO (iTEACH) based at a large government hospital in SA, began training 300 Traditional Healers on basics of TB and HIV. Training was conducted in local language (isiZulu) as the majority of healers are illiterate. In 2008, approval was obtained for the certification course for HIV Counseling to be conducted in isiZulu, to enable healers to provide HIV voluntary counseling and testing (VCT). In Feb 2009, HCWs (doctors, nurses, counselors) and patients were surveyed to assess attitudes around integrating Traditional Healers in government TB and HIV services. In March 2009, a 1-page patient assessment form was created to enable healers to document signs/symptoms of TB, AIDS and drug side-effects, and to serve as a patient referral letter to a clinic or hospital. Signs/symptoms were depicted graphically (photo or drawing), to enable healers to take a history by checking a box next to an image.

Results: Retention of TB and HIV information was high amongst healers, as was acceptance of the need for TB and HIV patients to receive treatment from a clinic/hospital. HCWs expressed reservations about receiving referrals from healers, while patients were strongly in favor of a plan for dual support.

Discussion: Traditional Healers may serve as powerful allies in achievement of TB and HIV treatment adherence and success in SA, and thus represent an underutilized resource. A pilot is planned to determine feasibility and efficacy.

PS-95400-05 Low-level isoniazid and ethionamide co-resistance: preliminary findings in the Western Cape

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Introduction: Based on the presence of *katG* and *inhA* mutations, the Genotype®MTBDR*plus* (Hain Lifescience) line-probe assay (Hain LPA), provides a presumptive diagnosis of isoniazid (INH) resistance. Low-level INH resistance, mostly associated with i*nhA* mutations, has been shown to be associated with co-resistance to ethionamide (ETH). This study aims to determine if in the Western Cape, this association occurs frequently.

Design and methods: Specimens were collected during a TB drug resistance survey at two clinics in Khayelitsha, Cape Town and 527 cultures from these patients were tested by Hain LPA and then sent for 'blind' susceptibility testing at the National TB Reference Laboratory in Johannesburg. Critical concentrations of 0.1 ug/ml and 0.4 ug/ml were used for low-level- and high-level INH resistance determination and 5.0 ug/ml for ethionamide resistance.

Results: Early findings indicate that all of 7 cultures found to harbour the MUT1 *inhA* mutation exhibited low-level INH resistance with co-resistance to ethionamide. An eighth isolate which also showed co-resistance had a *katG* mutation, indicating that in this small cohort the MUT1 *inhA* mutation is strongly associated with low-level INH resistance combined with ethionamide resistance. Further DST results are being awaited, and once available, the *inhA* mutation distributions will be assessed.

Discussion and conclusion: There is good clinical evidence that patients with low-level INH resistance may respond to high-dose INH therapy. The present study is ongoing and if this strong correlation between the MUT1 *inhA* mutation and dual resistance between these two drugs is confirmed, also in studies from other regions, the demonstration of this mutation by routine line-probe testing could, as has been suggested, be used for early optimization of MDR-TB management with high-dose INH and omitting ethionamide from the treatment schedule.

PS-95422-05 The cost of acidic commercial fruit drinks versus fresh citrus microcarpa juice for use with PAS

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Background: Para-aminosalicylic Acid (PAS) is given to 22% of patients with MDR-TB in the Philippines in a formulation that requires an acidic medium upon ingestion. This is an additional cost to the expensive treatment for MDR-TB.

Design and objectives: Commonly chosen fruit drinks by patients were listed and tested. This study aimed to determine and compare the pH and costs of these drinks with fresh calamansi or Citrus microcarpa juice for use with PAS.

Results: The mean pH of commercial fruit juices ranged from 2.8–3.6 which is acidic, of which grape fruit juice had the lowest. Powdered juices 45 g pack

Table Cost and pH of commercial fruit drinks and preparation using fresh Citrus microcarpa juice

Preparation/Product	ml/unit	Cost/ unit USD	Cost/ 250 ml USD	Mean pH
Commercial fruit drinks				
Liquid				
Tetra pack				
Product 1 (pineapple, grapes, orange, mango)	200 ml	0.109– 0.125	0.137– 0.156	2.8–3.6
Bottled				
Product 2 (pine orange, pineapple)	330 ml	0.438	0.331	3.2
Product 3 (orange, apple)	355 ml	0.416	0.293	3–3.03
Can				
Product 4 (four seasons)	240 ml	0.469	0.488	3.6
Powder				
45g pack				
Product 5 (sweet ponkan)	1 L water	0.186	0.058	2.9
Product 6 (calamansi)	1 L water	0.186	0.058	3.1

	Citrus microcarpa juice in 250 ml of water	Cost/ 250 ml USD	pH
Preparation using fresh *Citrus microcarpa* juice			
Without sugar	5 ml	0.035	2.8
	10 ml	0.058	2.7
	20 ml	0.105	2.5
	30 ml	0.152	2.4
	40 ml	0.199	2.6
	50 ml	0.246	2.6
With 2 teaspoon sugar	5 ml	0.039	2.8
	10 ml	0.062	2.6
	20 ml	0.109	2.5
	30 ml	0.156	2.4
	40 ml	0.203	2.6
	50 ml	0.250	2.6

diluted in one liter of water had a pH of 2.9 and 3.1. Pure Citrus microcarpa juice, 5 ml to 50 ml incorporated in 1 cup of water with or without sugar, had a pH range of 2.4–2.8. As low as one teaspoon of Citrus microcarpa juice in 1 cup of water produced an acidic drink with a pH of 2.8 which means that as low as USD 0.035 can be spent by patients for use with PAS. The cost of commercial fruit drinks ranged from USD 0.058–USD 0.488 and the cost of using fresh Citrus microcarpa ranged from USD 0.035–0.246.

Conclusion: Commercially available fruit juices with flavors of orange, pineapple, grapes, mango, pine orange and apple are safe for use with PAS. Powdered citrus fruit juices are safe provided that the recommended dilution by the manufacturer is strictly followed. As low as one teaspoon of Citrus microcarpa in 1 cup of water with pH of 2.8 can already be used with PAS. With the increasing prices of basic commodities, patients will have the option of taking this very economical juice drink with PAS.

PS-95429-05   Severity of adverse drug reactions to second-line anti-tuberculosis therapy

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Background: The treatment of MDR-TB is difficult due to adverse effect of second line drugs which can lead to default, morbidity and failure of treatment.

Methods: Retrospective analysis of patients with MDR-TB admitted in hospital in last one year was done. Directly observed, standardized treatment with second line ATT was given to all patients. The severity of ADR was graded according to modified common toxicity criteria (NIH, DCTD, DHHS 1998). Appropriate interventions were done for the ADR.

Results: 110 HIV-seronegative in-patients (65 males, 55 females, mean age 50 ± 24 years) were studied. ADR were observed in 93/110 (85.4%). These were gastritis (73/93, 78.5%), pruritis (26/93, 28%), injection abscess (23/93, 24.7%), arthralgia (15/93, 16.12%), hypothyroidism (12/93, 12.9%), headache (10/93, 10.7%), ototoxicity (9/93, 9.7%), hyperuricemia (9/93, 9.7%), rashes (8/93, 8.6%), vertigo (4/93, 4.3%), gynaecomastia (2/93, 2.1%), skin discolouration (2/93, 2.1%), psychosis (1/93, 1%). No ADR was seen in 17/110 (15.4%). Many of the patients had more than one ADR simultaneously. The onset of ADR was significantly higher in 4 to 6 months as compared to first 3 months of ATT (79/93 vs 9/93, Odds Ratio = 8.77, 95%CI = 4.15–18.52, P = 0.0001). Grade I ADR were seen in 79/93 (85%), grade II in 13/93 (14%), grade III in 1/93 (1%), while grade IV ADR was seen in none. Sputum conversion was seen in 85/110 (77.3%) within six months of starting of treatment, while 25/110 (22.7%) were given extended intensive phase treatment as the sputum conversion was delayed.

Conclusions: Onset of ADR were highest 4–6 months after starting treatment. Gastritis was the commonest occuring ADR. Most of the patients had grade I ADR, while grade II ADRs were seen in those on an extended intensive phase. Recognition and management of ADRs to second-line therapy is important to prevent default and failure of treatment.

PS-95655-05   Impact of food support on TB treatment at a community-based DOTS program, Kampala, Uganda

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Background: It has been observed that loss of food security is a major challenge faced by patients with TB-HIV living in a large urban slum with population 269 000 people in Kawempe division, Kampala, Uganda. This contributes to poor adherence and a high default rate 15% (MOH 2007).

Intervention or response: The most vulnerable patients are identified by the community volunteers during DOTS and their socio economic status is evaluated. Those eligible are put on weekly rations of food support including rice, sugar, beans and maize flour for a maximum of 4 months at a cost of 20 US dollars a month. The patient's health is evaluated through regular home visits by clinical team.

Results: In 2008, 161 HIV patients were treated for TB of which 49 (30.4%) have received food support. Of the food beneficiaries, 28 (57.2%) have completed treatment, 6 (12.2%) died before completion while 15 (30.6%) are still on treatment. 50% of the people who are still on treatment have been on food support for at least three months. 90% of those who completed treatment have resumed work and marked improvement in their health was noted within 3 months after food initiation. 112 (69.6%) of the patients who did not receive food support also reported good adherence as well as marked health improvement.

Conclusion/recommendation: The food support for destitute TB patients improves their adherence and treatment outcomes. Organisations providing TB-HIV care should consider providing food support to the vulnerable patients.

LABORATORY AND TB DIAGNOSIS I

PS-94077-05   A rational laboratory approach during mass screening in Azerbaijan prisons

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Setting: Specialized Treatment Institution, Ministry of Justice, Baku, Azerbaijan.
Objective: To illustrate how a modified lab approach can cope with prison-context induced problems, by limiting microscopy, without affecting detection.
Method: Following identification of 'TB suspects' by MS combining Questionnaire and MMR, sputum is examined by microscopy and culture.
Results: MS identified 2068 'TB suspects' in 2008. Specimens were collected on 1764 of these 'TB-suspects' (85% coverage due to release, transfers, and refusal of detainees to comply). 2951 sputum specimens were examined (<2 specimens per 'TB-suspect', due to their high numbers induced by a low screening sensitivity) microscopically after ZN, resulting in 54 SS+ patients (3%), of whom 12 (22% of SS+) were highly infectious cases. Sputum of 1369 'TB-suspects' was cultured out of a total of 1764 'TB-suspects' (78% coverage, due to low volume and/or quality), either on both MGIT and LJ, or on LJ only due to lack of MGIT reagents. (Table)
Conclusions: Low-yielding microscopy combined with the problems obtaining quality specimens led to reducing the number of specimens to <2/patient. Nevertheless, a single microscopic slide identified the highly infectious cases, while culture identified the vast majority of TB patients. When considering the prevalence of MDR-TB, a growing culture offers the supplementary advantage of enabling timely Drug Sensitivity Testing.

Cultured on both MGIT and LJ: 699 specimens			Cultured on LJ only: 670 specimens
CC+ on MGIT only	C+ on MGIT & LJ	C+ on LJ only	C+ on LJ
35/699 (5%)	96/699 (14%)	9/699 (1%)	75/670 (11%)
Microscopy vs. culture/results	C+/SS− 165 (75%)	C+/SS+ 50 (23%)	C−/SS+ 4 (<2%)

PS-94156-05   Monitoring of quality and effectiveness indicators of TB microbiology diagnosis in Russia

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Aim: To develop optimal criteria to evaluate quality and effectiveness of TB microbiology diagnosis and determine recommended values for Russian laboratories. To carry out a comparative analysis of laboratories performance in different Russian regions based on the most demonstrative indicators.
Methods: The studies have been carried out for several years in 15 Russian regions monitored by the Central TB Research Institute. Out of them 5 were pilot territories, i.e. they first implemented the DOTS Programme and the qualitative laboratory studies assurance system.
Results: We observed low effectiveness of sputum smear-positive TB cases detection by Ziehl-Neelsen microscopy at clinical diagnostic laboratories of general health institutions of Russia. However, based on the pilot regions experience, we established that general health institutions could detect over 50% of all registered TB cases with positive smears. At the same time, the proportion of sputum smear-positive TB cases detected by general health clinical diagnostic laboratories from the total number of examined patients was 1–3%. The monitoring of TB bacteriology laboratories performance revealed that in 2007 average proportions of smear and culture positive pulmonary TB cases out of all newly-detected pulmonary TB cases in Russia were 33.7% and 45.8% respectively. But in the pilot regions these rates were significantly higher than the Russian average, and in 2007 reached: in Ivanovo region 53.1% and 70.3%, in Orel region 53.8% and 78%, in Mary-El Republic 46% and 75.3%, respectively. In the other regions these indicators were the same or even lower than the Russian average rate.
Conclusion: In the pilot regions of the Russian Federation TB microbiology diagnosis effectiveness indicators are significantly higher than in the other regions and meet the international standards. This demonstrates the necessity to implement the system of qualitative laboratory studies assurance countrywide.

PS-94178-05   Evaluation of fluorochrome staining technique at room temperature and at 37°C to detect acid-fast bacilli

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Background: Fluorochrome staining is preferred for Acid Fast Bacilli (AFB) detection in the overburden laboratories as it is readily interpreted and yields greater sensitivity. This cross-sectional study was conducted at National Tuberculosis Reference Laboratory, National Tuberculosis Centre, Bhaktapur, Nepal with an objective to evaluate Fluorochrome staining techniques at room temperature and at 37°C to detect AFB in direct sputum smear.
Methods: A total of 300 specimens from clinically tuberculosis suspected cases were processed from

July to November 2007 attending Out Patient Department (OPD) National Tuberculosis Centre were submitted for study. Two sets of direct smear were prepared using standard method. Staining was done at room temperature as well as 37°C using standard methods.
Results: Out of the 300 sputum specimen processed, 61 (20.3%) patients were diagnosed as having as tuberculosis by culture whereas; the contamination rate was 7.3%. Compared to culture, the sensitivity, specificity, positive predictive value and negative predictive values at room temperature and at 37°C were 67.2%, 95.8%, 82% and 77%, 95.8%, 84% and 93.6% respectively. Sixty three (21%) were positive for AFB by fluorochrome staining techniques, 55 were positive for both methods and 8 were positive at 37°C only. Staining at 37°C increased the smear positivity by 12.7%. Of the 55 positive smear by both methods, 17 (31%) had more AFB on smear stained at 37°C, and 6 (11%) had greater number of AFB on smear stained at room temperature.
Conclusion: The fluorochrome staining technique at 37°C is found to be more sensitive and enables visualization of greater number of AFB in a smear. Hence, the study concludes that fluorochrome staining at 37°C is economical in terms of both time and expense and can be recommended for routine use.

PS-94188-05 Systematic review of sputum processing methods for smear microscopy: an update

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Background: A systematic review published in 2006 found that any chemical processing of sputum followed by centrifugation or gravity sedimentation increased the sensitivity of smear microscopy for TB diagnosis. We present an updated analysis that includes studies published since 2005.
Methods: Multiple databases were searched (2009 January) for primary studies in all languages comparing direct (DM) and processed microscopy (PM). Unlike the prior review, studies were ineligible if they included <10 participants or only specimens found negative on DM. Standard methods for systematic reviews were followed, including visual assessment of forest plots and testing for heterogeneity (χ^2 and I^2 tests) overall and within pre-specified PM sub-groups: A) Any chemical processing + centrifugation ($n = 15$); B) Bleach centrifugation ($n = 7$), and C) Bleach sedimentation ($n = 5$).
Results: 69 studies (46 articles) were included. 45 (65%) studies enrolled TB suspects, 36 (52%) presented patient-level analyses, 27 (39%) reported adequate blinding, 7 (10%) included HIV-infected patients, and 6 (9%) evaluated PM in a peripheral laboratory. Microscopy was performed using Ziehl-Neelsen stain in 61 (88%) and culture served as the reference standard in 35 (51%) studies. Significant heterogeneity in sensitivity estimates was present overall ($P < 0.001$, I^2 87%) and in each sub-group. However, inspection of forest plots revealed that PM sensitivity was at least 5% greater than DM sensitivity in 11/15 sub-group A, 5/7 sub-group B, and 3/5 sub-group C studies.
Conclusions: Although significant heterogeneity was present, we found that the majority of studies in all sub-groups reported higher sensitivity with PM than with DM. Additional high quality studies conducted in peripheral laboratories in low income countries are needed to adequately inform policy recommendations.

PS-94214-05 Same-day smear microscopy for tuberculosis diagnosis: an alternative approach

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Background: Recent studies highlight the importance of completing the TB diagnostic evaluation at the initial patient visit in high burden countries. We compared the accuracy of smear microscopy for TB diagnosis when using a same-day strategy (one direct and one concentrated smear prepared from a single spot sputum specimen) versus using the standard spot-morning sputum collection strategy.
Methods: Consecutive patients admitted to Mulago Hospital (Kampala, Uganda) with cough ≥2 weeks provided sputum specimens at initial evaluation (spot) and early the next morning. Direct (Ziehl-Neelsen) and NALC-NaOH concentrated (Auramine-O) smears were prepared from both specimens. The same-day strategy combined the results of direct and concentrated smears of the spot specimen only. The standard strategy combined the results of direct smear of the spot specimen and concentrated smear of the morning specimen. Sensitivity and specificity were compared using sputum culture as the reference standard.
Results: Of 640 patients enrolled, 532 (83%) were HIV-infected and 371 (58%) patients had at least one positive TB culture. The sensitivities of the standard (66%) and same-day (64%) sputum collection strategies were not significantly different (difference 2%, 95%CI −3% to +6%, $P = 0.60$). Direct smear of the spot specimen detected 51% of cases. The incremental gain in sensitivity with the second, concentrated smear was 15% for the standard and 13% for

the same-day strategy. The specificities of the two strategies were also similar (88% vs. 87%, $P = 0.74$).

Conclusions: In a hospital-based cohort with high HIV prevalence, examining two smears prepared from a single sputum specimen was as sensitive as examining two smears prepared from sputum specimens collected on successive days. This same-day approach may enable improved infection control through earlier identification of infectious patients and also merits further evaluation in ambulatory settings.

PS-94310-05　Systematic review of same-day sputum examination for smear microscopy

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Background: The recommended approach to evaluating pulmonary TB suspects is to collect and examine at least 2 sputum specimens over 2 consecutive days. This 'standard' approach is associated with substantial patient drop-out. As an alternative, 'same-day' smear microscopy, in which either 2 specimens are collected on the same day ('front-loaded') or a single specimen is examined by 2 separate smears ('single-specimen'), may reduce losses without decreasing smear+ case detection. We performed a systematic review of the literature to compare the accuracy of same-day with standard (2-day) smear microscopy.
Methods: We searched multiple databases for primary studies in all languages comparing same-day to standard sputum microscopy on ⩾2 smears for diagnosing pulmonary TB. Using standardized instruments, 2 reviewers independently extracted information on study design and quality, as well as data to calculate sensitivity of same-day and standard strategies. We tested for heterogeneity using χ^2 and I^2 tests, and generated Mantel-Haenszel pooled estimates of sensitivity and within-study sensitivity differences.
Results: 5 studies (4 articles) from 5 low-income countries were included (1563 participants). All were of high quality, and 4/5 included a reference standard. 2 studies enrolled HIV+ patients. Pooled estimates of sensitivity were 65% (95%CI 61–69) for the same-day strategy, and 66% (95%CI 62–70) for the standard strategy, both without significant heterogeneity. Within-study sensitivity differences found the same-day strategy as sensitive as the standard strategy (difference −1.2%, 95%CI −6.7–4.3, $P = 0.66$) without heterogeneity.
Conclusions: Examining 2 separate sputum smears obtained on the same day detected a similar proportion of TB cases as standard, 2-day strategies. Additional large studies performed under operational conditions and including HIV+ patients would strengthen the case for changing guidelines.

PS-94367-05　Lack of sensitivity of interferon-gamma release assay for TST conversion in recently exposed HHCs

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Introduction: A major challenge in tuberculosis (TB) control is the diagnosis and treatment of latent TB infection. Until recently, there were no alternatives to the tuberculin skin test (TST) for diagnosing latent tuberculosis; however, interferon-γ assays that use *Mycobacterium tuberculosis* (Mtb)-specific antigens, such as ESAT-6 and CFP-10, were developed and may have advantages over the TST, in terms of higher specificity, better correlation with exposure to Mtb, and less cross-reactivity due to BCG vaccination and non-tuberculous mycobacterial infection.
Methods: One-hundred and forty-nine household contactants from TB index cases, aged 1–78 years, from 23 families, were tested by both TST and Quantiferon-Gold (QTF-G). TST was given at time of enrollment and QTF-G 8 weeks later. If the first TST was negative (<10 mm) it was repeated at the time of QTF-G. The presence of soluble IFN-γ in the supernatants was evaluated by ELISA.
Results: All 149 individuals were tested by both TST and QTF-G. We observed 27% (40/149) discordance between QFN-G and TST ⩾ 10 mm. All of the discordants were TST+ but QFN-negative. Among those 40 discordant individuals, 8 (20%) did not present a BCG scar and 14 (35%) were TST converters; therefore, highly unlikely to be false positive for TST. Even the stable TST+ subjects are unlikely to be false positive TST+, given their status as household contacts of highly infectious index cases. Furthermore, 30/40 discordant individuals aggregated within nine families.
Conclusion: These findings from the household contacts indicate that QFN-G test may lack sensitivity in detecting tuberculosis infection in newly infected patients.

PS-94450-05　Can LED fluorescence microscopes replace conventional bright field microscopes?

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Diagnosis of TB by sputum microscopy has been the cornerstone in resource-poor, high burden countries. Conventional fluorescence microscopy (FM) with au-

ramine O staining has higher sensitivity and specificity compared to ziehl-neelsen (ZN) method using bright field light microscopes. However, due to logistical difficulties and high cost (need for a darkroom, constant power, expensive equipment, periodic replacement of bulbs and frequent maintenance), FM has not been widely used. Recently, new range of microscopes utilizing light emitting diode (LED) technology have been introduced, with a performance characteristics similar to FM at a much lower cost, hassle-free maintenance, and minimal infrastructure requirement (no need for a darkroom or air-conditioner). As part of the FIND iLED demonstration study, cost analysis was performed comparing FM (in select sites), ZN and LED FM in various settings (low to high volume microscopy centers) in Lesotho, India, and Peru. Cost per sputum specimen screened by various microscopy methods was calculated based on detailed in-laboratory observations, expenditure records, interviews and annualized capital costs over the estimated life-time. Our preliminary results reveal cost LED FM (unit cost per test ranging from 0.90–1.15 USD) is cost-favorable compared to ZN (1.00–1.20 USD). Further analysis is being done to evaluate full cost-effectiveness of LED FM as an alternative routine method for AFB smear microscopy.

PS-94610-05 Concentrated sputum and light emitting diode fluorescence microscopy to diagnose tuberculosis

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Background: Simplified fluorescence microscopy (FM) using Light Emitting Diode (LED) is an alternative to conventional FM for overburden peripheral laboratories. Our study aims to evaluate the performance of the FluoLed Easy Blue™ FM after overnight sputum sedimentation with sodium hypochlorite (NaOCl).
Method: Three sputa were collected over 2 days from tuberculosis (TB) suspects in an urban health clinic in Mathare, Nairobi-Kenya. Auramine staining was performed the same day on fresh specimen and the following day on sediment after overnight sedimentation with equal volume of 3.5% NaOCl. Forty fields were read using 40× objective. A 4th specimen was collected and sent to the Kenyan Medical Research Institute laboratory for Lowenstein Jensen culture. McNemar's test was used to compare positivity rates, sensitivity and specificity.
Results: A total of 1062 specimens from 387 TB sus-

pects were analyzed. Smear-positivity rate increased from 19.6% to 25.1% after NaOCl sedimentation, $P < 0.001$. Culture results were available for 281 patients (824 sputa). After NaOCl sedimentation, sensitivity increased from 63.8% (136/213) to 69% (147/213), $P = 0.03$. Specificity decreased from 98.2% (600/611) to 91.3% (555/608), $P < 0.001$. Out of 53 false positive results after NaOCl sedimentation, 38 (73.1%) had below 3 acid-fast bacilli (AFB). Of a total of 55 smears with <3 AFB after NaOCl sedimentation, a third (17) were from culture positive patients. Artefacts were reported in 1.5% and 7.9% of 1062 smears using direct and FM after NaOCl sedimentation, respectively ($P < 0.001$).
Conclusion: Despite a significant increase of detection using NaOCL sedimentation method in addition to simplified FM, the loss in specificity is a serious concern. The increase of artefacts could be a reason and should be further investigated.

PS-94707-05 Relation between macroscopic and microscopic assessment of specimens collected for TB diagnosis

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Background: The diagnosis of tuberculosis (TB) by bacteriological examination needs a high-quality specimen. The quality is, under programmatic conditions, assessed by macroscopic evaluation. If this evaluation fails to match with formal microscopic features of an adequate bacteriological specimen, specimens can be falsely rejected or accepted, which will have a detrimental effect on the diagnosis.
Objective: To assess the agreement between macroscopic assessment of specimens by health workers and formal algorithms based on microscopic features of the specimen, in the setting of a national TB-prevalence survey in Bangladesh.
Methods: The study was carried out in 17 selected clusters of the prevalence survey (in total 40 clusters). Each collected specimen in the prevalence survey was scored macroscopically as saliva or sputum by the field worker. This analysis was restricted to specimens from individuals who reported cough for at least 3 weeks. The specimen was sent to a central laboratory for microscopic assessment (Gram-stain). Four different algorithms for classifying specimens by microscopy were used; 1) Murray: based on epithelial cells; 2) Scoy: based on polymorphic cells; 3) Barry: based on epithelial and polymorphic cells; 4) Gal-Oz: based on epithelial and polymorphic cells. The last algorithm has an intermediate scoring which was also

assumed to be sputum. For each of the algorithms we assessed agreement with macroscopic classification (kappa), where adequate agreement was assumed when kappa > 0.4.

Results: Specimens from 707 individuals were included, of which 433 (61.2%) were classified as saliva. See Table for results on assessments.

Conclusion: Macroscopic assessment of sputum specimens has no agreement with microscopic features of the specimen, regardless of algorithm used. Deciding to reject specimens based on a macroscopic assessment of saliva would falsely reject up to half of the specimens.

| Sputum according to | Macroscopic assessment | | |
	Saliva ($n = 433$) n (%)	Sputum ($n = 274$) n (%)	Kappa
Murray	229 (52.9%)	149 (54.4%)	0.01
Scoy	2 (0.5%)	7 (2.6%)	0.03
Barry	103 (23.8%)	75 (27.4%)	0.04
Gal-Oz	243 (56.1%)	157 (57.3%)	0.01

PS-94747-05   Evaluation of portable fluorescence kit for sputum smear microscopy

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Aim: Sputum smear microscopy remains a common and inexpensive method for infectious TB case finding and treatment monitoring. Fluorescent microscopy of sputum smears provides higher sensitivity than conventional light microscopy, but is more costly and requires dark room conditions and more complicated maintenance. New simpler and cheaper equipment options based on LED technology have become available recently for fluorescent microscopy. We evaluated the performance and sensitivity of one, the Lumin Kit.

Methods: 200 sputum samples from hospitalized patients on TB treatment with previously confirmed TB by sputum microscopy and/or culture on solid media were stained by Zeil-Nielsen and by rodamine and auramine. An experienced microscopist examined all smears using each of the following: a light microscope Mikmed-6 (Russia); a fluorescent microscope Lumam DRS-250-3 (Russia); and Mikmed-6 equipped with a portable fluorescence kit Lumin (USA). The average time for microscopy, number of positive results, and subjective comments by the microscopist were collected and analyzed for each method.

Results: The average time for microscopy of a slide was 10 minutes for light, 5 minutes for fluorescent, and 4.5 minutes for light microscope with Lumin. Of 200 slides, 52 (26%) were AFB positive by light microscopy, 78 (39%) by traditional fluorescent micros-

copy, and 80 (40%) by light microscopy with Lumin. The impressions of microscopist were that in high workload settings it would be helpful to attach a protective screen to the microscope with Lumin to shield the operator's eyes from reflected LED light.

Conclusions: Sputum smear microscopy by a light microscope with Lumin is much more sensitive than conventional light microscopy. This technology can increase the capacity of a microscopist up to 2.2 times without such negative features of conventional fluorescent microscopy as substantially higher cost, complicated maintenance and need for dark room conditions.

PS-94828-05   Validation of a clinical algorithm for the diagnosis of smear-negative pulmonary tuberculosis

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Background: Diagnosis of smear-negative pulmonary tuberculosis is a clinical challenge, especially where only clinicians' criteria and conventional solid culture media define diagnosis. Current guidelines are vague in their definitions, and don't provide the necessary elements for decision making, so a clear, stepwise diagnostic approximation is needed to address this health problem.

Objective: To validate a diagnostic algorithm for smear-negative pulmonary tuberculosis in a high incidence country.

Setting: Two third-level hospitals with a high burden of pulmonary tuberculosis in Lima, Peru, a country with a concentrated epidemic of HIV/AIDS.

Methods: A Delphi panel developed a diagnostic algorithm for smear-negative pulmonary tuberculosis. The algorithm was composed of a sputum concentrate, a clinical prediction rule (score), response to an antibiotic trial and two liquid culture media for patients still without diagnosis after all the previous. The algorithm was validated in a set of patients with clinical suspicion of pulmonary tuberculosis and 2 negative acid fast bacilli (AFB) smears in simple sputum specimens. We compared the algorithm-based decision against a composite gold standard defined by the sputum culture positivity in any of three culture media (Ogawa, Middlebrook 7H9 and MGIT).

Results: 684 patients were included from September 2005 to March 2008, out of which 663 had complete data available. 182 (27.1%) had Smear-negative pulmonary tuberculosis based on positive cultures. The sensitivity, specificity, positive predictive value, negative predictive value, diagnostic accuracy, positive

and negative Likelihood ratios for the algorithm were 0.84, 0.94, 0.86, 0.93, 0.91, 14.25 and 0.17 respectively.

Conclusion: The clinical algorithm was an efficient way of diagnose SNPT. It could be used to uniform the management of patients with suspicion of this condition. Prospective validation in other settings is suggested.
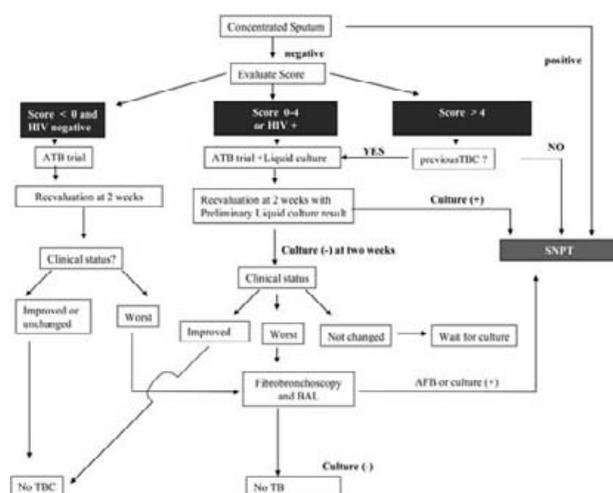
PS-94839-05   Performance of the algorithm proposed by WHO for diagnosis of smear-negative pulmonary tuberculosis

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Background: Smear negative pulmonary tuberculosis is an increasingly important problem in Public Health, especially for less developed countries. Current World Health Organization (WHO) guidelines for diagnosis of smear negative tuberculosis are based on an algorithmic approach ('WHO algorithm'). However, this algorithm should be formally validated.

Objective: To evaluate the diagnostic performance of the 'WHO algorithm' for diagnosis of smear-negative pulmonary tuberculosis in HIV-negative patients in two hospitals in Lima, Peru.

Methods: Patients with clinical suspicion of tuberculosis and three negative sputum smears were included. They underwent a clinical history, physical examination, Chest X Ray and HIV testing. Sputum culture was done in Ogawa, 7H9 and MGIT. In patients testing negative for HIV, diagnostic performance of the 'WHO algorithm' was evaluated. Clinical assessment was aid by a clinical prediction rule ('score'). The reference standard for diagnosis was a positive culture in either of the media.

Results: 285 patients were included. Out of them, 75 (26.3%) patients had a positive culture for *M. tuberculosis*. 21 patients did not complete the follow up and were considered 'indeterminate' in the final diagnosis. The 'WHO algorithm' results were conclusive for 264 patients. Its sensitivity was 22.9% and its specificity 95.4% when compared against culture results. Its positive predictive value was 64% and the negative predictive value was 77.4%. The positive likelihood ratio was 4.92 and the negative LR was 0.81.

Conclusions: The 'WHO algorithm' for diagnosis o smear-negative pulmonary tuberculosis should be reevaluated before its widespread use. Its sensitivity and positive predictive values were poor, hence missing most patients with tuberculosis. An important component of the algorithm to be reassessed is the clinical response to antibiotics, which is likely even in cases of tuberculosis and can be misleading.
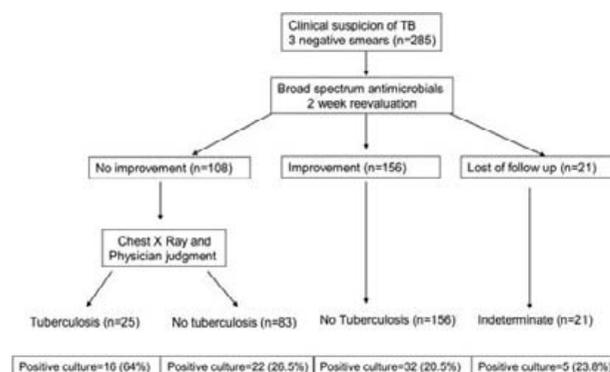
PS-94935-05   Comparison of two interferon-gamma assays and Roche Cobas Amplicor *Mycobacterium tuberculosis* assay

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Background and purpose: Two commercial interferon gamma (IFN-γ) assays, which are commonly used for diagnosing latent tuberculosis, are also useful for diagnosis of active TB. We compare interferon gamma assays and PCR in diagnosis of tuberculosis.

Methods: A prospective comparison of the performance of two commercial interferon gamma assays (QuantiFERON-TB Gold [QFT-G] and T-SPOT-TB [T SPOT]) and PCR using the Roche Cobas Amplicor *Mycobacterium tuberculosis* (RCA-TB) Assay in the rapid diagnosis of tuberculosis was conducted from January 2007 to December 2007 at a university-affiliated hospital in Taiwan.

Results: Of the 187 study patients, results from both T SPOT and QFT-G were available in 154, including 109 active tuberculosis patients and 45

non-tuberculosis patients. The sensitivity of T SPOT (89.0%) was higher than that of QFT-G (71.4%). RCA-TB had the highest sensitivity (90.2%) and specificity (100%), but was usually performed in acid-fast bacilli smear-positive patients. In extrapulmonary tuberculosis, T SPOT had high diagnostic value (sensitivity, 81.3%). Significant discordance between the two interferon gamma assays was also noted. Interferon gamma assays provided more rapid diagnosis of tuberculosis (mean difference 8.23 ± 12.86 days, $P < 0.001$) than the conventional culture method.

Conclusions: Use of interferon gamma assays may shorten the duration before diagnosis of tuberculosis, especially in smear negative patients and those with extrapulmonary disease.

	TB ($n = 109$)		Non-TB ($n = 45$)				Predictive value	
	Assay (+)	Assay (−)	Assay (+)	Assay (−)	Sensitivity	Specificity	Positive	Negative
T SPOT	97	12	11	34	89.0%	75.6%	89.8%	73.9%
QFT-G*	70	28	7	30	71.4%	81.1%	90.9%	51.7%
RCA-TB	74	8	0	21	90.2%	100%	100%	72.4%

* Exclude 11 indeterminate results in TB group and 8 indeterminate results in non-TB group.

PS-95030-05   Rapid diagnosis of pulmonary tuberculosis in patients with diabetes mellitus by enzyme-linked immunospot assay

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Background: Diabetes mellitus is a known risk factor for pulmonary tuberculosis and had negative impact on the treatment outcome. However, the presentation of tuberculosis in diabetic patient may be atypical and lead to a delay diagnosis. Recently, an enzyme-linked immunospot (ELISPOT) assay was demonstrated to be a supplementary tool for diagnosing active pulmonary tuberculosis. Therefore, we evaluated the feasibility of ELISPOT for interferon-γ for diagnosis of pulmonary tuberculosis in diabetic patients.

Methods: From January 2007 to December 2008, diabetic patients with suspected pulmonary tuberculosis were recruited in a tertiary care hospital. Clinical characteristics and conventional laboratory results were collected and a blood sample was obtained for the performance of ELISPOT assay.

Results: A total of 84 diabetic patients with suspected diagnosis of pulmonary tuberculosis were recruited during the two-year study period. The clinical characteristics were shown in the Table. Of the 84 patients, 51 (60.7%) were classified as pulmonary tuberculosis, including 42 (50.0%) confirmed tubercu-

losis plus 9 (10.7%) probable tuberculosis, and 33 (39.3%) were classified as not tuberculosis. Of the 42 patients with confirmed tuberculosis, 36 (85.7%) were had positive ELISPOT results. Of the 9 patients with probable tuberculosis, ELISPOT assay showed positive result in 7 (77.8%). While combine two groups (confirmed and probable tuberculosis) into the analysis, the overall sensitivity, specificity, positive predictive value and negative predictive value are 84.3%, 66.7%, 79.6%, and 73.3%, respectively.

Conclusions: ELISPOT assay could be an adjuvant tool for diagnosing pulmonary tuberculosis in patients with diabetes mellitus.

Table   Clinical characteristics of 84 diabetic patients with suspected pulmonary tuberculosis

Variable	Patients n (%)
Mean age, y (range)	67 (32–93)
Male:female	63:21
Underlying condition	
Malignancy	29 (34.5)
Solid cancer	13 (15.5)
Hematologic cancer	6 (7.1)
Chronic renal failure	17 (20.0)
Chemotherapy or immunosuppressant therapy	13 (15.5)
Received steroid	4 (4.8)
Transplantation	2 (2.4)
Liver cirrhosis	2 (2.4)
Autoimmune disease	2 (2.4)
HIV infection	1 (1.2)
History of tuberculosis	6 (7.1)
Prior antituberculosis treatment before recruitment	5 (6.0)
Positive acid-fast smear	53 (63.1)
Granulomatous inflammation or acid fast bacilli in biopsy specimen	10 (11.9)
Positive ELISPOT assay	54 (64.3)
Confirmed tuberculosis	42 (50.0)
Probable tuberculosis	9 (10.7)
Diagnosis other than tuberculosis	33 (39.3)

PS-95220-05   Evaluation of new methods for quality control of acid-fast bacilli smear microscopy in Cuba

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Aim: Quality control of smears for acid fast bacilli (AFB) is essential for the appropriate functioning of the laboratory work. We evaluated two new methods for quality control of sputum smears for AFB in Cuba.

Method: Between January 2004 and December 2006, 2058 smears were evaluated, 1518 by the blinded rechecking method and 540 by the panel testing method in selected laboratories from Havana City and Las Tunas provinces. Rechecking was applied quarterly

and two controls were done, the first at the TB Provincial Laboratories of Microbiology of the participating provinces and the second at the National Reference Laboratory (NRL), Institute Pedro Kouri. The panels were prepared and validated at the NRL before the application with a biannual frequency.

Results: With the rechecking method, we identified 4 reading errors during the first control, and 33 in the second. The general rate of errors, the rates of false positives and false negatives were not over 5% in the two controls carried out. The quality indicators showed values over 99%, with a kappa index of 0.9926 ($P > 0.05$). With the panel testing method 63 reading errors were detected.

Conclusions: By the blinded rechecking method, the agreement obtained between two laboratories was high and the quality indicators showed acceptable values. The application of the panels testing permitted the identification of the laboratories where the personnel needed additional training in order to improve their reading quality for AFB smears.

PS-95264-05   External quality assessment of acid-fast bacilli smear microscopy in Korea

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Introduction: Sputum smear microscopy remains the basis of diagnosis for tuberculosis (TB) in Korea. The importance of correct examination of sputum smears at the district level, where the diagnosis is usually made, is critical. Therefore, quality assurance of smear microscopy is an essential part of an effective national TB control program (NTP). In this study, we evaluated the concordance between smear results at the district level and subsequent regional laboratory and slide rechecking results.

Methods: From Jan 2007 to Dec 2007, a total of 246 272 sputum specimens were examined at 258 public health centers (HC) and 152 522 specimens were subsequently referred to 12 Korean National Tuberculosis Association (KNTA) branch laboratories for culture. HC slides, which showed the discrepancy with KNTA smear result, were requested and rechecked by KNTA laboratories staffs.

Results: Among the 152 522 specimens, which were examined at both KNTA laboratories and HCs, positive rate of smear microscopy at KNTA laboratories and HCs were 4.3% and 3.6%. The discrepancy between HCs and KNTA laboratories was 1.2% (1899 specimens). Possible false-negative [KNTA (+)/HC (−)] were 1473 (77.6%) and possible false-positive [KNTA (−)/HC (+)] were 426 (22.4%). 74.5% of specimens with possible false-negative were culture positive, but only 30.8% of specimens with possible

false-positive were culture positive. Rechecking 699 slides of 1473 possible false negative slides confirmed 23.5% ($n = 164$) were truly positive. Of 426 possible false positive slides, 242 were rechecked and among them, 45.5% ($n = 110$) were truly negative.

Conclusion: Relatively poor performance of district level laboratories was observed. Therefore, quality assurance system of NTP in Korea should be strengthened.

PS-95351-05   Comparison of three LED-based fluorescence microscopy methods for TB detection

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Sputum smear microscopy using Ziehl-Neelsen (ZN) staining is the mainstay of TB diagnosis in most high burden countries, including Uganda. Although rapid and inexpensive, it has low sensitivity in programmatic settings, particularly in HIV co-infected patients. Replacement of light microscopy (ZN) with fluorescence microscopy (FM) would be an immediate option for improving TB case detection in high-burden settings. Several systems utilising ultra-bright LEDs to enable inexpensive FM have been recently developed. We compared the performance of three LED-based systems iLED Primostar (Zeiss); Lumin (LW Scientific Inc); AFTER Fluorescence LED module (Fraen Corporation) for detection of acid-fast bacilli in TB suspects presenting at Mulago Hospital, Kampala. Fraen uses transmitted light, the other two systems use reflected light. In phase 1 of the study, we compared performance of the three systems and ZN by blindly reading smears prepared using 242 sputum specimens, submitted for routine FM microscopy, in a research laboratory. Reading of smears by each LED method and ZN was done using grading charts and in a blinded fashion. Sensitivity and specificity of TB detection of each LED-based system and routine FM was compared with direct ZN and culture (MGIT and LJ) and correlation of iLED, Fraen and Lumin performance was calculated. Phase 2 of the study will compare operational performance in 810 TB suspects presenting at the Infectious Disease Institute at Mulago Hospital. An end-user appraisal and assessment of examination time of the three LED methods will also be reported.

PS-95447-05   Outpatient assessment of WHO recommendations for the diagnosis of sputum smear-negative tuberculosis

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Background: The World Health Organization (WHO) recently published new recommendations for the diagnosis of smear-negative TB (SNTB) in resource-limited high HIV prevalence settings. The diagnostic utility and outcomes of the algorithms are unknown.
Design: Four hundred and twenty one adults with at least 2 negative sputum smears and symptoms suggesting TB were enrolled from clinics around Edendale Hospital in KwaZulu-Natal, South Africa. Participants with a normal examination and chest radiograph assessed by primary care clinicians were referred for pericardial and abdominal ultrasound. Induced sputum and other relevant specimens were obtained for mycobacterial culture. Participants identified with a disease process compatible with WHO SNTB recommendations or intra-abdominal TB were started on antitubercular therapy (treatment group); those without were observed over eight weeks (observation group).
Results: Two hundred and ninety nine participants (71.0%) were assigned to the treatment group and 122 (29.0%) in the observation group. Two hundred and thirty four participants (54.1%) consented to HIV testing and 228 (83.5%) were HIV seropositive. Overall, 135 participants (45.1%) in the treatment group and 19 participants (15.6%) in the treatment group were diagnosed with confirmed or probable TB ($P < 0.0001$); sensitivity 0.88 (95%CI 0.81–0.92) specificity 0.39 (95%CI 0.33–0.45); PPV 0.452 (95%CI 0.39–0.51) NPV 0.84 (95%CI 0.77–0.90), positive likelihood ratio 1.43, negative likelihood ratio 0.32. Twenty participants (8.7%) were assigned to the treatment group based on ultrasound scan findings only. Eight participants died in the treatment group and four died in the observation group ($P = 0.73$).
Conclusion: The WHO recommendation for the diagnosis of smear-negative TB detect the majority of cases with culture positive disease, and are associated with a low mortality over an 8-week period.

PS-95468-05   Effect of MDR-TB diagnostic strategy on laboratory scale-up needs in India

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Background: India requires an enormous expansion of laboratory capacity to meet the 2012 national MDR-TB target of drug susceptibility testing (DST) for all smear-positive re-treatment TB patients. Line probe assay (LPA) or liquid culture systems are both WHO-approved platforms, but their role in the national MDR-TB response was unclear. To guide country planning, we modeled the effect of diagnostic strategy on laboratory requirements to meet the country DST target.
Methods: Using decision analysis, we compared the number of standard laboratory units (LU) required to annually test 180 000 persons for MDR-TB and offer follow-up cultures for 30 000 MDR-TB patients on treatment. Strategies compared included solid culture and DST, liquid culture and DST, and LPA with either solid or liquid follow-up cultures. A microbiologist panel determined feasible LU specimen workloads for each diagnostic strategy. Sensitivity analysis covered probable ranges for laboratory workload, MDR prevalence, follow-up culture numbers, and test failure rates.
Results: The model predicted that diagnosis by solid-media culture and DST would require 124 additional LU to meet the MDR-TB diagnostic target in India; liquid culture required 96 LU, and LPA-based diagnosis required 78 LU. The relative efficiency of liquid and LPA strategies resulted from greater DST throughput and, for LPA, no diagnostic culture for the majority of specimens. Sensitivity analysis showed that LPA and liquid strategies required fewer LUs irrespective of laboratory workload, MDR prevalence, and test failure rates. Reducing the number of follow-up cultures from 11 to 6 would require 24 fewer LUs across all strategies.
Conclusions: For planning laboratory scale-up in India, an LPA or liquid culture-based diagnostic strategy would require respectively 37% or 22% less laboratory capacity than solid culture. Fewer follow-up cultures, if clinically acceptable, would yield major reductions in required laboratory capacity.

PS-95538-05   LED-based fluorescence microscope for TB detection: evaluation in reference laboratories

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Background: A new generation of LED-based microscopes has been developed which have the potential to overcome some limitations of conventional light (LM) and fluorescence microscopy (FM). We evaluated the performance of the Carl Zeiss Primo Star iLED (iLED) compared to LM and FM using conventional equipment at reference settings, prior to implementation at microscopy centers.

Methods: Performance of iLED was assessed at 5 reference laboratories experienced in FM. Five quality-assured slide panels were generated from homogenized sputum and distributed to each of the sites, 110 for ZN staining and 220 for AuramineO/KMnO4. Sensitivity, specificity and reading-time were assessed by 5 readers for iLED (at 20× and 40×, without darkroom, after 1 week experience) in comparison to ZN and conventional FM (with darkroom).

Results: iLED performance is shown in the Table. Sensitivity of iLED was higher than ZN (overall 5%; 95%CI 93.2–97.4) and equivalent to FM. A greater difference in sensitivity (20%) was found for very low-positive slides. Specificity of iLED-40× was equivalent to ZN, whereas specificity of iLED-20× was slightly lower and equivalent to FM. Average gain in reading time compared to ZN was 60% for FM and iLED-20× and 55% for iLED-40×. Operational performance was assessed with a user appraisal questionnaire and rated very high. At 3 of the sites iLED was adopted for routine work.

Table   Overall sensitivity and specificity of iLED compared to conventional methods at 5 reference laboratories

	ZN	FM	iLED 40	iLED 20
Sensitivity	90.4%	95.7%	95.7%	95.7%
[95% CI]	[87–93]	[93.2–97.4]	[93.2–97.4]	[93.2–97.4]
Very low pos (scanty)	61.3%	80%	81.3%	80%
Low pos (1+)	96.9%	99.6%	99.6%	99.6%
High pos (2+, 3+)	100%	100%	98.7	100%
Specificity	100%	94.9%	100%	94.3%
[95% CI]	[97.9–100]	[90.5–97.3]	[97.9–100]	[89.8–96.9]

Conclusions: This assessment confirmed good operational and clinical performance of iLED at reference centers using a standardized panel of prepared slides.

Based on these findings, a second project phase was initiated: demonstration of iLED-40× effectiveness in programmatic conditions at microscopy centers without prior experience in FM.

PS-95477-05   Validacion de la prueba MODS en el Laboratorio Regional de Salud Publica de Arequipa, Peru

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Objetivo : Validar el rendimiento de la prueba MODS para diagnóstico de tuberculosis (TB) y detección de resistencia a isoniacida (INH), rifampicina (RIF) y MDR en el Laboratorio de Referencia Regional de Arequipa.

Métodos : Se procesó 126 muestras de esputo de personas con diagnóstico probable de TB pulmonar. Las muestras se colectaron antes de iniciar tratamiento. Se aplicó el protocolo MODS de la Universidad Peruana Cayetano Heredia y como prueba de referencia, el cultivo en medio Löwenstein-Jensen (LJ) y susceptibilidad a INH (0,2 ug/ml) y RIF (40 ug/ml) por el método de proporciones de Canetti et al. La lectura de cada método fue realizada desconociendo los resultados de la otra prueba.

Resultados : De las 126 muestras, 104 (83%) fueron positivas por LJ y 103 por MODS, un cultivo MODS se contaminó y 22 resultados fueron negativos por ambos métodos. En 15 (12%) cultivos LJ se obtuvo cultivos positivos con menos de 20 colonias. De los 104 cultivos LJ positivos, 3 no desarrollaron por el método Canetti, 8 fueron resistentes a INH y 7 a RIF. De los 103 cultivos positivos por MODS, 8 fueron resistentes a INH y 8 a RIF; 95 fueron sensibles. Los valores de concordancia, índice kappa, sensibilidad, especificidad, valor predictivo positivo y negativo, fueron, para cultivo: 97,6%; 0,92; 99%; 95,5%; 99% y 95,5%; susceptibilidad a INH: 98,9%; 0,93; 88%; 100%; 100% y 98,9%; susceptibilidad a RIF: 100%,1,0; 100%, 100%, 100% y 100%; y detección de MDR: 98,9%, 0,92; 86%; 100%, 100% y 98,9%. El tiempo promedio de cultivo LJ fue de 49 días y del método de Canetti fue de 42,3 días, y para MODS, el cultivo y la susceptibilidad se obtuvieron en forma simultánea a los 13,4 días, en promedio.

Conclusión : En condiciones de un laboratorio de salud pública regional, hemos validado satisfactoriamente el método MODS, demostrando que es un método altamente eficiente y oportuno, que se debe aprovechar al máximo para controlar la TB y TB resistente en países con escasos recursos.

PS-95518-05   Implementation of LED-based fluorescence microscope in microscopy centers in India

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Background: Replacement of conventional brightfield microscopy with LED-based fluorescence microscopy (FM) is one immediate option to improve TB case detection and reduce workload in high-burden countries. In order to generate the evidence required for policy change and allow for wide-spread use in programmatic settings, a demonstration project using the Carl Zeiss Primostar iLED (iLED) microscope was initiated in coordination with National TB Control Programs in 10 countries. This abstract describes the experience in 9 microscopy centers in India.

Methods: iLED was introduced in routine microscopy centers without prior experience in FM. For all sites, baseline performance data were collected using the standard ZN procedures over a one month pre-study period. Following a 3–5 day training session on the iLED, sites initiated a validation phase. During this phase, all slides were screened with iLED and then confirmed daily by a supervisory site using a conventional FM. Patient care during this phase was based on the results of conventional FM. When performance criteria were met, centers entered a 6 month implementation phase, during which patient management was based on the iLED results. Rechecking by the supervisory sites was reduced over time. Clinical, operational performance and user appraisal were assessed throughout the project.

Results: Within 1 month, all microscopy centers obtained a sensitivity and specificity for iLED of >95% compared to conventional FM rechecking results. After 2 months, all of them reached or exceeded accuracy of ZN. Overall, microscopists scored ease and convenience of Auramine O staining and iLED reading as superior to ZN.

Conclusion: This project demonstrates the feasibility of implementing iLED in microscopy centers without prior experience in FM. These data help to establish the training and supervision needs for FM implementation and provide some of the evidence required for policy change and roll out in programmatic settings.

PS-95519-05   Cost-effectiveness of the nucleic acid amplification test in a high TB-HIV prevalence setting

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Background: The CDC recently recommended that a nucleic acid amplification test (NAAT) become part of standard practice for the diagnosis of tuberculosis (TB) but there are limited data on the impact of the routine use of NAAT. Our urban university-affiliated public hospital has routinely used the NAAT on all AFB positive respiratory specimens since 2002.

Objective: To conduct a cost-effectiveness analysis (CEA) of the routine use of a commercially available NAAT (MTD, Gen-Probe) on AFB+ respiratory specimens for early exclusion of TB at Grady Memorial Hospital (GMH), Atlanta.

Methods: A CEA was conducted using decision analysis models. NAAT sensitivity, specificity, and positive predictive value (PPV) of an AFB+ respiratory specimen for culture-confirmed TB were determined based on data in the GMH Epidemiologic TB database (1/2002–6/2008). Costs estimates were obtained from GMH Pharmacy, Epidemiology/Infection Control Department, State of Georgia TB Control Program, CDC, and published literature.

Results: NAAT had an overall sensitivity of 99.6% and specificity 99.1%. The PPV of AFB smear+ respiratory specimens for culture-confirmed TB was 27% (252/949); when stratified by HIV status, PPV was 19% (85/445) among HIV+ patients and 56% (152/271) among HIV-negative patients. The cost-effectiveness of the NAAT was $2817 per test performed on each AFB smear+/NAAT negative/culture negative case. These savings were based on the costs of the NAAT ($174/test), cost of anti-TB therapy ($8.23/day), respiratory isolation (RI) ($50 surcharge/day), and contact investigation (CI) ($2620/TB case) which were averted by NAAT results in early exclusion of TB.

Conclusion: Routine use of NAAT on AFB smear+ respiratory specimens was shown to be highly cost-effective in our setting. Early exclusion of TB (especially among those who were HIV+) allowed early discharge from RI rooms, avoidance of anti-TB therapy and unnecessary CIs among those who were AFB smear+ and NAAT negative.

TB-HIV DIAGNOSIS AND CLINICAL MANAGEMENT I

PS-94192-05 Chest radiographs in HIV-infected patients with culture-confirmed pulmonary TB, United States

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Background: In HIV-infected persons with tuberculosis (TB), smears of sputum specimens often test negative for acid-fast bacilli. Chest radiography (CXR) may aid in diagnosis of TB suspects with negative sputum smears. However, HIV-infected TB patients may have atypical or even normal CXR findings, presenting a further challenge for TB diagnosis.

Methods: We performed a retrospective cohort analysis of US. national TB surveillance data and included all culture-confirmed pulmonary TB cases reported from 1993–2007. We compared CXR results among HIV-infected and HIV-uninfected TB patients, and further examined differences between smear-negative TB cases and smear-positive TB cases.

Results: From 1993–2007, there were 72 717 culture-confirmed pulmonary TB cases in the United States with CXR and HIV test results. Of these, 16 023 (22%) were HIV-infected. CXR was interpreted as normal in 1746 (10.9%) patients with TB-HIV, compared to 1374 (2.4%) of 56 694 TB patients not infected with HIV (RR 4.5; 95%CI 4.2–4.8). Among patients with HIV, those with smear-negative TB were more likely to have a normal CXR ($n = 1010, 16.1\%$) as compared to those with smear-positive TB ($n = 694, 7.4\%$; RR 2.2; 95%CI 2.0–2.4).

Conclusions: Among culture-confirmed pulmonary patients with TB-HIV, CXRs were read as normal >10% of the time regardless of sputum smear result, increasing to >16% in patients with TB-HIV who have negative sputum smear results. These data reflect comparatively optimal circumstances, where sputum smears are performed using advanced technology and CXRs are usually read by trained radiologists. Using CXR to diagnose or exclude pulmonary TB in patients who are smear-negative could lead to underdiagnosis, delayed treatment, and could increase the risk of death or TB transmission. More widespread use of sputum culture is critically needed in high HIV prevalence settings to improve TB diagnosis, especially for patients who are smear-negative.

PS-94353-05 Operational study of an algorithm to improve the diagnosis of tuberculosis among HIV-positive adults

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Background: WHO issued new guidelines to improve the diagnosis and outcome of smear-negative and extrapulmonary tuberculosis in HIV-positive patients. HIV-testing is requested together with sputum smear for all TB suspects. A chest X-ray is requested immediately if the patient is HIV-positive and smear-negative (2 smears). When suggestive of tuberculosis, the guideline suggests omitting an antibiotic trial and starting treatment for smear-negative pulmonary or extrapulmonary tuberculosis without delay.

Methods: Prospective, observational cohort study in 4 study sites in Phnom Penh, Cambodia.

Results: From August 2008 till January 2009, 941 TB suspects enrolled in the study of whom 311 (33.0%) were diagnosed with tuberculosis. Overall 283 (30.1%) TB suspects were HIV-positive, of whom 35 (12.4%) were newly diagnosed HIV-positive during workup. 45 (15.9%) HIV-positive patients were started on tuberculosis treatment. 33 (73.3%) patients were diagnosed with smear-negative (22/45) or extrapulmonary (11/45) tuberculosis. Chest X-ray identified 21/22 (95.5%) of smear-negative tuberculosis cases and 7/11 (63.6%) of extrapulmonary tuberculosis cases. Abdominal ultrasound identified two additional cases (18.2%). Mycobacterial culture did not identify additional patients. The median time between first presentation and TB diagnosis was 5 days (IQR: 1–15 days).

Conclusion and recommendations: The delay between first presentation and TB diagnosis remains substantial, partly due to the physician's reluctance to adopt the new guideline. Even when suspecting smear-negative or extrapulmonary tuberculosis in HIV-positive patients, physicians still feel it is necessary to prescribe an antibiotic trial before starting TB treatment. Mycobacterial culture of sputum does not identify additional cases of tuberculosis.

PS-94431-05 Réponse bacilloscopique à la phase intensive du traitement antituberculeux par rapport au statut

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Objectif : Evaluer la réponse bacilloscopique à la phase intensive du traitement antituberculeux en fonction du statut sérologique et immunitaire au VIH-1.

Méthode : Nous avons étudié prospectivement sur 1 an, du 1ier décembre 2007 au 1er décembre 2008,

une population de patients atteints de tuberculose pulmonaire bacillifère présentant ou non une co-infection avec le VIH-1. Deux groupes ont été obtenus de façon aléatoire. Un groupe A (96 patients) était constitué de patients co-infectés TB/VIH+ et un groupe B (171 patients) était constitué de patients tuberculeux séronégatifs au VIH. Tous les patients ont été traités pour leur tuberculose avec le régime de catégorie I au RHEZ pendant 2 mois. Une évaluation de la bacilloscopie a été faite à 2 semaines, 4 semaines, 6 semaines et 8 semaines dans les deux groupes.

Résultat : 267 patients ont été traités, représentant 26,6% des admissions. L'âge moyen était de 34,62 ± 11 et le sex-ratio M/F était de 1,3. Un total de 35,75% des patients était co-infectés par le VIH avec un taux de CD4 moyen de 285 ± 102 cellules/mm3. La négativation de la bacilloscopie a été de 92,59% chez les patients du groupe A contre 24,56% dans le groupe B à 2 semaines, de 100% chez les patients du groupe A contre 61,83% dans le groupe B à 4 semaines, de 100% chez les patients du groupe A contre 87,33% dans le groupe B à 6 semaines et à huit semaines chez 100% des patients du groupe A contre 96,77% des patients du groupe B. Les différences trouvées étaient statistiquement significatives jusqu'à la 6ème semaine ($P < 0,0001$).

Conclusion : La réponse au traitement antituberculeux s'est révélée meilleure chez les patients immunodéprimés que chez les patients immunocompétents dans les 6 premières semaines.

PS-94665-05 High rates of smoking and depression co-occur among people living with HIV in Canada

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Background: While antiretroviral therapy has significantly improved HIV life expectancy, mid-life chronic illnesses, such as cardiovascular and pulmonary disorders are rising. In Western countries, alarmingly high rates of cigarette smoking (40%–70%) are reported in HIV patients (e.g. Stein et al. 2008) as compared to the general population rate of 19% (Health Canada, 2007). HIV smokers have higher rates of pulmonary disease and cancers as compared to HIV nonsmokers (Stein et al. 2008). Smoking and depression share some common dopamine mediated biochemical pathways. To date, scant research exists on the effects of marijuana smoking in HIV patients. This study examined the prevalence and relationship between cigarette and marijuana smoking, and depression in a sample of HIV patients.

Methods: This is a cross-sectional study of 101 HIV outpatients in Ottawa, Canada. During regular HIV outpatient visits, participants consented to complete a questionnaire package that included validated measures of depression and smoking behaviors.

Results: Canadian HIV patients reported very high rates of both cigarette smoking (46%) and marijuana smoking (40%). As well, 57% of HIV patients scored above clinical cut-off scores for depression. Compared to HIV patients with low depressive symptoms, those with high depressive symptoms reported more cigarette smoking ($P < 0.01$) and greater marijuana use ($P < 0.01$).

Conclusion: Results highlight the need to regularly assess and address smoking behavior and depression among HIV patients. An examination of potential overlapping biochemical pathways as it pertains to clinical implications for optimizing HIV treatment and quality of life will be discussed.

PS-94698-05 The utility of TB symptoms for TB screening in HIV/AIDS in China

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Setting and objectives: There was an absence of an algorithm for TB screening in PLWHA in China. We piloted a TB symptom questionnaire for screening TB suspects among PLWHA in order to find out the best combinations of TB symptoms with less investment and more case detection.

Methods: We did the pilot in four high HIV-prevalence counties in Henan, Yunnan and Sichuan province with a combined population of 3.1 million. From September 2006 to February 2007, we screened the registered PLWHA using a designed TB symptom questionnaire which includes seven symptoms, namely cough of more than 3 weeks, hemoptysis, unexplained fever longer than 2 weeks, night sweats, unexplained excessive weight loss, fatigue or difficulty breathing and lymphadenopathy. The PLWHA with one of symptoms in the questionnaire or more were regarded as TB suspects and refered to TB clinic for TB evaluation, including sputum smear, chest X-ray, and diagnostic treatment (if appropriate).

Results: 3274 PLWHA received TB symptom screening. Among them, 1258 were TB suspects (38.4% positive rate) and were all referred to TB clinic for TB evaluation. Finally, 116 were diagnosed with TB, including 22 (19.0%) smear-positive pulmonary TB cases, 86 (74.1%) smear-negative pulmonary TB cases and 8 (6.9%) extra-pulmonary TB cases. The positive predictive value (PPV) of the questionnaire was 9.2% (116/1258).

Conclusion: In this pilot, we found that 'cough more than 3 weeks' was used alone for TB screening among

PLWHA, 98.3% TB cases would be detected and 25% investment in screening would be saved and it would be more practical. However its truth needs to be confirmed by more evidence.

Symptoms & signs	Questionnaire screening positive (n = 1258) n (%)	Tuberculosis diagnosed (n = 116) n (%)	PPV (%)
Cough	944 (75.0)	114 (98.3)	12.1
Hemoptysis	70 (5.6)	16 (13.8)	22.9
Fever	317 (25.2)	55 (47.4)	17.4
Night sweats	528 (42.0)	60 (51.7)	11.4
Weight loss	324 (25.8)	45 (38.8)	13.9
Fatigue	526 (41.8)	40 (34.5)	7.6
Lymphadenopathy	89 (7.1)	6 (5.2)	6.7

PS-94760-05   Tuberculosis in patients receiving HAART in a South African study cohort

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Background/objective: The combined epidemics of TB and HIV have had a catastrophic effect on sub-Saharan Africa. We measured the frequency of TB diagnosis prior to and after starting antiretrovirals (ARVs) in patients from an ARV rollout program in Cape Town, South Africa, who were enrolled in a clinical trial.

Methods: The study was performed at an ART roll-out clinic at GF Jooste Hospital in Cape Town, South Africa. Data were collected during a randomized trial using trained patient-nominated treatment supporters providing partial DOT on outcomes of ART.

Results: Of 274 subjects enrolled into the study, 190 (69.3%) had a history of TB, with 52% on TB treatment at the time of enrollment (55% of those on treatment were in the intensive phase of therapy). Patients with TB at enrollment had more advanced WHO classification of HIV disease and lower Karnofsky scores. During evaluation for ARVs, 7 subjects were diagnosed with TB. After starting ARVs, 29 patients (10.6%) developed a new case of TB at a median of 7 months; 18 patients had pulmonary TB (62%), 11 had extra-pulmonary TB (38%) and 4 patients developed MDR-TB (13.8%).

Conclusions: Tuberculosis rates were extremely high in this HIV-infected population with over half of subjects being actively treated at the time of starting ARVs. Once initiating ARVs, the risk of developing TB remained high, underscoring the importance of integrating TB and HIV care programs.

	Yes	No	P value
History of TB	190 (69.3%)	84 (30.1%)	
On TB meds at time of enrolment, n (%)	99 (52.1)	NA	NA
Of those on TB meds, phase of TB treatment at time of enrolment n (%):			
Intensive	55 (55.6)		
Continuation	44 (44.4)	NA	NA
Risk factors of those with history of TB:			
Age (mean ± SD)	36.2 ± 8.6	37.2 ± 11.5	0.5028
Male, n (%)	88 (46.3)	28 (33.3)	0.0449
History of ETOH, n (%)			
Current drinker	33 (17.4)	15 (17.9)	
Non-drinker	80 (42.1)	41 (48.8)	
Ex drinker ≥ 1 year	20 (10.5)	9 (10.7)	
Ex drinker < 1 year	57 (30.0)	19 (22.6)	0.6266
Karnofsky Score (mean ± SD)	89.2 ± 8.2	92.6 ± 5.9	0.0003
WHO stage of disease			
I	0 (0.0)	3 (3.8)	
II	7 (4.1)	22 (27.5)	
III	77 (45.0)	35 (44.7)	
IV	87 (50.9)	20 (25.0)	<0.0001
Number of people living with patient (mean ± SD)	3.1 ± 1.7	2.7 ± 1.3	0.0406
CD4 count (mean ± SD)	99.5 ± 74.5	111.9 ± 66.4	0.1880
Log10VL (mean ± SD)	5.0 ± 0.5	4.9 ± 0.5	0.2041
Developed TB after starting HAART	29	245	
	8.4 ± 6.8		
Of those, when did it develop (months)—mean, median, range	7.0 0–22	NA	
Type of TB			
Pulmonary	18 (62%)		
Extrapulmonary	11 (38%)	NA	
Risk factors			
Age (mean ± SD)	35.9 ± 8.5	36.9 ± 9.8	0.6175
Male, N (%)	8 (27.6)	108 (44.1)	0.0891
History of ETOH, N (%)			
Current drinker	3 (10.3)	45 (18.4)	
Non-drinker	14 (48.3)	107 (43.7)	
Ex drinker ≥ 1 year	3 (10.3)	26 (10.6)	
Ex drinker < 1 year	9 (31.0)	67 (27.4)	0.7516
Karnofsky Score (mean ± SD)	90.0 ± 5.1	90.6 ± 7.8	0.6938
WHO stage of Disease			
I	0 (0.0)	3 (1.3)	
II	4 (16.0)	25 (11.1)	
III	11 (44.0)	101 (44.7)	
IV	10 (40.7)	97 (42.9)	0.7994
History of TB	16 (55.2)	174 (71.0)	0.0801
Number of people living with patient (mean ± SD)	2.9 ± 1.4	3.0 (1.6)	0.6015
CD4 count (mean ± SD)	87.2 ± 50.8	104.6 ± 73.4	0.2165
Log10VL (mean ± SD)	5.0 ± 0.5	5.0 ± 0.5	0.9424

PS-94844-05   Human immunodeficiency virus infection seroreactivity survey in children with respiratory disorders

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Settings: Across the world, children are at higher risk of TB infection and disease and also dying if they are HIV infected.

Aim: To determine the seroprevalence of HIV in hospitalized children for respiratory disorders.

Material and methods: 15-year study period of HIV seroprevalence in Paediatrical department of Constantza Clinical Pneumology Hospital from 01.10.1990

to 31.12.2005. For HIV antibodies screening and positive diagnosis of HIV infection, serial blood samples were obtained from 3,698 hospitalized children less than 15 years of age. Demographic and HIV risk factor informations were also collected from clinical medical files.

Results: 5.43% of 3698 subjects (95% confidence interval, 1.3% to 10.9%) were positive for HIV-1 on enzyme-linked immunosorbent assay and Western-blot analysis. Mean age of HIV screened children was 11.44 y.o. ± 3.137 std.dev. (limits: 2–14 yrs.). The HIV seroprevalence rate in our hospital was higher in children hospitalized for tuberculosis vs lower respiratory infections (6.2%; $n = 121/1958$ vs 4.5%; $n = 80/1740$; OR = 1.34, RR = 1.32, $P < 0.05$). HIV positive seroreactivity was revealed in 60.2% of cases ($n = 121/201$) by tuberculosis. 39.8% of HIV infected children ($n = 80/201$), were considered to be infected via blood transfusion by the end 1980s.

Conclusion: Outbreaks of HIV infection among children are a reality, being mostly associated with tuberculosis than other respiratory diseases. Early diagnosis of HIV infection based on standard methods of screening could have important therapeutical implications in prolonged survival of children mostly if TB is also involved.
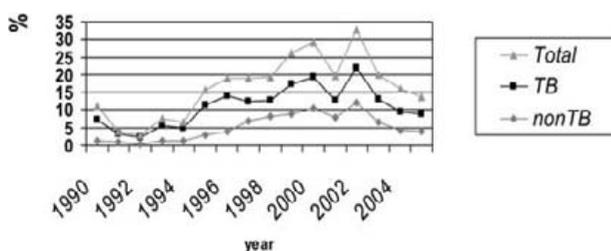
Figure HIV seroprevalence in children hospitalized for respiratory disorders ($n = 3698$), including TB, Constantza, 1990–2005.

PS-95380-05 *Pneumocystis jiroveci* is common among smear-negative suspected recurrent PTB in HIV-infected adults

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Introduction: Respiratory infection is a leading cause of morbidity and mortality especially in association with HIV. PCP and bacterial infections are common respiratory pathogens. Recurrent tuberculosis is commonly most suspected cause of pulmonary symptoms among HIV infected adults previously treated for active PTB and those with sputum negative are unnecessarily started on anti TB chemotherapy. This exposes HIV infected persons to unnecessary pill burdens, overlapping ART and anti-tuberculosis drug toxicities and drug interactions.

Setting: National Referral TB Treatment Center, Mulago Hospital Kampala.

Objectives: To determine the prevalence of PCP, and bacterial pathogens and evaluate the antibiotic sensitivity profiles of bacterial isolates.

Methods: Patients with cough ≥2 weeks, sputum AFB negative, HIV+, aged 18–60 years, were eligible. Patients underwent sputum induction and evaluated for PCP and bacteria and sensitivity testing. Septrin and ART use were recorded.

Results: Between March and October 2008 total of 58 patients (29 men and 29 women; mean age 38.4 years; SD 9.2) 56% unemployed or skilled workers were enrolled. Their mean CD4 count was 316.1 SD 222.7. Twenty percent had PCP pathogens and 17% had bacterial isolates all resistant to septrin.

Conclusion: PCP infection rate is high despite septrin prophylaxis probably indicating high level resistance to septrin. Determination of PCP is resistance to septrin is warranted.

PS-95398-05 Blood cultures for the diagnosis of TB among hospitalized HIV-infected TB suspects in Tanzania

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Background: The rapid, accurate diagnosis of TB in hospitalized HIV-infected patients is challenging in many resource-limited settings. Blood culture may improve the sensitivity of diagnosis.

Methods: We prospectively enrolled hospitalized HIV-infected TB suspects at two hospitals in Dar es Salaam, Tanzania. Subjects gave 3 sputum specimens for concentrated AFB smear and solid media culture, and 40 mLs of blood for culture by both automated broth-based MB Bac T and manual agar-based Isolator methods. Subjects were randomized 1:1 into two blood culture strategies: A = 40mLs drawn once and B = 2, 20mLs drawn 12–24 hours apart.

Results: Among 265 subjects approached, 258 agreed to participate. Of the 258 subjects, 67% were female, mean age was 37 years, and mean CD4 count 149 (1–1016 range). 83 (32%) had microbiological confirmation of TB. Sensitivity of sputum smear and culture was 40% (30/75) and 91% (68/75), respectively. Sensitivity of blood cultures was 49% (41/83): 81% (33/41) by MB Bac T and 51% (21/41) by Isolator ($P = 0.005$). Blood cultures were the only source of TB diagnosis in 15 of 83 (18%) patients. The two blood culture methods were concordant positive in only 13 of 41 complete sets from the 83 TB patients. The sensitivity of Strategy A was 54% (21/39) and of Strategy B was 46% (20/44) ($P = 0.44$).

Conclusions: In our setting enriched for HIV-associated TB, blood culture was a useful method for TB diagnosis, with overall sensitivity higher than sputum AFB smear. MB Bac T was a more sensitive detection method. We did not detect a difference in sensitivity according to phlebotomy strategy.

PS-95402-05 The main risk factors of IRIS in PLWHA

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Background: The immune reconstitution inflammatory syndrome (IRIS) in HIV-infected people (PLWHA) initiating from restored immunity to specific infections or non-infected antigens. The known phenomena are ARV treatment causing this paradoxical clinical worsening. Tuberculosis is the commonest cause of morbidity and mortality in HIV infected people in sub-Saharan Africa. The situation is more complicated because TB is difficult to diagnose in HIV-infected people. It modifies the clinical presentation of TB, particularly in those with more advanced immune suppression.
Objectives: Determine the cause of death due to IRIS in people living with AIDS. Determine if only ARV could be the cause or could there be other causes of IRIS due to an immunological response to antigen stimuli that are the risk factors in PLWHA.
Methodology: An 18 month retrospective study of the mortality of PLWHA in a district hospital with a special TB ward of 30 beds.
Results: The cause of dead were overwhelming due to infections. Pathogens most frequently implicated in the syndrome are mycobacterium, viral hepatitis and encephalopathy. With risk factors causing IRIS like blood transfusion, low CD4 count, toxicity due to anti-tuberculosis treatment
Conclusion: The main factors described in associating with IRIS include more than ARV treatment.

PS-95492-05 Paciente con tuberculosis pulmonar por *M. simiae* y *M. tuberculosis* VIH negativa

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Introducción : Las micobacterias ambientales se encuentran distribuidas en la naturaleza, la infección es por inhalación, por vía digestiva y vía hematógena en HIV positivos, en estos ha ocurrido un aumento de las infecciones por *M. avium* o *M. intracellulare* y es rara la infección por *M. simiae*.

Caso clínico : Femenina de 45 años, no diabetes, HIV negativo, trabaja con plantas secas y semillas con defección de monos. Con tuberculosis pulmonar en 1997, tratada por 6 meses con rifampicina, pirazinamida e isoniacida y dada de alta por curación. Presenta primera recaída en octubre del 2006, lavado bronquial con BAAR positivo, inician tratamiento con rifampicina, pirazinamida, etambutol y estreptomicina, continúa con síntomas, por lo que acude a nuestro hospital en julio del 2007. En radiografía de tórax se observa caverna apical izquierda. TAC de tórax con cavernas bilaterales, imagen de árbol en yema y bronquiectasias. Se le realiza lavado bronquial con BAAR positivo, se aisla *M. tuberculosis* resistente a isoniacida, y una segunda micobacteria de crecimiento rápido identificada por secuenciación como *M. simiae*. Se inicia tratamiento con rifampicina, isoniacida, pirazinamida, etambutol, kanamicina, levofloxacina y claritromicina, persiste con cultivos positivos donde ya no se logra identificar a *M. tuberculosis* pero persiste *M. simiae*. Actualmente la paciente se refiere asintomatica respiratoria, sin pérdida de peso y sin fiebre.
Discusión : *M. simiae* se reporta en afección pulmonar en pacientes inmunocomprometidos, HIV positivos o en diabéticos, también a nivel cutaneo en pacientes sometidos a tratamientos cosméticos por mesoterapia, solo hay reporte de casos anecdóticos en pacientes inmunocompetentes. Es una micobacteria resistente a la mayoría de los antituberculosos algunos casos mejoran con etambutol, quinolonas y claritromicina. Llama la atención que esta paciente no es diabética ni HIV positiva y que presenta una coinfección por dos tipos de micobacterias.

PS-95542-05 Clinical performance of nucleic acid test for TB diagnosis in hospital with high-HIV prevalence

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Aim: The nucleic acid amplification assay (NAA) for rapid detection of *Mycobacterium tuberculosis* has been implemented in routine clinical microbiology laboratory to provide early diagnosis of *M. tuberculosis* on acid-fast bacilli (AFB)-smear-positive respiratory samples. Clinical performance of NAA for rapid detection of *M. tuberculosis* has been monitored and analyzed in the patients with high HIV prevalence.
Methods: Nucleic acid amplification assay for direct diagnosis of *M. tuberculosis* using amplified *M. tuberculosis* direct detection method (MTD by Gen-Probe)

has been implemented since 2001 for clinical testing on AFB-smear-positive respiratory samples in the large inner-city public hospital. MTD results from 2001 to 2006 were analyzed against AFB culture results and the available HIV infection status results including the HIV antibody and/or HIV RNA testing.

Results: In a 6-year period, 1469 AFB-positive respiratory samples have been tested by using MTD method and AFB culture. Among those testes, 472 samples (32.1%) were positive for *M. tuberculosis* by MTD. Sensitivity of MTD was 99.8%. The turnaround time for MTD results average 2 to 4 days. Among 1015 suspected cases with 29.2% positive rate for *M. tuberculosis* being tested each year, the positive rates for *M. tuberculosis* decreased gradually: 51.2% in 2001, 42.9% in 2002, 35.2% in 2003, 29.2% in 2004, 14.2% in 2005, and 16.7% in 2006. Although not all patients had HIV tests, there were 605 cases were tested positive for HIV. Less than one third (31.1%) among those cases known to be HIV positive were positive for *M. tuberculosis*.

Conclusion: Among the AFB-smear-positive respiratory samples tested for *M. tuberculosis*, only 20% or less were positive for *M. tuberculosis*. Among the AFB-smear-positive patients with HIV infection, 30% or less were positive for *M. tuberculosis*. In conclusion, NAA by using MTD tests has proven clinically useful for rapid diagnosis of *M. tuberculosis*, thus overcomes the low positive predictive value for AFB smear only in this large urban public hospital.

NON-TB MYCOBACTERIOLOGY

PS-94083-05   Nontuberculous mycobacterial pleurisy: an eight-year experience in a medical center in Taiwan

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Background: Guidelines for the treatment of nontuberculous mycobacteria (NTM) pleurisy are currently lacking. However, this issue is of greater clinical concern due to the increasing prevalence of NTM infection.

Methods: From 2000 to 2007, patients with NTM isolated from their pleural effusion (PE) samples, but not mixed with other micro-organism or malignancy, were identified (NTM pleurisy group). Those with PE samples being culture-positive for *Mycobacterium tuberculosis* were also identified. Among them, four times of the patient number as in the NTM pleurisy group were selected (TB pleurisy group) and compared.

Results: A total of 35 NTM patients and 140 tuberculous patients were reviewed. The former seemed younger. Male predominance, high prevalence of underlying co-morbid conditions and hypoalbuminemia were noted in both groups. Significantly smaller proportion of patients with NTM pleurisy received anti-mycobacterial treatment as compared with those having TB pleurisy (37% vs. 91%, $P < 0.001$). The results of PE analysis revealed that patients with NTM pleurisy had a higher leukocyte count with lymphocyte predominance yet with a relatively low percentage and a lower level of total protein. The 1-year survival was similar in the two groups. In the NTM pleurisy group, survival analysis revealed that anti-NTM treatment was significantly associated with better outcome ($P = 0.004$).

Conclusion: In addition to TB pleurisy, NTM pleurisy should be considered in a relative young patient presenting with higher PE leukocyte and lymphocyte predominance with a relatively low percentage. Starting anti-NTM therapy should be considered because there is an association between treatment and survival.

PS-94218-05   Excellent in vitro activity of tigecycline against rapidly growing mycobacteria in Taiwan

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Aim: Diseases caused by rapidly growing mycobacteria (RGM) are emerging infectious diseases and have occurred increasingly in Taiwan. However, RGM showed high prevalence of antimicrobial resistance in Taiwan. We want to evaluate the in vitro activities of tigecycline against RGMs in Taiwan.

Methods: Totally 160 clinical isolates of RGMs including 79 isolates of *M. abscessus*, 58 isolates of *M. fortuitum*, and 23 isolates of *M. chelonae* were tested for the susceptibility of tigecyline, minocycline, tetracycline and doxycycline. The MICs were determined by broth microdilution assay according to the CLSI guidelines.

Results: Among these four agents, tigecyline had excellent activity against RGMs. Most (91.1%, 98.3% and 91.3%) of the *M. abscessus*, *M. fortuitum* and *M. chelonae* isolates had clofazimine MICs of ≤1 μg/ml. The MIC50s of tigecyline against the three RGM species were 0.125 to 0.5 μg/ml and MIC90s

were 0.5 to 1.0 μg/ml. The MIC50s and MIC90s of minocyline, tetracycline and doxycycline were 64μg/mL to >128 μg/m.

Conclusion: Tigecycline showed excellent in vitro activities against RGMs in Taiwan, but minocyline, tetracycline and doxycycline had only little or no activity against the three pathogenic RGMs. Tigecyline may play an important role to treat the infection of RGMs in the future.

Antibiotic	MIC (μg/ml)		
	Range	MIC50	MIC90
M. abscessus (79)			
Tigecycline	0.125–4	0.5	1
Minocycline	<0.25–>128	128	>128
Tetracycline	2–>128	>128	>128
Doxycycline	<0.25–>128	>128	>128
M. fortuitum (58)			
Tigecycline	0.06–2	0.125	0.5
Minocycline	<0.25–>128	128	>128
Tetracycline	2–>128	>128	>128
Doxycycline	<0.25–>128	>128	>128
M. chelonae (23)			
Tigecycline	0.125–2	0.5	1
Minocycline	<0.25–>128	64	128
Tetracycline	1–>128	>128	>128
Doxycycline	<0.25–>128	>128	>128

PS-94246-05   Evaluation of the BD MGIT TBc ID Test for rapid *M. tuberculosis* complex liquid culture detection

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Background: The MGIT TBc Identification (TBc ID) Test is a rapid chromatographic immunoassay to qualitatively detect the MPT64 protein antigen of *M. tuberculosis* complex (Mtbc) from AFB smear-positive BD MGIT liquid cultures. The test requires no sample prep, is visually read, and can detect Mtbc from a 100 μl sample in ≤15 minutes with no cross reactivity to non-Mtbc organisms. This primarily seeded study characterized the TBc ID test performance using respiratory pathogens.

Methods: 23 Mtbc organisms and 33 non-Mtbc mycobacteria, bacteria and yeasts were cultured in 1–3 lots each of both MGIT 7 ml and 4 ml liquid culture media. Media were inoculated into 1–3 device lots to test agreement between device results and known organism Mtbc status, equivalency between media types, and performance with respect to inoculum storage conditions, BD MycoPrep sputum processing reagents, and sample volume.

Results: In testing with equal numbers of MGIT 960 and manual MGIT cultures, 529/530 devices tested with Mtbc cultures gave 99.8% positive agreement (one result was un-interpretable). 628/628 devices tested with non-Mtbc cultures yielded 100% nega-

tive agreement (no cross-reactivity). Intra and inter lot reproducibility was 100%. Results were comparable between MGIT media types, media lots, and device lots, and not noticeably affected by stressing media supplements @ 50degC for 14 days, storing inocula @ 37degC for 10 days or frozen for ≥3 months, or from carryover reagents from processed sputum samples. Mtbc organisms were reliably detected the day of culture positivity. The test is robust with regard to sample inoculum volume, device storage conditions and stability of test result.

Conclusions: BD MGIT TBc ID Test results were >99.9% concordant with organism Mtbc status, no cross-reactivity with common non-Mtbc respiratory pathogens was observed, and device performance was robust. The TBc ID clinical trials are ongoing.

PS-94360-05   Use of p-nitrobenzoic acid in 7H10 agar to differentiate *Mycobacterium tuberculosis* from NTM

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Background: PNB (p-nitrobenzoic acid) is commonly used to differentiate *Mycobacterium tuberculosis* from non-tuberculous mycobacterial species (NTM). PNB is inhibitory for *M. tuberculosis* and has been evaluated for use in Lowenstein-Jensen (LJ) medium, BACTEC and MGIT automated systems with good results. In resource-poor settings, use of the above media is hampered by unavailability of antibiotic-free egg base and high costs. Published data on the use of Middlebrook agar for PNB testing is limited although evaluation of Middlebrook agar (7H10/7H11) for this purpose is important due to its low cost. We evaluated the efficacy of PNB for identification of *M. tuberculosis* using 7H10 medium.

Methods: PNB was incorporated in 7H10 agar at a concentration of 500 μg/ml, and a bacterial suspension of 106 CFU/ml was inoculated onto agar plates with organism control. The test was performed in quad-plates to increase cost-effectiveness. Plates were monitored for growth at 10, 14 and 21 days, and results were compared with the BACTEC-NAP test and the PNB-MGIT test.

Results: Eighty-eight isolates of Mycobacterium spp. were tested, with 77 *M. tuberculosis* and 11 NTM. PNB-7H10 showed 100% agreement with PNB-MGIT and BACTEC-NAP test results. The cost of PNB 7H10 agar was PKR 58 (US$.07) as opposed to PKR 283 (US$ 3.5) for PNB MGIT and PKR 412 (US$ 5.2) for BACTEC NAP.

Conclusion: PNB can be used in the 7H10 medium for the identification of *M. tuberculosis*. The PNB-7H10 test is especially cost-effective when used in quad-plates, and can be used by laboratories where MGIT automated systems are unavailable.

PS-94846-05 Differential diagnosis of mycobacterial lymphadenitis among children

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Background and aim: Suspicion of TB and the differential diagnosis between TB and Non-tuberculous mycobacteria (NTM) lymphadenitis among children are often based on epidemiological and clinical data. The aim of this study was to describe epidemiological and clinical characteristics of mycobacterial lymphadenitis among pediatric patients in our TB clinic.

Methods: All children under 15 years of age attending the clinic with a suspect of mycobacterial disease were enrolled. Logistic regression was used to estimate the ability of clinical and socio-demographic variables to independently predict TB lymphadenitis.

Results: From 1999 to 2008, a total of 95 children had a diagnosis of mycobacterial disease; during the first five years (1999–2003) the median of cases was 5.0 cases/year, progressing to 9.0 cases/year from 2004 to 2008 ($P = 0.008$). Female children were 59% of cases, 60% were Italians and the median age was 4 years (range 1–15 years). Forty-seven children (49%) had TB disease, 21% (10/47) had cervical or submandibular TB lymphadenitis; 48 (51%) had NTM lymphadenitis. Increasing age, being foreign born and having an abnormal chest radiography were independently associated with TB lymphadenitis. In the selected model, a foreign-born 5-year-old child with cervical lymphadenitis and abnormal findings on chest radiography has an estimated 0.99 probability of having TB disease. On the other hand, an Italian child of the same age with lymphadenitis and normal chest radiograph has a very low probability of having TB ($P_r = 0.009$).

Conclusion: Epidemiological and clinical data are useful tools in the differential diagnosis between TB and NTM lymphadenitis while awaiting the results of bacteriological investigations.

PS-95268-05 Alta capacidad infectiva de M. abscessus hacia neumocitos tipo II

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Introducción : *M. abscessus*, es una micobacteria causante de diversas manifestaciones clínicas en el humano, entre otras, queratitis infecciosa, afección pulmoníar y la afección de tejido blando. En particular, nuestro grupo de trabajo recuperó y purificó un aislado clínico de *M. abscessus* a partir de un caso de queratitis post-LASIK, la cual mostró multifarmacoresistencia.

Material y métodos : Tratando de conocer la virulencia del aislado clínico de *M. abscessus*, evaluamos su capacidad infectiva y de sobrevivencia intracelular en el modelo de células no fagocíticas A549 (neumocitos tipo II) desde las 2–96 hr. La activación de la macropinocitosis por parte de la bacteria, se evaluó cuantificando la captación de fase fluida, el rearreglo del citoesqueleto se analizó por microscopía confocal, la formación de macropinosomas se estudio por microscopia de fluorescencia y la producción de NO utilizando DAF.

Resultados : La micobacteria se interiorizó en las células A549 eficientemente y se multiplicó sin restricción, con un 20% de infección a las 24 hrs hasta alcanzar un 100% a las 72 hrs post-infección, provocando la muerte celular de toda la monocapa a las 96 hrs. A nivel del citoesqueleto, la micobacteria estimuló la formación de lamelipodios de gran longitud y aume-nto de volumen en la región perinuclear, el sobrenadante de cultivo, ocasionó los mismos efectos observados con la bacteria íntegra. La infección durante una hora estimuló la formación de inmumerables macropinosomas que cubrieron el citoplasma de la célula. *M. abscessus* indujo la producción de NO en la célula desde los 15 min hasta las 4 horas. Al inactivar a la micobacteria, se disminuyó significativamente su capacidad de estimular la endocitosis.

Conclusion : *M. abscessus* es una micobacteria no tuberculosa con alta capacidad infectiva, parte de esta propiedad la debe a su alta capacidad de inducir la macropinocitosis.

PS-95430-05 *Mycobacterium avium* complex meningitis in adults, Chris Hani Baragwanath Hospital, South Africa

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Background: Meningitis is a rare manifestation of *Mycobacterium avium* complex (MAC) infection, despite the increasing burden of HIV-associated MAC disease.

Objectives: To describe the clinical features and laboratory findings of adults presenting with MAC-meningitis to Chris Hani Baragwanath Hospital in Soweto, South Africa.

Methods: Between January 2000 and December 2008, 20 patients with culture confirmed MAC-meningitis were identified. A retrospective review of laboratory records (all patients) and medical records (of 12 patients) was done.

Results: The median age of patients was 35 years (range 20–55); 45% were female. In-hospital mortality rate was 37%. Of 18 patients tested for HIV, 17 were seropositive. In 14 patients tested, median CD$_4$ count was 16/mm³, with 71% < 50/mm³. 1 patient was on HAART, and likely had an immune reconstitution syndrome event. Common presenting symptoms were confusion (50%), cough (33%), followed by fever, diarrhoea, weight loss and headache. Common findings were fever (72%), confusion (50%), and meningism (42%). CSF abnormalities included elevated protein levels (70%) and hypoglycorrhachia (50%). CSF lymphocyte predominance was present in 50% cases, and leukocytes were absent in 35%. 2 patients with normal CSF had clinical meningitis. Mycobacterial blood cultures were positive in 5 of 6 done (83%). Only 1 patient received appropriate treatment. 3 patients had concomitant non-mycobacterial infections (3 meningitis and 2 bacteraemias).

Conclusion: Clinical features are protean, as are CSF-findings. MAC-meningitis carries a high mortality. Lack of clinical suspicion and lengthy time to positive mycobacterial culture result in long delays in instituting appropriate treatment.

PS-95464-05   Human *Mycobacterium bovis* infection in a tertiary care centre in Mexico City

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Aim: To compare the clinical features, drug resistance and outcome between patients with *Mycobacterium bovis* and *M. tuberculosis* infections in a tertiary care facility in Mexico City, between 2000 and 2007.

Methods: A case-control study using clinical charts as well as microbiologic and molecular data was done. We included demographic variables, co-morbidities, treatment regimen and outcomes of all cases (*M. bovis* patients) and their proper controls (*M. tuberculosis* patients). For each *M. bovis* patient, we chose for comparison two *M. tuberculosis* patients at random. The isolates were fully characterised as either *M. bovis* or *M. tuberculosis* based on biochemical tests and/or spoligotyping. Susceptibility testing to streptomycin, rifampin, isoniazid, and ethambutol were performed using the BACTEC 460 TB.

Results: Initially, we identified 58 *M. bovis* isolates using biochemical tests, 45 were confirmed by spoligotyping/PCR methods, 6 were identified as *M. tuberculosis,* and 7 were not recovered. We included 90 *M. tuberculosis* patients. *M. bovis* patients showed a higher frequency of gastrointestinal symptoms than *M. tuberculosis* patients. *M. tuberculosis* patients showed a higher frequency of respiratory symptoms,

but *M. bovis* patients also had frequent pulmonary manifestations. There was no difference among species in HIV patients. Ninety percent of *M. tuberculosis* were pansusceptible, whereas only 75% of *M. bovis* (P = 0.026). Cure rates were quite high in both groups (87.5% and 95.7%, respectively) and relapses were rare.

Conclusions: As expected, we found an association between pulmonary involvement in patients with *M. tuberculosis* as opposed to those with *M. bovis*, who had a tendency towards more extrapulmonary disease. Of note, we achieved high cure rates and surprisingly *M. bovis* isolates were more resistant than *M. tuberculosis*.

EPIDEMIOLOGY IN LUNG HEALTH

PS-94190-05   Drug-resistant tuberculosis in Cuba, 2000–2007

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Aim: The spread of multidrug-resistant tuberculosis (MDR-TB) in the world remains a major public health problem. Surveillance of anti-tuberculosis drug resistance is therefore as essential tool for monitoring the effectiveness of TB control program and, through policy development, for improving national and global TB control. The objective of this research was to determine the prevalence of anti-TB drug resistance in Cuba during the period 2000–2007.

Method: Drug susceptibility testing was determined in 1668 *Mycobacterium tuberculosis* strains against isoniazid, rifampicin, streptomycin and ethambutol. The tests were conducted using the proportion method on Lowenstein-Jensen medium according to the standard procedures.

Results: The results included in this study are part of the third and fourth Global Project on Antituberculosis Drug Resistance Surveillance. Resistance was identified in 136 of 1532 patients (8.15%) in new cases. Resistance was 0.66% to isoniazid, 6.41% to streptomycin, 0.06% to rifampicin and ethambutol. MDR was 0.24%. Among patients who had received prior treatment, 66 (37.08%) were resistance and 13 (7.30%) showed MDR.

Conclusions: The early application of DOT and surveillance of drug-resistance by the Cuban National Tuberculosis Control Programme has resulted in the decrease of *M. tuberculosis* with resistance among new cases and very low rates of MDR-TB. The results have set the stage for the possibility of TB elimination in Cuba.

PS-94217-05   Comportamiento epidemiologico de la TB en personas con DM Nuevo Le ane 2006–2007

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Objetivo : Describir el perfil epidemiológico que adquiere la Tuberculosis (TB) cuando se encuentra conjuntamente con Diabetes Mellitus (DM), denominado (Binomio TB/DM), en el periodo 2006–2007, Nuevo León.

Material y métodos : Se realizó un estudio descriptivo retrospectivo, de los estudios epidemiológicos de personas con diagnóstico de TB, que ingresaron a Tratamiento, residentes de Nuevo León. Se estimaron la tasa de incidencia anual de tuberculosis en diabéticos y no diabéticos, frecuencia de las variables : edad, sexo, localización, tipo de paciente, abandono, curación, marcando algunos comparativos entre el Total de casos de TB (DM + No DM) contra los casos binomio (TB y DM).

Resultados : La muestra fue de 2279 casos de TB, la frecuencia de DM fue del 20,7%, la localización pulmonar en los Binomios fue del 95,8%, 72,6% se presentan en el grupo de edad mayor a 45 años ; 91,6% la residencia habitual es el área urbana ; en cuanto a la clasificación final se reportó un porcentaje de curación del 79,7 ; 8,9% de abandonos ; recaías y reingresos es del 14,6%, contra un 12,4% del total de casos.

Conclusiones : En nuestro estado, en este Binomio existe una elevada proporción de casos pulmonares, que es de importancia epidemiológica, ya que es la forma infectante ; las recaídas/reingresos son más altos: se ha logrado incrementar el % de curación año con año, sin embargo el creciente número de casos de DM que se observa globalmente es inquietante, considerando que este es un grupo de riesgo para padecer TB, lo que frenaría, de cierta manera la posibilidad de lograr éxitos de curación más altos. Es necesario, intensificar las acciones preventivas, que incluya búsqueda intencionada de sintomáticos respiratorios en las personas diabéticas; así como continuar investigando esta asociación.

PS-94229-05   Stages of childhood tuberculosis in Sweden

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Less than 100 years ago the rate of tuberculosis (TB) in children was very high in northern Europe, including Sweden. It is nowadays a rare entity in indigenous Swedes. Travel, migration and screening activities has however led to an increasing rate with a variety of manifestations, from mild to severe forms. During 1998–2008 we diagnosed 100 cases of childhood TB

in northern Stockholm. 82 of them were born in or had parents from high burden countries. We classified each case as mild, severe or indeterminate, depending on clinical and laboratory findings. We then looked for predictors of having a severe or mild form of TB. 25% were severe and 50% were mild. Severe cases were typically older, born abroad, presented with symptoms more than a year after infection or immigration, and had an unknown source of infection. Mild cases were younger, Swedish born, found at active screening less than 6 months after infection or immigration and had a known source of infection. Diagnosed cases of TB in low burden countries have different manifestations of disease than those in high burden ones. Screening leads to the detection of mild cases, many of which would otherwise have spontaneously resolved. Results from studies of most aspects of TB treatment and control in one setting may not be applicable to the other. There is a lack of knowledge of how to best treat mild disease.

PS-94350-05   HIV in TB patients: a dataset audit of predictors in North East London

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Introduction: TB in NEL has been increasing since 1987. In recent years HIV rates have also been increasing in NEL. One of the strongest risk factors for TB is HIV positive status with prevalence of HIV amongst TB patients over ten times that in the general population in 2007 (local data).

Methods: We used the 2007 Primary Care Trust dataset to identify predictors of HIV status amongst TB patients. Demographic and clinical data were entered into SPSS for analysis; logistic regression was used with HIV status as the dependent variable.

Results: The model correctly predicted 10 out of 18 individuals with HIV positive status (Table), explaining between 17.8 and 63.3% variance. However, of the 898 cases entered for analyses only 51.3% informed regression analysis.

Table   Sensitivity and specificity of regression model

Observed	Predicted		
	HIV status		
	Negative/ unknown	Positive	% Correct
Step 1			
HIV status			
Negative/unknown	440	3	99.3
Positive	8	10	55.6
Overall Percentage			97.2

Conclusion: TB patient reported data can help to predict more than half of those patients with HIV+ status. In an attempt to diminish stigmatisation of

testing for HIV, NEL is moving towards an 'opt out' system of HIV testing, therefore, a screening tool based on these analyses is of limited value. Nevertheless, the model may be useful for identifying those at highest risk of HIV. It could also be validated for use amongst HIV cohorts in NEL and beyond. Data reporting should be improved to better the reliability of the model.

PS-94613-05   Spatial clustering of tuberculosis cases in the Czech Republic

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Background: In 2005, the Czech Republic had a total tuberculosis (TB) case notification rate of 10/100 000 population (1007 cases). We observed high-density sub-national clusters of TB case rates within this central European country.
Methods: TB age-sex specific case rates by sub-district ($n = 206$) of patient residence were derived using individual data on notified TB cases and matching population statistics (total population 10.4 million). Cases with unknown sub-district of residence were excluded (28; including homeless). SaTScan v7.0.3, a geographical surveillance programme, was used to identify the most significant sub-national spatial clusters of high TB case rates.
Findings: Crude TB case rates ranged widely across sub-districts (0.0 to 45.1; Map). After adjustment for age-group and sex, the most significant high-density clusters were observed in two eastern sub-districts (Frýdek-Místek [43 cases; Relative Risk = 4.4] and Brno [73 cases; RR = 2.1]), and in a window encompassing 19 contiguous sub-districts in the western extremity of the country [111 cases; RR = 1.6].
Conclusions: The high-density clusters identified fall within areas with particular risks for TB, including social deprivation in the west, as well as refugee and prisoner centres in the east. Study of the geographical distribution of TB cases in a country can identify disease hotspots to prioritize for further surveillance, including in particular molecular techniques, and for targeted screening and control.
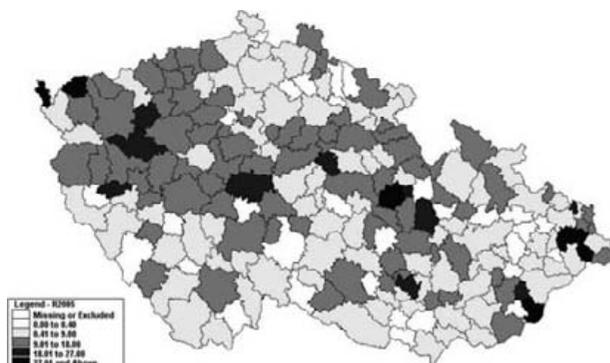
PS-94636-05   The molecular epidemiology of multidrug-resistant *M. tuberculosis* in the United States

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Background: Multidrug-resistant tuberculosis (MDR-TB) remains a significant threat to global control efforts, yet little is known about the transmission dynamics and molecular epidemiology within the United States. Objectives of this study include assessment of the clinical and molecular epidemiology and transmission dynamics of MDR-TB in the US.
Methods: A population-based, cross-sectional study of select MDR-TB cases at 13 geographic sites in the US was conducted from September 2006 through January 2009. All isolates were characterized using spoligotyping, 12-loci mycobacterial interspersed repetitive unit typing (MIRU), and IS*6110* restriction fragment length polymorphisms (RFLP).
Results: Sixty-nine MDR-TB cases were enrolled at 11 of 13 (85%) Tuberculosis Epidemiologic Studies Consortium sites. Patients with MDR-TB had a median age of 36 years; 32 (46%) were male, 6 (9%) were HIV-infected, and 55 (80%) were foreign born. Of the 66 isolates available for characterization by spoligotyping and MIRU, 50 distinct patterns were identified representing 8 genotype-based clusters. Among the 66 cases, 24 (36%) belonged to a genotype cluster with another MDR-TB case in the study period. Twelve of 55 (22%) foreign-born subjects had documentation of an overseas medical exam and 10 (18%) were diagnosed within 3 months of US arrival. Twenty-one (31%) participants had a prior history of TB, including 19 foreign-born persons, 14 (73%) of whom were diagnosed prior to US entry.
Conclusion: Our findings emphasize the global influence of the epidemiology of MDR-TB in the US. Importation of MDR-TB cases among foreign born persons who migrated to the US, and recent transmission of MDR-TB in the US. account for the large part of MDR-TB in the US, but the frequency of prior TB in these patients suggests acquired drug resistance is a potentially important contributor.

PS-94779-05 Nepal NTP impact: review of past 10 year case finding trend among age groups

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Objective: To review case finding trend of new smear-positive TB cases among age groups for 1997–2007 period to ascertain changes and possible impact of NTP on the epidemiological situation of TB in the community.

Background: Nepal adopted DOTS Strategy in 1996 and achieved nationwide coverage in 2001. Since then NTP has consistently achieved and maintained both global targets for TB control. Currently all government health institutions in the country were providing DOTS service.

Methods: NTP surveillance, monitoring and evaluation system is in place since introduction of DOTS in 1996. NTP collects four monthly programme data from all levels through standardized formats. DATA cleaning and verification takes place during four monthly Monitoring and Planning Workshops at District, Regional and National levels. NTP uses MS excel programme for data analysis. For this review data will be analysed using EpiEnfo.

Results: Trend in case notification of new smear-positive cases of tuberculosis indicates a steady rise in rate of notified cases between 1996 (the year the DOTS strategy was introduced) and 2001 (the year nationwide DOTS coverage was achieved) after which the rates stabilized and then began to slowly decline. Like many developing countries, in Nepal tuberculosis mostly affects the young age group of the population (15–54 year). However age distribution trend among new smear-positive cases over 1997–2006 period shows a small but steady shift towards older age group. This evidence suggests positive impact of good TB control and slowing of disease transmission in the community.

Conclusion: Nepal NTP is well functioning and successful. NTP has consistently achieved both global targets for past several years. Although majority of smear-positive TB cases belong to 15–54 year age group however a small and steady shift to older age group is observed. This evidence suggests positive impact of good TB control program.
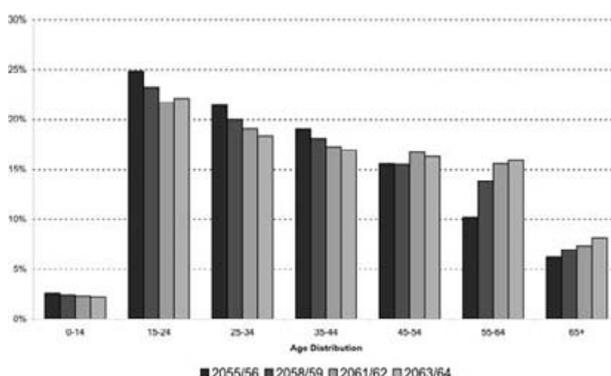
Figure New smear-positive cases age distribution trend.

PS-94869-05 Risk factors associated with multidrug-resistant tuberculosis in a rural area of Saratov region, Russia

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Background: This cross-sectional study was identify factors associated with multidrug-resistant tuberculosis in rural area of Saratov region, Russia.

Methods: 122 rural patients aged 18–60 years were interviewed using a structured questionnaire. All patients had tuberculosis cultured from sputum *M. tuberculosis* susceptibility to isoniazid and rifampicin was determined by testing the diagnostic, pre-treatment sample. The factors associated with MDR-TB at the time of diagnosis were calculated using logistic regression analysis.

Results: In the multivariate analysis, the risk factors significantly associated with MDR-TB were: low accumulated wealth (univariate odds ratio 16.70), financial insecurity (5.67), living with a relative with tuberculosis (2.94), being unemployed (6.10), living in overcrowded conditions (2.99) and prison (12.50). MDR-TB was not significantly associated with past tuberculosis therapy, (1.8).

Conclusions: Amongst this population of rural TB patients, the most important factors in the development of pulmonary tuberculosis associated with MDR-TB were the close contact with another tuberculosis patient and unemployment.

PS-94873-05 Modelling the health impact and cost-effectiveness of screening new entrants to the UK for latent TB

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Background: In the UK (UK), TB notifications have increased over the last decade—particularly among non-UK born migrants from high prevalence regions (HPR) as a result of reactivating latent TB infection (LTBI). Current national control methods are having little impact on TB notifications and it is postulated that targeted screening, with the tuberculin skin test (TST) or T-cell interferon gamma release assays

(IGRAs), and chemoprophylaxis for LTBI in new entrants (NE) to the UK may enhance TB control.

Aims: To utilise a mathematical model to assess the health impact, and cost-effectiveness, of introducing screening for LTBI in NE to the UK.

Methods: A compartmental/deterministic model of TB transmission in the UK was developed to incorporate immigration into the UK from HPR. Targeted screening for LTBI in NE was added to conventional TB therapy and the health impact, and cost-effectiveness, of using a dual TST+IGRA or an IGRA only screening protocol at different intervals were considered.

Results: Model predicted a UK TB incidence of 13.9 cases/100 000 which was fit to UK data (2006). Introducing screening for LTBI reduced annual TB incidence by 9–45%; more frequent screening/protocols with a higher sensitivity (IGRA only) resulted in the largest reductions. Health-economic analysis suggested that implementing a 3-yearly TST+IGRA strategy would result in monetary savings of ~£8 345 291 and 25 538 cases averted in the first 20 years. Additional cost-effective strategies were the annual TST+IGRA and annual IGRA only strategies with incremental cost-effectiveness ratios of ~£1298 and ~£25 072 per case averted respectively.

Conclusions: This work suggests supplementing current TB control measures with a targeted screening and treatment programme for LTBI in NE from HPR can reduce overall UK TB incidence whilst also being cost-effective for the UK government. Further detailed modelling and economic analyses are underway.
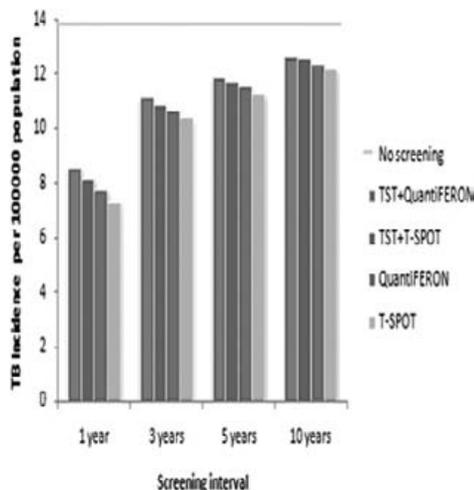
Figure   TB incidence per 100 000 population.

PS-94890-05   Molecular cluster surveillance of tuberculosis in the Netherlands: trends in recent transmission

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Background: Nation-wide fingerprinting of isolates through IS*6110* Restriction Fragment Length Polymorphism (RFLP) typing is performed since 1993 by the RIVM. Local TB units investigate possible epidemiological relations in clusters and report to the central database at KNCV TF. Estimates were made on the annual proportion of TB cases attributed to recent transmission.

Method: Trend analysis of routine cluster surveillance data 1993–2007. Recent transmission is defined as: a case with an identical DNA-fingerprint with a clustered patient and with a confirmed or likely epidemiological pattern and within two years from the previous case. Cases with a unique DNA-fingerprint pattern, first cases in a cluster, clustered cases without a contact link or with a longer time frame from the previous case than two years, are regarded as reactivation or imported from abroad.

Results: 43% of all notified culture positive cases is clustered with a previous case and 35% with a previous case within two years. Nearly half of the latter cases is not confirmed with contact tracing. The overall percentage of all culture positive cases with thus defined recent transmission was 19%. The total number of notified cases decreased with 35% since 2000 (Table).

Table   Number of notified TB patients attributed to importation of *M. tuberculosis* infection, reactivation of remote infection or recent transmission in the Netherlands 1996–2007

	Infected before 1993 or imported	Cluster, remote infection	Recent trans-mission	Culture negative	Total notified cases
2000	766	107	175	395	1443
2001	753	128	199	412	1492
2002	717	126	190	382	1415
2003	670	133	163	374	1340
2004	578	124	180	419	1301
2005	565	122	164	295	1146
2006	489	118	140	268	1015
2007	497	103	132	228	960

Conclusion: Even in a low-incidence setting with a declining epidemic, the proportion of TB patients with culture positive disease attributed to recent transmission is considerable (one in five patients) and does not decline as fast as the annual number of patients.

PS-95040-05   Prevalencia del binomio tuberculosis-diabetes tipo 2 en dos jurisdicciones de Jalisco Mexico

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Objetivo : Determinar la prevalencia del binomio Diabetes Mellitus Tipo 2-tuberculosis (DM2-TBP) en pacientes diabéticos.

Introducción : Recientemente se ha encontrado que el binomio DM2-TBP es más importante que el de TBP-VIH en México (18%) y también en Jalisco (21%), donde está en aumento. Aunque el control de la glicemia en pacientes DM2 es importante para prevenir infección y recaída por TBP, la detección precoz de TBP en pacientes diabéticos, que es más costo-benéfica, no se encontró en la literatura.

Método : Estudio observacional, comparativo, transversal; Se realizaron a 345 casos de DM2 en control, 3 baciloscopias para detección de TBP y determinación de Hemoglobina glicosilada para control de DM2. Se estudiaron también datos personales, evolución de DM2, estado nutricional, y síntomas respiratorios. Se hizo búsqueda intencionada de TBP en personas asintomáticas con DM2, y se concientizó al personal de salud para búsqueda de casos de TBP en este grupo.

Resultados : La prevalencia de DM2-TBP fue 1,7% (6) casos, que pudieron no haberse detectado, pues la mitad no eran sintomáticos respiratorios (y pudieron haber infectado a 90 contactos). De ellos, 100% se ubicaron en mal control de DM2. Las variables relacionadas a la posibilidad de padecer TBP fueron : sobrepeso (χ^2 de Pearson = 8,65, P = 0,0032), Sintomatología respiratoria (χ^2 de Pearson = 4, P < +005), Mal control de la DM2 (OR 1,026, IC95% 1,005–1,047). Se recomienda búsqueda intencionada de TBP, y control de peso en pacientes con DM2, considerada la obesidad como una malnutrición que incrementa vulnerabilidad a TBP.

PS-95214-05   The burden of type 2 diabetes mellitus on tuberculosis control: implications for prevention

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Aims: The growing pandemic of type 2 diabetes mellitus (DM) is increasingly recognized as a threat to tuberculosis (TB) control. We determined the proportion of TB patients with DM (TB-DM) and identified socio-demographic characteristics that distinguish them in order to identify opportunities for preven-

tion and early detection of TB in this vulnerable population.

Methods: Patients suspected to have active TB $\geqslant 20$ yrs of age were enrolled in South Texas and northeastern Mexico, and final TB diagnosis was based on microbiological confirmation or clinical diagnosis. Diabetes was assessed by blood glucose and self reported medical history, and chronic hyperglycemia by $HbA_{1c} \geqslant 6.2\%$. Socio-demographics were recorded at interview.

Results: 205 of 334 (61%) TB suspects had TB. The prevalence of DM among TB patients (76/205;37%) was ~2-fold higher than that of the corresponding general population ($P < 0.05$). Among TB patients with DM (TB-DM), 66% presented chronic hyperglycemia. Importantly, TB-DM patients had been aware of their DM status for a mean of ~9.2 yrs. When compared to non-DM controls, TB-DM patients were more likely to be unemployed, older females (median age ~49) with no history of social risk factors for TB (alcohol abuse, drug abuse, HIV positive).

Conclusions: The high proportion of TB-DM patients supports the contribution of DM to active TB. The extended period of awareness of their DM status indicates missed opportunities where diagnosis and TB prophylaxes might have prevented TB. The unexpected socio-demographic profile of TB-DM can delay the clinical suspicion of TB and hence, diagnoses. Health professionals should 'think TB' when patients with DM present compatible TB symptoms, despite a lack of other social risk factors.

PS-95394-05   Immigration status and HIV in tuberculosis infection: diverging trends in the UK and US

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Background: In the last three decades, the United States (US) has experienced a steady decline in new tuberculosis (TB) cases, while the UK (UK) has experienced an increase in reported cases. Reasons for the divergence in trends in these countries with similar case management remain unknown.

Methods: We examined trends in US and UK national TB data from 1998 to 2007 to elicit explanations for these differences.

Results: A similar proportion of cases completed treatment in the UK (70%) and the US (71%). However, a greater proportion of UK cases were multidrug-resistant (0.53%) as compared to the US (0.01%). Additionally, there were a much higher proportion of extrapulmonary cases (42.5%) in the UK than the US (28%). In both countries, over half of new TB cases were among foreign-born people, but the disparity in incidence rates among local and foreign-born was

much more extreme in the UK. In both foreign- and UK-born, the greatest proportion of cases were among Black and Asian ethnic groups, whereas US cases were predominantly Asian and Hispanic foreign-born cases, with US-born cases mostly occurring in Black and White individuals. In the UK, Black foreign-born cases were primarily from Sub-Saharan Africa, and Asian cases were from India and Pakistan; very few cases in the US were born in these locations. Additionally, although a higher proportion of cases in the US were human immunodeficiency virus (HIV) co-infected (8.6%) than in the UK (5.5%), nearly one in five foreign-born Black African UK cases were coinfected.

Conclusions: Differences in TB incidence in the US and UK are likely to be due to different immigration patterns and co-infection with HIV. Different policies for case-finding and treatment of latent infection and active disease may be necessary for TB control in the UK and the US. Additionally, research into differences in extrapulmonary cases is warranted.
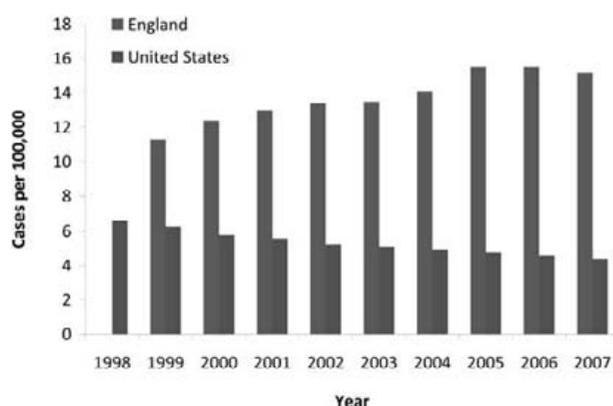
Figure   Reported rate of tuberculosis per 100 000 population, United Kingdom and United States, 1998–2007.

PS-95441-05   Drug-resistant tuberculosis in Poland, 1997–2004: prevalence, trends and risk factors

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Drug-resistant tuberculosis, and particularly multi-drug-resistant tuberculosis (MDR-TB is an increasing health problem and a serious challenge to TB control programmes. Analysis of local rates of TB drug resistance is helpful in the detection and monitoring of the predominance of MDR strains, indicating the quality of TB control in a country. The material for the work was taken from 10 913 tuberculosis patients. The patients were analyzed for primary and acquired drug resistance in 3 WHO programmes. The subject of the work was to determine occurrence of different primary and acquired drug resistance pat-

terns in patients according to their sex, age and place of residence.

Results: In three consecutive edition of the survey 10 913 patients were analyzed. In all the three research editions acquired drug resistance (avg 17.5%) occurred more often than primary one (5.0%, $P <$ 0.001). Also the number of patients excreting MDR-type resistance strains and with resistant to 4 drugs occurred significantly more often in patients who had been treated than in untreated patients ($P < 0.001$). Overall percentage of primary resistance was lowest in 1997, it doubled in two following editions of the research ($P < 0.001$). Sixty-one patients were found infected with MDR type tuberculosis and 17 patients infected by bacilli resistant to 4 drugs (primary resistance). Among the patients who had been treated (acquired resistance) 170 patients with MDR resistance bacilli were found and 35 with bacilli resistant to 4 drugs. Among 8.729 studied untreated patients primary drug resistance occurred similarly often: in 327 men (4.7%) and 117 women (4.45). While occurrence of acquired resistance in previously treated patients was different.It was detected in 307 men (18.5%) and 67 women (12.85%), ($P < 0.001$).

Conclusions: Prevailing drug resistance type in both groups of patients is single-drug resistance to INH while among MDR strains it is triple-drug resistance INH+RMP+SM.

PS-95560-05   Hacia una nueva atention de pacientes TB-MDR en Mexico, 2004–2006, lecciones aprendidas

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Introducción : En el año 2000 el Programa de TB detecta TB-MDR como punto crítico de atención. En 2002 GLC aprueba proyecto de México, con consecuente evaluación y ajuste del proceso de atención.

Objetivo : Mostrar experiencia de México en la atención de TB-MDR (2004–2006) y la metodología de la planeación en TB-MDR.

Desarrollo : En 2002 se inicia la implementación de un programa de control de TB-MDR en 6 estados pilotos. Los principales componentes fueron : creación de unidad central, acceso a tratamiento, y pruebas de sensibilidad de primera línea para TB-MDR. La estrategia se implementó por la SSA Federal, INER y Gobiernos de los Estados participantes.

Resultados : En total se atendieron 48 pacientes en 2004 y 2005. Curados 16 en 2004 y 4 en 2005, iniciado así la implementación de un manejo programático en TB-MDR.

Conclusiones : El manejo de la TB-MDR requiere de la creación de una unidad organizativa de TB-MDR,

la cual contemple coordinación sectorial, planeación estratégica, regulación de bienes materiales, análisis de la información, evaluación, monitoreo y soporte integral eficiente con objetivos específicos.

PS-95582-05   Profile of drug-resistant tuberculosis in Northern Regions of Namibia

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Background: TB incidence in Namibia is among the highest in the world (CNR 722/100 000 in 2007). The number of drug-resistant TB (DR-TB) cases has increased from 150 in 2006 to 300 in 2008. We describe the clinical profile and outcomes of DR-TB cases in northern Namibia.

Design/methods: Records were reviewed for patients treated for DR-TB in 2008 in 7 districts hospitals. Patients were managed according to national guidelines.

Results: TB cards from 185 DR-TB patients were reviewed. The sex ratio M/F was 0.8. Median age was 37 years. 95% were tested for HIV, and 64% were positive of whom 75% were on HAART. 160 (86%) of patients had had previous exposure to anti-TB therapy. Initial sputum Direct Microscopy (DM) was performed in 89%, not performed in 2%, and data was not available (na) in 9% of cases. DM was positive in 80%, negative in 9% and data n.a. in 11% of cases. Initial culture was performed in 84%, not performed in 1%, and data n.a in 15% of cases. Results were positive for *Mycobacterium tuberculosis* in 74%, negative in 7% and n.a in 19%. Initial drug sensitivity testing (DST) results were available for 91% of the positive cultures, and showed monoresistance in 1%, polyresistance in 18%, MDR in 73%, XDR in 2% and n.a in 6%. Directly Observed Therapy (DOTS) was reported in 74% of outpatients and 100% of inpatients. Median treatment duration was 10 months. The latest cultures were positive in 36%, negative in 33% and n.a in 31%. By the end of 2008, 5 (9%) were cured, 3 (6%) completed treatment, 13 (24%) failed, 7 (13%) were lost to follow-up and 26 (48%) died.

Conclusion and recommendations: A high rate of previous exposure to TB drugs suggests that most patients have secondary DR-TB. A high prevalence of DR-TB-HIV co-infection was found. Simultaneous HAART provision showed care integration. Cure rate was low and mortality relatively high. Strengthening DOTS for outpatients and enhanced counseling can improve treatment outcomes.

PS-95592-05   Decreasing time trend of childhood tuberculosis in central Serbia: a 15-year analysis

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Background: The age specific incidence of tuberculosis (TB) varies greatly over time within countries and concurrently between countries. Serbia is a South-East European intermediate TB incidence country. BCG vaccination is mandatory at birth.

Objectives: To examine the key trends of childhood TB in Serbia in the period 1993–2006.

Methods: We analyzed summary of all reported cases of TB in central Serbia in the 15-year period with special regard to patients aged 0–14 years. Source of data: i) Annual Reports of the Institute of Lung Diseases and TB in Belgrade, and ii) Central TB Register. Population estimates with extrapolations were based on 1991 and 2002 census data.

Results: Decreasing trend is found both in the girls (y = 2.367–0.040x; $P = 0.262$) and in the boys (y = 2.102–0.055x; $P = 0.090$) but without significance of the trends (Figure: open-circle line: girls; closed-square line: boys).

Conclusion: Despite socio-economic crisis of the 1990s, childhood TB incidence rate shows favorable time trend.
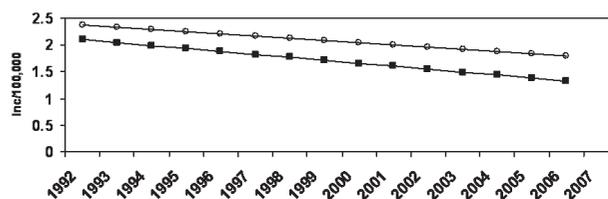
Figure   Time trend of childhood tuberculosis incidence rate in Serbia.

CURRENT ISSUES IN LUNG HEALTH

PS-94063-05   High-dose inhaled corticosteroids are associated with pulmonary tuberculosis in patients with COPD

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Background: Using high-dose inhaled corticosteroids (ICS) in patients with chronic obstructive pulmonary disease (COPD) has recently been shown to increase the incidence of pneumonia.

Objective: To investigate the association between high-dose ICS and pulmonary tuberculosis (TB) in patients with COPD.

Design: Retrospective chart review.

Setting: A tertiary-care referral center in north Taiwan.

Patients: Among 36 684 patients who underwent pulmonary function testing, 554 who were more than 40 year-old and had irreversible airflow limitation seen between August 2000 and July 2008 and followed for at least three months.

Measurements: Cumulative incidences of pulmonary TB in the 50 patients using high-dose ICS (equivalent to more than 500 μg/day of fluticasone) and the other 504 patients.

Results: The two groups had similar clinical characteristic, except patients using high-dose ICS were more likely to have severe or very severe COPD. Sixteen (3%) patients developed active pulmonary TB within a follow-up of 25 544 person-months. Multivariate analysis using Cox regression model revealed that the use of high-dose ICS, receiving 10 mg or more of prednisolone per day, and the presence of old TB lesions on initial chest radiograph were independent risk factors for the development of active pulmonary TB.

Limitation: The study may be biased due to the retrospective analysis and data collection from a single center.

Conclusion: Use of high-dose ICS, presence of old TB lesions on the initial chest radiograph and use of 10 mg or more of prednisolone daily were associated with an increased risk of pulmonary TB in patients with COPD. Chest radiography and sputum smear/culture for *Mycobacterium tuberculosis* should be performed before initiating high-dose ICS and regularly thereafter.
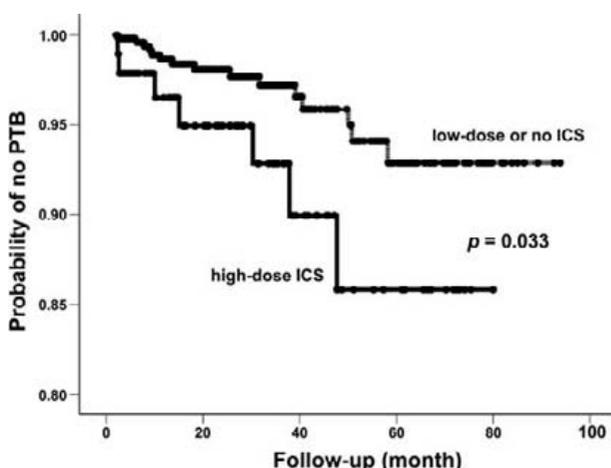
PS-94159-05   Prevalence of asthma symptoms in children in Atbara, Sudan

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Objectives: Estimation of asthma symptoms prevalence in Sudanese children and validation of adapted ISAAC questionnaire.

Method: Cross-sectional study performed in Atbara town (north Sudan) during the period 2008/2009. A modified ISAAC questionnaire was distributed to school children aged 13–14 years chosen randomly. Any subject with asthma symptoms was interviewed by another questionnaire specially designed for asthma subjects covering asthma symptoms, allergy symptoms and environmental factors. In addition, lung function tests had been done to all those claiming to have symptoms of asthma.

Results: 549 subjects aged 13 and 14 years were included. Average prevalence of asthma according to wheeze was 4.2%. Most of the patients have intermittent symptoms. Prevalence of wheeze and nocturnal cough was 2.4%. Reversibility test was positive in 52.2% of asthmatic group and exercise induced wheeze was positive in 73.2%. Trigger factors include house dust (78.3%), trees (13%) and animals (8.7%).

Conclusion:

1 The average prevalence of asthma depending on wheeze among Sudanese school children living in Atbara town (north Sudan) is 4.2% and 2.4% when combined with nocturnal cough.

2 The use of combination of asthma symptoms such as wheeze plus nocturnal cough or shortness of breathing could be better to estimate the prevalence of asthma in Sudan because the term used as a translation of wheeze is interpreted as any noisy chest.

3 House dust is the most important trigger factor among asthmatic group (78.3%).

4 Provocation tests, e.g., exercise test is better than reversibility test for validation in children.

PS-94206-05   Risk factors for death due to lung cancer

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Background: Malignancy is the leading cause of death in Hong Kong, and lung cancer tops the list of all cancer deaths.

Method: A cohort of clients aged 65 years or above, enrolled at 18 Elderly Health Centers in Hong Kong in 2000, were followed up prospectively through linkage with the territory-wide death registry for causes

of death till December 31, 2007, using the identity card number as unique identifier. The risk factors for death due to lung cancer and other malignant disease were assessed with adjustment of other baseline characteristics.

Results: Age, smoking, obstructive lung diseases and body mass index (BMI) were found to be independent predictors of lung cancer death in a combined analysis of all smoking categories. Obstructive airway diseases significantly increased the risk of lung cancer death only among smokers (ex-smokers or current smokers) but not never-smokers. Obesity was protective against lung cancer death (HR 0.32, 95%CI 0.15–0.65) in never-smokers, and underweight increased the risk of such death (HR 2.07, 95%CI 1.32–3.26) among ex-smokers.

Conclusion: Obstructive lung diseases predominantly increased the risk of lung cancer death among smokers in Hong Kong. Obesity and under-weight exerted differential effects on smokers and never-smokers.

PS-94207-05　L'approche pratique santé respiratoire (APSR ou PAL strategy)

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L'approche pratique de la santé respiratoire est une stratégie d'intégration des soins de santé primaire. Elle a pour but d'identifier les principaux problèmes de santé respiratoire et la capacité de les prendre en charge dans les services de santé de proximité. Cette stratégie repose sur une approche syndromique permettant la prise en charge standardisée des maladies respiratoires les plus fréquentes et de la tuberculose intégrée à l'activité de routine. Dans ce cadre, une étude d'intervention de formation concernant les médecins généralistes exerçant dans 77 établissements de santé de proximité a été réalisée en 2004.

Cette étude avait pour but d'évaluer comparativement avant et après formation :
— la proportion des malades qui consultent pour symptômes respiratoires
— la distribution et la répartition des maladies respiratoires selon les groupes d'âge
— la place de la tuberculose dans les services de proximité
— la qualité du diagnostic des maladies respiratoires
— l'impact de la formation sur les modalités de prescription médicale et sur le coût des prescriptions

Cette enquête a permis de montrer les résultats suivants :
— les symptômes respiratoires représentent le principal motif de consultation dans les services de santé de proximité, 31% au cours des deux périodes, avant et après formation

— les infections respiratoires aiguës constituent environ 70% des maladies respiratoires identifiées au cours des deux périodes
— les maladies respiratoires chroniques, l'asthme surtout sont plus fréquemment identifiées après l'intervention de formation (15,9% au lieu de 10,9%)
— les malades suspects de tuberculose représentent une minorité de demandeurs de soins. Ils sont mieux sélectionnés après la formation
— La prescription médicamenteuse est plus rationnelle après la formation entrainant une diminution du coût des prescriptions

PS-94226-05　Prevalence of asthma symptoms in tannery workers in Gezira state, Sudan

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Introduction: Occupational asthma in Sudan has not been thoroughly studied. Recently chronic exposure to benzene and cotton were found to reduce forced vital capacity and forced expiratory volume in the first second and asthma symptoms were found to be high in refinery company in Khartoum state. Further studies were recommended to investigate pulmonary problems in different occupations.

Objectives: To study the effect of occupational exposure to the different chemicals used in leather tanning, on the respiratory system of Gezira tannery workers.

Methods: Across sectional study was performed on 100 subjects (94 males and 6 females) of different ages, from all sections of Gezira tannery workers, in 2006/2007. The subjects filled a questionnaire covering personal data, general health, respiratory symptoms and triggering factors. Body weight in kilogram and height in centimeter were measured. Reversibility test using inhaled Salbutamol and skin prick test were performed for those with asthma symptoms.

Results: Of the 100 studied subjects, 15 (15%) were found having asthma symptoms. 4 (4%) of the subjects had +ve skin prick test and reversibility test, compared to 5 (5%) of them with −ve reversibility test but positive skin prick test. 6 (6%) of the subjects have −ve skin prick test and reversibility test. Safety measures were not well observed and periodic medical examination did not include pulmonary function tests.

Conclusion: Prevalence of asthma symptoms in Gezira tannery workers, Sudan is high (15%). Medical check up is not satisfactory for lung problems and needs improvement.

PS-94259-05   Asthma hospitalisations at Brazil, 1988–2007

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Aim: Presentaton of rates of hospitalisation as a result of exacerbations of asthma for Brazil during the years 1998–2007. To present data regarding hospitalizations resulting from asthma exacerbations in Brazil during the period 1998–2007.

Method: Data was obtained from the Brazilian official hospital records system (DATASUS), which includes hospitals financed by the Public Health System (PHS). For the decade studied, data was taken from the ICD J45 (asthma) and J46 (status asthmaticus); Revision 10 of the ICD.

Results: Asthma was responsible for 341 043 hospitalizations per year, or 934 per day. This figure represented a rate of 177.4 per 100 000 population, being slightly higher amongst females. In most cases, ICD J45 was the diagnostic classification used for the hospitalisation (88% vs 12%). Over the whole period, there was a discrete downward trend (3% per year). For PHS, asthma hospitalizations represented an average cost of R$104.2 million per year, which was stable during that period (1% per year). Hospital mortality was 0.3%. Although the highest medium hospitalization coefficient occurred among st those aged less than one year of age, almost half hospitalizations (47%) involved those aged 55 or more; which may indicate misdiagnosis with COPD.

Conclusion: Exacerbations of asthma resulted in a thousand daily hospitalizations during the decade studied at a cost of R$100 million per year for the PHS. Both the number of hospitalizations and the cost remained stable over the time period of the study. Children aged less than one year were the most affected. Hospital mortality rate was low and most of the hospitalizations were amongst older people.

PS-94312-05   Measuring the analogue DALYs in children: absenteeism among asthmatic preschoolers in Chile

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Background: Asthma is most prevalent chronic disease of children, causing high rates of absenteeism which contribute to school failure and economic vulnerability. School is child's work; absenteeism is closest measure of child's DALY. School-based asthma programs for poor 10–18-year-olds reduce absenteeism. Can preschool-based asthma programs reduce absenteeism? Chilean records report 96% attendance year-round; classroom observations suggest lower levels. Accurately measuring attendance in schools is scientifically challenging worldwide. Can absenteeism be accurately measured to determine impact of preschool-based asthma action plans (AAP)?

Design: Un Buen Comienzo (UBC) is 2-year, cluster randomized controlled trial of professional development for preschool teachers to improve literacy and health among low-income Chilean children. UBC offers monthly content-focused modules (workshops, in-classroom coaching, and feedback). Respiratory intervention introduces alcohol-based hand gel to reduce respiratory infections and written AAPs. Outcome measures include absenteeism, clinic visits, hospitalizations for respiratory symptoms. We performed classroom ethnography with parent and teacher interviews. We recorded air pollution, temperature and weather.

Results: We developed new methodology to collect 5707 repeated measures of attendance for 403 children in public preschools in Santiago. Mean absenteeism was 24% in non-asthmatic s v. 26% in asthmatics. Ethnography revealed causes of absence: illness, child fatigue, family events.

Conclusion: We developed new methodology and accurately measured attendance. Absenteeism rates were higher among asthmatic preschoolers, but also high for non-asthmatics. This methodology can be powerful tool to explore: can implementation of asthma action plans by preschool teachers reduce absenteeism? Does air pollution influence preschool attendance? What child, family, health characteristics drive attendance?

PS-94320-05   Indoor air pollution: an evaluation of cooking practice with traditional and improved stoves

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The study assessed the cooking practice and indoor air pollution in rural Bangladesh. Data were collected in January–March 2007, June–August 2007, Nov–Dec 2007, and April–June 2008 through interview, focus group discussion, observation, and laboratory test. The study included 2400 households from 120 upazilas randomly. The study focused cook stoves, fuels, kitchen, particulate matter (PM2.5), combustion efficiency, people's preferences regarding stove characteristics, and linkage between stove type and human health especially women health. Findings show that less than 2% of the households used improved cook stove (ICS). Majority (80%) of the households

used agricultural residue for cooking purpose and most of them gathered fuels free of cost. Involvement of female members was much higher in fuel collection. Study also shows that chimney based ICS released about 86% less smoke than ICS without chimney. Disease state especially cough/congestion/trouble breathing among female members of the households cooking with traditional stoves was higher compared to households cooking with ICS. The findings are expected to help design further study and awareness program on health impacts of indoor air pollution.

PS-94388-05   Inverse association between asthma and neural tube defects: ecological proof of epigenetic changes?

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Background: Epigenetic changes such as DNA methylation regulate gene transcription, and there is increasing awareness that this mechanism might be operating in asthma. Folic acid is used for prevention of neural tube defects (NTD) such anencephaly and spina bifida, but studies in mice shown that maternal diets with extra methyl donors (such as folic acid, vitamin B12, methionine) increase the severity of allergy in the offspring. We aimed to analyze a possible association between NTD and asthma.
Methods: Data about frequency of asthma and NTD in Mexico and the USA were obtained from their respective government websites. Incidence or mortality rates of NTD were adjusted $\times 100\,000$ infants <1 year old. Evaluation was done by Spearman's correlation coefficient (rS).
Results: Regarding geographical distributions (Figure), in the $31 + 1$ Mexican states the log-transformed incidences of asthma and anencephaly (2004–2007 average) were inversely correlated with an rS = -0.48, $P = 0.005$. Likewise, among the $50 + 1$ USA states the anencephaly + spina bifida mortality rate was inversely correlated with the adult self-reported lifetime asthma prevalence (2002–2005 average) with rS = -0.39, $P = 0.005$. In relation to time-trends, in Mexico annual incidence rates of asthma and anencephaly displayed roughly opposite trends in the studied period (1997–2007, rS = -0.73, $P = 0.01$). A similar trend was also observed in the USA regarding mortality rates of asthma and anencephaly + spina bifida (1979–2005), reaching a highly-significant inverse correlation if only years prior to mandatory cereal fortification with folic acid were taken into account (1979–1998, rS = -0.91, $P < 0.0001$).
Conclusion: An inverse association between asthma

and NTD was found in Mexico and USA from the geographical (those states with lower frequency of NTD had more asthma) and time-trend points of view. This association might be due to dietary or supplemented methyl donors, though other factors should be investigated.
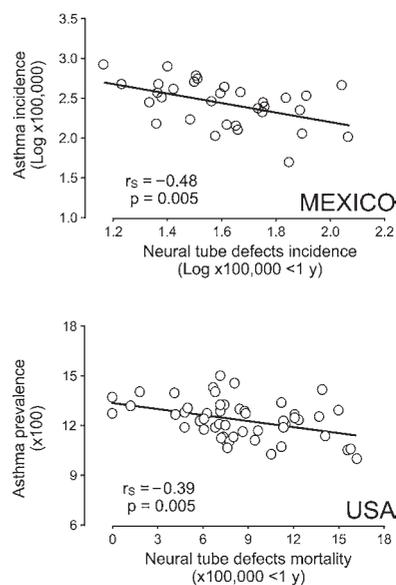
PS-94527-05   Childhood asthma in White Nile State, Sudan

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Objectives: To find out the prevalence, symptoms and predisposing factors for bronchial asthma in White Nile State, Sudan.
Design and settings: This was a randomized study performed in December 2008 to March 2009 in some White Nile state towns (Kosti, Rabak, Assalaya and Gezira Aba) in central Sudan. 500 school pupils aged 13–14 years old were included. Subjects had completed ISAAC questionnaire then pulmonary function tests (salbutamol reversibility and exercise provocation) were performed to those who heard the wheeze.
Results: Prevalence of asthma according to wheeze hearing was 9% (8.4% in males and 9.6% in females) and it became 6.4% after validation with pulmonary function testing with questionnaire validity of 71.1%. Prevalence of asthma according to wheeze hearing plus dry cough or shortness of breath was 8.6% (8.4% in males and 8.8% in females) and the prevalence became 6.4% after validation with questionnaire validity of 74.4%. There was significant correlation ($P < 0.05$) between asthma and dry cough,

hay fever, articaria, sneezing and itch. Also asthma prevalence was correlated significantly ($P < 0.05$) with animals and insects allergens.

Conclusion: Asthma prevalence was found to be higher than that of eastern Sudan (Gadarif = 5.5%) and close to that of the capatil Khartoum (10%) this is because White Nile is highy populated by animals plus the industrial nature of the state. Better validity of ISAAc questionnaire was obtained when we calculated asthma prevalence according to wheeze hearing and another symptom. There was strong correlation between asthma and the symptoms of dry cough, hay fever, articaria, sneezing and itch.

Asthma prevalence	Male	Female	Total
According to wheeze	8.4%	9.6%	9%
According to wheeze plus shortness of breath or dry cough	8.4%	8.8%	8.6%
Validated prevalence according to wheeze	5.6%	7.2%	6.4%
Validated prevalence according to wheeze plus shortness of breath or dry cough	5.6%	7.2%	6.4%

PS-94833-05   Taking in charge respiratory diseases in heath facilities in Burundi

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Objective: A retrospective survey has been led in the 17 provinces of Burundi in order to appreciate the prevalence of the respiratory diseases.

Method: The investigation has been achieved using data from January 2006 to December 2007. A hospital and a health centre by province have been chosen, according to the number of consultations. A questionnaire by patient more than five years old has been filled.

Results: Of the 10 389 patient files consulted, 4756 (46%) were male and 5633 (54%) female. Among them, 2534 (24%) presented a respiratory pathology of which 29% are upper respiratory tract infections, 27% pneumonia, 13% lower respiratory tract infections except pneumonia, 12% chronic respiratory tract infections and 18% pulmonary tuberculosis confirmed bacteriologically. 59% of the all cases represent the group of age from 5 to 34. The sputum smears for acid-fast bacilli has been asked in 13%, the X-ray in 1.6%; numeration and spirometry were never asked. The most prescribed antibiotics were amoxicillin, cotrimoxazole and ampicillin. Aminophyllin and inhaled salbutamol were the most prescribed during the asthma crises.

Conclusion: This survey shows weaknesses in management of respiratory diseases in Burundi. The spu-

tum smears for acid-fast bacilli is not systematic. The antibiotics are prescribed abusively. The management of asthma is not enough procured. The National Leprosy and Tuberculosis Control Program, by introducing Practical Approach for Lung Heath can improve the management of respiratory diseases in Burundi.

PS-95202-05   Biomass exposure is still an important health hazard for women in Turkey

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Object: Lung diseases caused by biomass exposure have an important place particularly amongst women who live in rural areas. This study was carried out in order to investigate biomass exposure in women suffering from lung disease.

Material and methods: 100 women patients, who had biomass fuels (animal dung, wood, charcoal, dried plant) exposure history for heating and cooking purposes, were investigated due to lung disease in our hospital between September 2008–March 2009.

Findings: The average age of 100 biomass exposed women patients was 55.13 ± 17.65. All the women had been exposed to some kind of biomass fuels. These were wood (92%), animal dung (30%), and charcoal (23%), and dried plant 23 (23%). 6 patients (6%) are still smoking and 23 (23%) had a history of smoking, but are now non-smokers. Of these patients 84 (84.0%), were housewives. The diagnosis of these patients were as follows: COPD in 22 patients (22.0%), asthma in 15 patients (15.0%), lung carcinoma in 12 patients (12.0%), bronchectasis in 8 patients (8.0%), tuberculosis in 26 patients (26.0%), interstitial lung disease in 17 patients (17.0%). In 60 patients (60.0%) there were accompanying systemic diseases such as diabetes, hypertension etc.

Conclusion: Biomass exposure is still an important and ignored health hazard issue particularly for women which may result in different types of lung diseases in our country.

PS-95254-05   Lung cancer at a tertiary-care hospital in Pakistan

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Setting: Lung cancer is one of the leading causes of cancer-related death in Pakistan. There is dearth of local data on issues related to lung cancer.

Aims: To study the risk factors, clinical characteristics, pathologic findings and outcome of patients with lung cancer.

Method: A retrospective review of lung cancer cases

(histopathologically confirmed) seen at the Aga Khan University Hospital, Karachi.

Results: One hundred and forty-six cases were studied. Mean age ± SD was 61 ± 11.2 years. 123 (84%) were men. 121 (83%) were current or ex-smokers and 25 (17%) never-smokers. Commonest comorbids were hypertension in 43 (30%) and previous TB in 42 (29%). Cough and weight loss were the most frequent symptoms in 116 (79%) and 99 (66%) cases respectively. Anemia in 26 (18%) and cachexia in 20 (14%) were the commonest detected signs. CXR showed a central mass in 71 (49%) and a pleural effusion in 55 (38%). 114 (78%) underwent bronchoscopy. There were 27 (18%) cases of small cell carcinoma and 119 cases of non-small cell carcinoma (Squamous 62%, adenocarcinoma 20%, large cell or undifferietiated 19%). ECOG functional status was 2 and 3 in 59 (40%) and 51 (35%) cases respectively. 50 (34%) received chemotherapy, 26 (18%) radiation therapy and 29 (20%) underwent surgery.

Conclusions: Mostly men who are either current or ex-smokers are affected. Distribution of cell type and location are similar in Pakistan to other developed countries.

PS-95557-05   Exposicion intradomiciliar a formaldehido: asma y atopia en escolares, Salvador, Bahia, Brasil

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Introducción : Formaldehido ha sido asociado a síntomas respiratorios en niños y adultos. Este estudio evalua la relación entre la exposición a formaldehido intradomiciliar y síntomas de asma y atopia en escolares.

Métodos : Estudio transversal de base poblacional realizado de febrero de 2007 a julio de 2008, como parte de un estudio longitudinal investigando factores de riesgo para asma y alergia en niños escolares (SCAALA). La concentración de formaldehido fue determinada en 1188 casas a través de técnica de amostrage pasiva utilizando el reagente Fluoral P. El análisis de las muestras fue realizada a través de espectrofluorimetria. Informaciones sobre condiciones domiciliares fue obtenida a través de entrevista padronizada. La prevalencia de síntomas de asma fue investigada utilizando el cuestionario ISAAC. Atopia fue evaluada por positividad al teste cutáneo y niveles serológicos de IgE específica. La asociação entre la concentración de formaldehido y asma y atopia fue evaluada a través del teste de Mann-Whitney-Wilcoxon y el cálculo de la OR no ajustada y ajustada.

Resultados : Formaldehido mostró estar asociado con asma actual utilizando la concentración mediana ($P = 0,00$), el Q3 $= 0,81\mu g/m^3$ ($P = 0,00$), y la OR que es infinita P significante. Existe asociación entre

la concentración de formaldehido y el teste cutáneo positivo ($P = 0,04$). El número de ventanas en la casa y dormitorio del niño son las únicas características del ambiente domiciliar asociadas a la concentración de formaldehido.

Conclusión : La concentración de formaldehido intradomiciliar esta asociada a asma actual y atopia. La concentración encontrada es muy baja en relación a la reportada en otros estudios en la literatura publicada. Fuentes del ambiente externo a los domicilios parecen ser las únicas determinantes de las concentraciones internas.

PS-95537-05   Decreasing trend of asthma mortality rate in Serbia, 1980–2006

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Background: Serbia, a South-East European low-middle-income country in socioeconomic transition.

Objective: To analyze the trend of asthma mortality rate in Serbia in the 1980–2006 period.

Methods: A descriptive study; source of data: Republic of Serbia Institute of Statistics. We analyzed asthma mortality data in total population and in selected age group $\geq$5–34 years. The International Classification of Diseases codes for asthma 493 (1980–1996) and J45 + J46 (1997–2006) were included in the study. Population estimates were based on 1991 and 2002 census data, with extrapolation.

Results: The average age specific mortality rate was 7.56/100 000 population (confidence interval, 6.77–8.36). The mortality rate peaked in 1981 with 11.3/100 000 population and it was 3.8/100 000 population in the last year of analysis. While the over-all mortality rate showed clear decrease over the observed 27-year period (y = 9.996–0.186x; $P = 0.000$), there was a slight increase of the rate in the age group $\geq$5–34 years (y = 0.204 + 0.001x; $P = 0.787$). Male-to-female ratio was 1.57 ± 0.15, on average.

Conclusion: Although the failure of health care system during the socioeconomic crisis of the 1990s transiently might reflect on asthma mortality rates, the over-all mortality rate of the disease shows favorable trend.

PS-95552-05   Ambiente domiciliar—síntomas de asma y atopia en ninos escolares, Salvador, Bahia, Brasil

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Introducción : La prevalencia de asma en niños ha aumentado y factores del ambiente domiciliar se

encuentran relacionados. Evaluamos la relación entre factores del ambiente domiciliar y síntomas de asma y atopia en escolares.

Método : Estudio transversal de base poblacional realizado de febrero a agosto de 2007, como parte de un estudio longitudinal investigando factores de riesgo para asma y alergia en escolares (SCAALA). Domicílios de 1311 niños con edad entre 4 a 13 años fueron visitados. Información sobre condiciones internas domiciliares fue recolectada por medio de entrevista padronizada. Prevalencia de síntomas de asma fue investigada utilizando el cuestionário ISAAC. Atopia fue evaluada por positividad al teste cutáneo y niveles serológicos de IgE específica. Análisis descriptiva de variables es representada en tablas. Regresión logística foi utilizada en el análisis de la asociación entre variables dependientes y principales covariables con ajuste para el efecto de conglomerados controlando por posibles confundidoras.

Resultados : Hacinamiento de más de un niño <15 años por dormitorio es factor de riesgo para asma actual (OR : 1,24 ; 95%IC 1,04–1,48), y sibilo alguna vez en la vida (OR : 1,25 ; 95%IC 1,08–1,43) ; período corto de ventilación es factor de riesgo para sibilo en los últimos 12 meses (OR : 1,84 ; 95%IC 1,08–3,12) y sibilo alguna vez en la vida (OR : 1,66 ; 95%IC 1,05–2,63) ; presencia de humedad o moho en la casa es factor de riesgo para rinitis (OR : 1,72 ; 95%IC 1,26–2,34). No fueron identificados factores de riesgo para asma alguna vez en la vida, asma grave, y atopia.

Conclusión : Son factores de riesgo para síntomas de asma: hacinamiento de niños <15 anos por dormitorio, período corto de ventilación y presencia de humedad o moho en la casa. Se hace necesario disponer de más espacio por residente, mejor ventilación y manuntención física dentro de los domicílios.

TUBERCULOSIS OUTBREAK AND CONTACT INVESTIGATION

PS-94075-05   Drug resistance among untreated new cases of tuberculosis in Oran, Algeria

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Objective: To measure the prevalence of drug resistance throughout a representative sample of sputum smear-positive untreated tuberculosis patients in Oran town.

Methods: We performed a descriptive study by cluster sampling according to the methodology recommended by the International Union Against Tuberculosis and Lung Disease and the World Health Organization.

Results: Of 200 sputum smear-positive tuberculosis patients recruited to laboratory, 108 patients underwent drug susceptibility testing; among these 102 (94.4%) were susceptible to the four antituberculosis drugs and 6 (5.6%) were resistant to at least one antituberculosis drug [95%CI 0.01–0.10] Two patients (1.8%) were multidrug-resistant (resistance to rifampicin and isoniazid). For the other patterns of resistance, the resistance of isoniazide + streptomycine concerned two patients (1.8%).We registered a total of resistance for isoniazide 4.6%, streptomycine 3.7%, rifampicine 1.8% and ethambutol 0.9%.There was a significant correlation between primary resistance and the dwelling-place ($P < 10^{-6}$).

Conclusion: Despite the increase of tuberculosis incidence in our town during the last four years (40% from 2002 to 2005), the apply of the World Health Organization strategy (after more than 20 years), notably, direct observed therapy short course has limited the development of drug resistance in Oran town.

PS-94125-05   Two simultaneous multidrug-resistant tuberculosis outbreaks in the Federal States of Micronesia, 2007–2009

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Inconsistent adherence and incorrect treatment regimens promote acquisition of tuberculosis (TB) drug resistance. Preventing multidrug-resistant TB (MDR-TB), i.e., resistant to isoniazid and rifampin—the two best drugs for TB, requires directly observed therapy (DOT). Curing MDR-TB requires expensive second-line drugs. In response to the first reported MDR-TB cases and deaths in Chuuk, Micronesia, we conducted an investigation to prevent further transmission. An outbreak case was defined as culture-confirmed MDR-TB disease in a Chuuk resident during January 2006–July 2008. We abstracted medical records including *Mycobacterium tuberculosis* genotypes, interviewed patients (by proxy if deceased) about their contacts, and evaluated them with standard clinical methods. Among five initial MDR-TB cases, two simultaneous outbreaks with distinct genotypes, drug susceptibilities, and transmission chains were identified. Outbreak A ($n = 2$), caused by a three-drug-resistant strain, occurred in a family with prior TB cases having non-MDR two-drug resistance but matching genotypes. These patients had not received DOT and had taken medications inconsistently.

Outbreak B ($n = 3$) strain's genotype had not been previously documented in Chuuk; the index patient's history suggested exposure as a migrant worker. Without second-line drugs available, four (80%) of these five initial patients died after prolonged infectious periods. Of 205 named contacts, 16 (8%) had findings suggestive of MDR-TB disease; 124 (60%) had latent TB infection. Ten (48%) of the 21 total cases occurred in persons younger than 15 years. Extensive and ongoing transmission of MDR-TB was documented in Chuuk and was exacerbated by the lack of DOT and second-line drugs. Outbreak A was attributed to acquired drug resistance; Outbreak B probably started with imported infection. Establishing DOT and procuring second-line drugs will be necessary to end these outbreaks and prevent future ones.
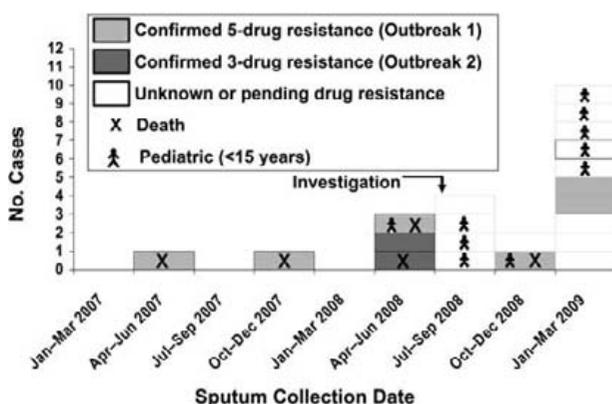
Figure Epidemiologic curve of MDR-TB cases by outbreak strain ($N = 21$).

PS-94163-05   Tuberculosis case-contact investigations in a suburban district of Paris, France, in 2007

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Background: The 'Hauts-de-Seine' district covers the suburban area located on the West side of Paris. It includes 36 cities and 1 532 000 inhabitants. The main duties of CLAT are to conduct TB case-contact investigations and to assure treatment and follow-up of TB cases and individuals with latent tuberculosis infection (LTBI).
Methods: For each notified case of TB, i) a CLAT physician makes contact with the notifying physician to collect basic information including patient address, type of TB, lab data, family and professional contacts, etc. ii) Direct contact with the TB case is made by the CLAT nurse who fills in a complete questionnaire; iii) Case-contacts are evaluated for both LTBI and active TB, and receive a tuberculin skin test (TST) and chest imaging, either in the CLAT or at a professional site.

The evaluation is repeated 3 months later. Results are communicated to all directly involved facilities (hospitals, other CLATs, laboratories, etc.).
Results: In 2007, 370 TB index cases (60% foreign-born; 80% with respiratory TB [47% smear + ve]) were notified, including 243 (14.7 per 100 000) living in the district and 127 living outside but having contacts in the district. The case-contact investigation found 13 (0.9%) TB cases and 77 (5.4%) LTBI cases among the 1434 family contacts, and 3 (0.2%) TB cases and 68 (3.9%) LTBI cases among 1732 professional contacts. All TB cases were successfully treated with standard daily WHO regimen for 6 months. Only 66% of LTBI cases received RIF+INH combination for 3 months, and individualized approaches were needed for many LTBI cases.
Conclusion: The yield of case-contact investigation was higher among family contacts but treated LTBI cases were too few.

PS-94304-05   Tuberculosis outbreak in a Hispanic population associated with illicit drugs, Las Vegas 2006–2008

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Aim: In the United States, tuberculosis (TB) disproportionately affects hard-to-reach populations, including substance users and foreign-born persons. During January 2007–August 2008, Las Vegas TB controllers detected a TB outbreak in eight Hispanic persons who traveled frequently between states and across the US–Mexico border and were involved with illicit drugs. We investigated the source of the outbreak to guide further case-finding and contact investigations.
Methods: We reviewed medical records, interviewed patients and contacts, and analyzed existing contact investigation results. An outbreak case was defined as TB with a *Mycobacterium tuberculosis* genotype matching that of the index case or a clinical TB diagnosis after exposure to a culture-confirmed case. Contacts were prioritized according to intensity and duration of exposure.
Results: Despite TB controllers' intensive outreach efforts, the index patient, an undocumented illicit drug distributor, was contagious for 29 months. He was deported during initial treatment and subsequently evaded treatment in Mexico, Nevada, and Arizona, before being detained in Phoenix, AZ. All

eight outbreak patients were Hispanic, and three were born in Mexico. Six were adults with rare matching *M. tuberculosis* genotypes, and five reported illicit drug use. No additional cases were detected. Of the 543 contacts, 419 (77%) underwent tuberculin skin testing and 79 (19%) had a positive result. Of 74 high-priority contacts, 54 (73%) were tested: 17 (31%) were positive (relative risk = 1.9; 95% confidence interval = 1.2–2.9, compared with 365 other tested contacts).

Conclusion: Evading treatment contributed to the index case's prolonged infectious period and the transmission of TB, as well as posing challenges to TB control measures. Establishing case detection and contact tracing protocols for hard-to-reach or non-adherent populations with the potential to transmit TB across jurisdictions is important for TB control efforts.

PS-94359-05   Initial default of pulmonary tuberculosis patients in a chest clinic in Karachi

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Objective: To assess the magnitude and reasons of initial/primary default among smear-positive pulmonary tuberculosis patients diagnosed at Nazimabad Chest Clinic, Karachi.

Method: Prospective study, conducted from 1st December 2007 to 30th April 2008. From the laboratory register we prepared the list of sputum smear-positive tuberculosis patients. Then the list was counterchecked with 'district TB register' and those who did not report for treatment initiation were labeled as 'initial default'. They were then contacted on phone number which was provided at the time of registration. They were informed of the diagnosis and asked to get themselves registered for the treatment. Patients, who registered at the clinic, were asked about reasons for not reporting.

Results: Of 869 tuberculosis suspects, 224 were diagnosed as smear-positive pulmonary tuberculosis cases. Of 224, 162 were registered for treatment. The remaining 62/224 (27.67%) was initial defaulters. On telephonic contact, 55 (88.70%) were traceable while 07/62 (11.29%) were untraceable-default. Twenty-four patients (38.70%) reported to the clinic and they were registered for treatment. The most common reason for default was dissatisfaction with services at the clinic.

Conclusion: The high initial default is a serious issue that needs to be addressed urgently.

PS-94432-05   Predominance of the Manila family of *Mycobacterium tuberculosis* in Southern Taiwan

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Background: Beijing genotype *Mycobacterium tuberculosis* is the dominant strain in many Asia countries, including Taiwan. However, the distribution of other genotype belong to non-Beijing genotype *M. tuberculosis* had rarely been analyzed. The purpose of this study was to evaluate the composition of non-Beijing genotype *M. tuberculosis*. Its clinical manifestation was also compared with Beijing genotype.

Methods: From January 2007 to December 2008, we prospectively analyzed the spoligotypes of *M. tuberculosis* strains from a random sample of patients with newly diagnosed culture-positive tuberculosis in Taiwan. Strains obtained from 6 hospitals around Taiwan were evaluated, and the results were correlated with demographic and clinical data. SpolDB4 and 'Spotclust' were used to assign isolates to families, subfamilies and variants.

Results: Of 502 patients, 212 (42.2%) were infected with Beijing family genotype. Among non-Beijing strains, the Manila family (57/290, 19.7%) and H3 family (50/290, 17.2%) were the two most dominant genotypes. Despite the diversity of *M. tuberculosis* families, the Beijing family was more common in Northern Taiwan than in Southern (50.5% vs. 9.3%, $P < 0.001$), while the Manila family genotype was dominated in Southern Taiwan (20.4% vs. 2.0%, $P < 0.001$). In clinical presentation, patients infected with Beijing strain had higher probability to be veterans (24% vs. 0%, $P < 0.001$), and associated with malignancy (15.5% vs. 2.3%, $P = 0.02$) as compared to those infected with Manilla strain. The clinical symptoms and drug susceptibility results were comparable between Beijing and Manila strains.

Conclusions: This study demonstrates that the Manila family strains dominated in Southern Taiwan, whereas a low prevalence of such strains was observed in Northern Taiwan. In addition, although with comparable drug susceptibility results, patient infected with Beijing strain had higher probability to be veterans and with malignancy.

PS-94434-05   Active case finding overcomes gender barriers to diagnosing tuberculosis

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Background: Globally, women have a lower reported TB incidence than men but it is unclear whether this is because women are less likely to have TB, or because they are less likely to be diagnosed.

Methods: Gender differentials in tuberculosis incidence were compared between passive and active case finding in a peri-urban shantytown. Smear-positive pulmonary tuberculosis index patients who were diagnosed by passive case finding were recruited over 5 years until January 2008. The household contacts of these index patients were visited in their homes and screened for tuberculosis by active case finding during the index patient treatment. Only patients and contacts aged >15 years were studied because of the uncertainty of paediatric TB diagnosis.

Results: Passive case finding diagnosed significantly more TB in men than women such that 60% of 1259 index cases were male ($P < 0.001$). Active case finding involved screening their 3599 household contacts and this diagnosed 141 cases of secondary TB. In contrast to the male excess in passively found index cases, only 51% of the actively found TB cases were male ($P = 0.72$). Therefore, active case finding was significantly more likely to diagnose women than passive case finding and this was true whether considering all household contacts with TB, only pulmonary TB or only sputum smear-positive pulmonary TB. Furthermore, active case finding in household contacts diagnosed TB after a significantly shorter cough duration than passive case finding (median 15 days (IQR 7–30) vs. 30 days (IQR 15–60) respectively, $P < 0.001$).

Conclusions: Active case finding diagnosed TB with approximately equal frequency in men and women whereas passive case finding appeared to significantly under-diagnose women. These results have important implications for increasing the effectiveness of TB control and for gender equality in TB care.

PS-94494-05   Tuberculosis outbreaks among students in school settings in Taiwan, 2006–2009

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Purpose: To describe the TB outbreaks among students in school settings and the efforts required to control them.

Materials and methods: The suspicious TB clusters in school settings reported from Mar. 2006 to Feb. 2009 were analyzed. TB outbreak was defined as more than two epidemiological linked culture-confirmed TB cases with identical RFLP DNA fingerprinting.

Results: 19 suspicious TB clusters were identified during the study period, of which 87 students were notified in the national registry. They were predominantly female (59.8%), college or university student (69.0%), and culture positive (64.4%) (Table). These

Table Demographic, clinical and investigation-related characteristics of clustered cases from all suspicious clusters in school settings, 2006–2009

Characteristic	Reported cases from all suspicious clusters ($n = 87$) n (%)
Demographic	
Sex	
Female	52 (59.8)
Age group, y	
10–14	10 (11.5)
15–19	21 (24.1)
20–24	53 (60.9)
25–29	2 (2.3)
30–34	1 (1.1)
School type	
Primary	2 (2.3)
Junior/Senior High	21 (24.1)
Vocational	4 (4.6)
College	20 (23.0)
University	40 (46.0)
Clinical	
Radiograph	
Abnormal/without cavity	60 (69.0)
Abnormal/with cavity	26 (29.9)
Normal	1 (1.1)
Sputum smear	
Positive	30 (34.5)
Negative	56 (64.4)
Not done	1 (1.1)
Sputum culture	
Positive	56 (64.4)
Negative	26 (29.9)
Pending	3 (3.4)
Not done	2 (2.3)
Investigation-related	
No. of clusters	19
No. of contacts (case index)	5544 (63.7)
No. of newly confirmed cases (case rate)	38 (685.4/10⁵)

clusters were followed up for 12.4 months averagely. 38 out of 5544 evaluated contacts were then confirmed as TB cases, indicating a case rate 32.7 times higher than the general population aged 10–34 years in Taiwan. Five clusters met the criteria of outbreak definition. Two of them happened in a vocational college in two consecutive years involving 10 students and 2 students respectively in their own classes with or without dormitory sharing. One was an outbreak with 17 students in a specific university. Eleven of them attended the special training course with or without house rental sharing. The rest of two outbreaks comprised with 3 and 8 students in two junior high schools each. One of the schools was

located in the high-incidence mountainous area. Four out of the five outbreaks are still under surveillance currently.

Conclusions: The result revealed that schools were one of the targets of outbreak investigations. Although social network of students might be relatively simple, lacks of epidemiological links at the initial investigation were observed. DNA fingerprinting demonstrated the links and was helpful in suggesting further investigations for connections among the cases. With the assistance of DNA fingerprinting and gene bank, the capability of detecting true outbreaks was reinforced compared to traditional contact tracin.

PS-94728-05 Spread of specific genotype streptomycin-resistant *M. tuberculosis* strains in Tokyo metropolitan area

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Aim: To describe the spread of the specific genotype strains of *Mycobacterium tuberculosis* in the Tokyo metropolitan area (TMA) in Japan.
Methods: We applied Variable Numbers of Tandem Repeats (VNTR) analysis to all *M. tuberculosis* isolates which were resistant to streptomycin with a matched IS*6110*-RFLP band pattern (M-strains). They were isolated either from cases with regards to the tuberculosis outbreak happened at a university in Yokohama City, or through DNA fingerprinting surveillance of *M. tuberculosis* in Shinjuku City and in Kawasaki City. For VNTR analysis, 12MIRU loci, 4ETR loci, seven loci recommended by Supply et al., and four loci recommended by Murase (QUB15, Mtub24, VNTR2372, VNTR3336) were chosen.
Results: Out of a total of 664 isolates collected during the study period, 57 (8.6%) were detected to have a matched IS*6110*-RFLP band pattern. 46 isolates (6.9%) were identified as M-strains. There was a tendency where those patients whose isolates belonged to M4-substrains, with four copies of tandem repeat at the ETR-C locus, had higher probability to have visited some of internet-cafés in the TMA than those whose isolates belonged to M5-substrains, with five copies at the ETR-C locus, although not statistically significant (30.8% vs. 10.0%, Exact $P = 0.150$).
Conclusion: It has to be taken into consideration that tuberculosis can be transmitted in congregated facilities where tuberculosis high-risk people and general people share common spaces such as internet cafés in urban settings in Japan.

PS-95118-05 Molecular epidemiology of tuberculosis in Riga, Latvia

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Background: Latvia is high incidence tuberculosis (TB) country (43 cases per 100 000 in 2008), yet little is known about the molecular epidemiology of TB in the country. Spoligotyping and IS*6110*-based restriction fragment length polymorphism (RFLP) analysis of *Mycobacterium tuberculosis* isolates enables the identification of genotyping clusters (i.e., two or more isolates with matching genotyping pattern) which can help determine the transmission dynamics of *M. tuberculosis*. Clustered patient isolates are suggestive of an epidemiologically linked chain of TB transmission.
Methods: We conducted genotyping (spoligotyping and IS*6110*-based RFLP) and drug susceptibility testing of isolates from all patients diagnosed in Riga and its urban districts (40% of the Latvian population) in 2008. The data were reviewed for identification of genotyping clusters and merged with TB surveillance data. Epidemiologic cluster investigations were conducted for patients in genotyping clusters.
Results: In 2008, 335 new pulmonary TB cases were diagnosed in Riga and its districts, 283 (85%) were bacteriologically confirmed. Genotyping was performed on 272 (96%) patient isolates. Of these, 47 (17%) were Beijing patterns. Using both genotyping methods, 50 (18%) isolates were in 16 distinct clusters (2 to 7 patients per cluster). Among clustered patients, 72% were males, 48% had history of alcohol abuse, 30% had Beijing genotype (3 clusters), 26% had known contact with TB patient and 26% had history of incarceration.
Conclusions and recommendations: Transmission of TB in Riga, Latvia, is common in populations with alcohol abuse and incarceration, but is not limited to these groups. In a country with high incidence of TB, molecular epidemiology can help determine TB transmission dynamics through prioritizing and enhancing contact investigations.

PS-95126-05 Contact investigations: a critical tool in early tuberculosis case identifications in Mississippi

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Background: Contact investigation is an important programmatic activity in TB control. However, it may be a challenging process in rural settings and for programs faced with limited financial resources. Mississippi had a steady downward trend of incident TB cases for 16 consecutive years until 2005 (Figure). Both DOT and contact investigations had been an integral part of the program with 0.7% cases identified in 1990–1998 through contact investigations. In 2006 and 2007 there was an increase in TB cases (115 cases—4.0/100 000 and 137 cases—4.7/100 000 respectively) leading to continued efforts for contact investigations.
Aim: To determine the number of early TB cases identified during contact investigations of patients with TB evaluated from 2004 through 2008.
Methods: Retrospective review of the Mississippi State Department of Health TB database to determine the number of contacts identified to TB cases diagnosed in 2004 through 2008. Data collected included the number of contacts identified with active TB, the number of contacts identified with LTBI, the number that started and the number that completed LTBI treatment.
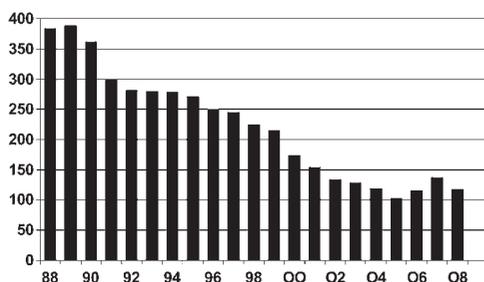
Figure Mississippi tuberculosis cases.

Results: From 2004 through 2008 a total of 13 373 contacts were identified to 472 cases. Of these, 1977 were determined to have a positive TST, 1716 (87%) infected contacts started LTBI treatment, 851 (50%) completed therapy and 219 are still on medications. Forty-seven contacts were identified as cases during this period.
Conclusions: Although contact investigation can be a daunting task for any TB control program, it is an essential element to determine not only those infected with TB, but also for early identification of active TB disease, so as to prevent further TB transmission.

PS-95210-05 Investigations de cas de tuberculoses à bacilles multirésistants suivis au CHU Yalgado Ouédraogo

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La tuberculose multirésistante est une forme de tuberculose dont les bacilles résistent au moins à l'isoniazide et à la rifampicine, les deux principaux médicaments antituberculeux essentiels. Nous rapportons une étude rétrospective descriptive portant sur 27 cas de tuberculose multirésistantes suivis dans le service de Pneumologie du Centre Hospitalier Universitaire Yalgado Ouédraogo. Ces 27 cas ont été enregistrés sur 2 années. La moyenne d'âge est de 37,7 ans avec des extrêmes de 22 à 69 ans. Le sexe ratio est de 3,5 en faveur des hommes (77,7% d'hommes et 22,3% de femmes). La notion d'antécédent de prise de traitement antituberculeux a été retrouvée chez 26 patients (96,3%) dont 30,8% avaient déjà eu au moins un traitement antituberculeux en Cote d'Ivoire. La notion de contage tuberculeux a été retrouvée dans 44,4% des cas. Le traitement antituberculeux des tuberculoses multirésistantes est probabiliste, la culture n'est pas réalisée en pratique courante au Burkina Faso. Les antécédents de traitement antituberculeux en Cote d'Ivoire, la notion de contage tuberculeux et les antécédents de traitement antituberculeux sont des facteurs favorisant l'émergence des tuberculoses multirésistantes au Burkina Faso.

PS-95255-05 Deteccion oportuna de tuberculosis en contactos y usuarios de drogas en el municipio de la Paz BCS

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Objetivo : Detectar nuevos casos de tuberculosis en contactos y grupos de riesgo en la periferia de ciudad La Paz BCS por Red TAES de enfermería.
Metodología : Gestión de recursos, capacitación a 54 enfermeras en búsqueda de casos, Búsqueda de contactos (2006–2008) por visita domiciliaria con Red TAES, Se revisaron tarjetas y expedientes de pacientes, se identificaron 151 contactos con sintomatología respiratoria. Se visitaron 13 grupos vulnerables, 263 usuarios de drogas, (1 septiembre al 10 de diciembre del 2008).
Resultados : Se realizaron 75 visitas a contactos, informándose sobre TB a 171 convivientes, enfatizando

en la detección oportuna, se realizaron 54 baciloscopias (35.76%) confirmándose 2 casos. En grupos vulnerables se informó sobre tuberculosis a 415 personas, realizándose 202 baciloscopias confirmando 2 casos (1%) de personas enfermas.

Conclusiones : Se encontró que la población no identifica a la tuberculosis como un problema grave de salud por tal motivo no se realiza la baciloscopia. La vigilancia de los contactos y grupos concéntricos disminuye el riesgo de contraer la enfermedad.

PS-95259-05 Incidence of tuberculosis among the household contacts of all types of TB patients: a 3 year study

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Background: TB remains a major cause of death and disability across the globe. Pakistan ranks 6th most high TB burden country in the world. The National TB control Program relies heavily on self reporting by the patient, which at times result in delayed diagnosis or mismanagement. Due to the infectious nature of the disease, it tends to spreads in close proximity. Immediate household contacts of all types of TB patients specially sputum positive, remained very vulnerable to carry TB infection or develop the disease.
Methodology: A three years (2005–2007) data analysis was done of all types of TB patients diagnosed by Marie Adelaide Leprosy Centre in Karachi. All Immediate household contacts were examined at least twice (at the time of registration and discharge) for the cardinal signs and symptoms of the disease.
Results: See Table.

	2005	2006	2007
All types of TB patients diagnosed, n	322	582	577
Contacts examined, n	1933	4387	3889
New cases detected among the contacts, n	27 (1.4%)	63 (1.43%)	87 (2.2%)
Cases detected through contact examination among the total number (%)	8.3%	10.8%	15%

Conclusion: TB incidence in Pakistan is 181/100 000 (0.181%). Household contact examination of all types of TB patients has revealed the incidence of 1.4%–2.2% which is quite high. Contact examination should be adapted as an effective way to increase case detection and disrupt the transmission cycle.

PS-95460-05 Hazard of TB disease in household contacts of MDR-TB and XDR-TB patients

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Objective: To measure and compare the hazard of TB disease among household contacts of patients with extensively drug-resistant tuberculosis (XDR-TB) versus other forms of multidrug-resistant TB (MDR-TB).
Methods: In 2004–2006, a study team visited the households of patients in Lima who were treated with individualized MDR-TB regimens in 1996–2003. The first person in the household treated in this program was designated the 'index' subject. All index baseline strains were confirmed to be resistant to INH and RIF (MDR-TB) and tested for additional resistance to fluoroquinolones and a second-line injectable (XDR-TB). Study workers interviewed household members about TB diagnoses and treatment and reviewed medical charts. The primary outcome was the time to active TB in a household member, defined as the first of either the date of a diagnosis of active TB, or the start date of a TB regimen.
Results: Median duration of household follow-up was 3.3 years. In 48 households, the index strain met the XDR-TB definition. In the other 645 households, the index strain did not meet the XDR-TB definition. Household contacts of XDR-TB patients had an elevated hazard of disease (HR: 1.9 (95%CI: 1.3–2.7)) during follow-up, compared to household contacts of patients with non-XDR MDR-TB. Multivariable analyses will be performed to evaluate potential confounders and effect modifiers of this association.
Conclusions: Close contacts of patients sick with any form of MDR-TB are at risk for developing active TB. Disease risk appears to be elevated in homes where strains with extensive resistance have been introduced. This may be due to a number of factors, including longer periods of inadequately treated disease, more exposure outside the home, and differences in strain fitness. Evaluating strategies to reduce the household burden of drug-resistant TB is essential. These should include early detection and treatment as well as household infection control measures.

PS-95506-05   Hawaii's response to a large multidrug-resistant TB outbreak in Micronesia

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Background: Chuuk, Federated States of Micronesia, experienced an expanding outbreak of multidrug-resistant tuberculosis (MDR-TB) in 2008. International partners provided assistance during this challenging outbreak of three- and five-drug-resistant TB strains. In accordance with treaties, Micronesians may enter the United States without visas or health evaluations, and many travel to Hawaii for employment, health care and reunification with family.
Aim: To prepare for a regional MDR-TB outbreak.
Methods: The Hawaii Department of Health initiated enhanced surveillance, outreach (free targeted testing, treatment), and prompt communication with stakeholders, other clinical providers and the community. We compared latent and active TB in Hawaii before and after the outbreak in Chuuk.
Results: We issued a health alert and convened a stakeholders meeting. TB cases among Chuukese in Hawaii increased from 2 in 2004 to 12 total in 2008, however there was no MDR-TB found among the cases from Chuuk. More Chuukese were offered free screening; however, latent TB infection rates were found to be stable over time (baseline: 25% positive skin test results among Micronesians tested in Hawaii). A Chuukese woman wtih young children was found to have mono drug-resistant TB and was promptly isolated and treated. We are closely monitoring and providing directly observed therapy to one infected MDR contact who traveled to Hawaii from Chuuk.
Conclusion: In the response to a large regional outbreak, enhanced surveillance has shown that active TB among the Chuukese in Hawaii has generally increased without emergence of MDR-TB or increased latent TB infection.

PS-95562-05   Impact of new technology and community partnerships on CI for a TB outbreak in the SF gay community

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Background: We discovered a cluster of five potentially infectious TB cases in gay men who were employed and non-homeless. In the past 5 years, we have found HIV-TB exclusively among indigent persons and not in our gay community. We expanded the screening early because of the anticipated prevalence of HIV, we sought community support, and we assessed the utility of genotyping and QuantiFERON®-TB Gold-In-Tube (QFT) in the contact investigation (CI).
Response: We assimilated spoligotype and MIRU results of *Mycobacterium tuberculosis* isolates into routine CI in real time, and we tested contacts with QFT. We collaborated with Magnet, a community clinic serving the gay Castro district.
Results: The five cases matched by genotype. Three of the patients were HIV infected. None of the five patients named each other through CI. Two patients, including one with an infectious period of 8 months, refused to name contacts. Two patients were linked to a business; four frequented multiple bars. We sought 253 bar employees from 12 bars for screening, and we evaluated 234 (91%), with 10 (4%) positive and 4 (1.6%) indeterminate QFT results. Magnet helped by 1) indicating gay bars where transmission appeared likely, 2) soliciting cooperation from bar owners, and 3) serving as a site for screening.
Conclusion: These cases represented new TB transmission in this vulnerable population. Routine genotyping confirmed TB transmission early, focusing attention on specific sites and enabling prompt interventions. This genotyping data provided compelling evidence that garnered community support and political will. Community support and testing with QFT allowed phenomenal evaluation rates, enabling us to confidently address concerns of transmission in the bars.

PS-95595-05   Resistencia a drogas antituberculosas en contactos de casos indices de TB-MDR, INS-PERU-2007–2008

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Objetivo : Determinar la frecuencia de resistencia a 11 medicamentos antituberculosas, en pacientes con antecedentes de contacto TB-MDR.
Métodos : Entre 2007–2008, se estudiaron 250 aislamientos de pacientes que tenían antecedentes de ser contacto de pacientes con TB-MDR, procedentes de los 33 laboratorios de la Red Nacional del Perú. Los aislamientos fueron procesados mediante la prueba de susceptibilidad a drogas antituberculosas de primera y segunda línea por el método de las proporciones agar 7H10 en placa. La susceptibilidad a la pirazinamida fue determinada por el método de Wayne.
Resultados : De los 250 aislamientos evaluados, 71 (28,4%) presentaron patrón resistencia MDR, en los que se encuentran 4 aislamientos con patrón de resistencia XDR, 76 (30,4%) fueron resistentes a otras drogas y 103 (41,2%) fueron sensibles a todas las

drogas. La resistencia global a isoniacida, rifampicina, ethambutol, estreptomicina y pirazinamida fueron : 42,0%, 32,4%, 13,6%, 35,6%, y 10,8%, respectivamente. Para las drogas de segunda línea : ciprofloxacina, kanamicina, capreomicina, etionamida, PAS y cicloserina, la resistencia global fue de : 2,0%, 6,8%, 5,2%, 15,6%, 0,8% y 0%, respectivamente.

Conclusion : Alrededor de la tercera parte de los pacientes con antecedentes de contacto de caso índice con TB-MDR desarrollaron resistencia ; por lo que es importante la detección temprana mediante el uso de la prueba de susceptibilidad rápida desde el inicio del diagnóstico.

PS-95604-05 Multidrug-resistant tuberculosis in families: a retrospective cohort study

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Few studies have estimated the incidence of tuberculosis disease in household contacts of patients with multidrug-resistant tuberculosis. Between June and August 2008, 410 multidrug-resistant tuberculosis patients (median age 29, IQR 23–39) diagnosed after 1st January 2005 in Lima, Peru were interviewed in a retrospective cohort study to determine the incidence of active tuberculosis disease amongst their household contacts. Out of a total of 2408 contacts (median 5.0 per MDR-TB index case), 110 (5%) developed active tuberculosis after that of the index case within the 3.5 year follow up period. These 110 second cases of tuberculosis were clustered into 92/410 (22%) households. Although some of these cases could have arisen as a result of reactivation or transmission outside the home, the household incidence of a second case of active tuberculosis disease (22%) is very high. Regardless of the source of transmission, intervention strategies to improve prevention or early detection of tuberculosis disease in this high risk group must be prioritised.

DOTS EXPANSION I

PS-94102-05 Evaluation of internal quality assessment on DSSM of the national reference laboratory, Philippines

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Setting: National Tuberculosis Reference Laboratory, Philippines.

Background: Since the establishment of the National Tuberculosis Reference Laboratory (NTRL) in 2002, internal Quality Assessment of smeared slides has been done to maintain the skills and proficiency of the laboratory staff in Direct Sputum Smear Microscopy (DSSM). It is important to have competency in TB Microscopy, for NTRL is mandated to conduct training on DSSM and Quality Assurance, and monitor laboratory activities in the network.

Objective: To evaluate the competency of NTRL staff in DSSM using the internal QA results in slide reading and smear preparation.

Method: Specimens previously processed in DSSM were collected weekly from the microscopy centers near NTRL. Each specimen was again smeared, stained and read by each NTRL laboratory staff. The lab supervisor quarterly collects and selects slide using LQAS for validation. The senior medical technologist blindly re-checked the slide reading and assessed smears using the six checkpoints on quality smear preparation. Over-all agreement and number of Major Errors (HFP and HFN) and Minor (Quantification) Errors were used as indicators in slide reading evaluation, while at least 90% good quality in each checkpoints was used in smear assessment.

Results: The over-all agreement is consistently high ranging from 95% to 98.50%, indicating good performance in the slide reading. Of the six checkpoints, only specimen quality does not reached the 90% target rate. This is because most specimens collected were already liquefied. The other checkpoints (staining, cleanness, thickness, size and evenness) ranging from 92% to 100%.
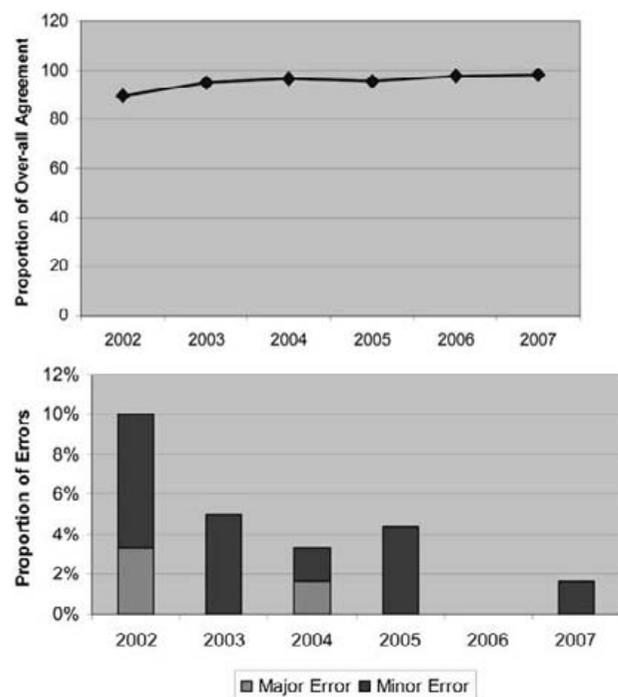
Figure Slide reading quality check (top) and slide reading errors (bottom).

Conclusion: Internal QA of smeared slides is indeed helpful in maintaining skills and proficiency in TB Microscopy. This also serves as indicator of laboratory staff performance, especially for those NRL that are not yet been assessed by a supranational laboratory.

PS-94203-05   Missed opportunities for early TB diagnosis by an active case finding campaign in a slum, Rio de Janeiro

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Setting: A successful community-based DOTS program was implemented in 2003 in the *favela* of Rocinha (Rio de Janeiro), the largest slum in Latin America, where tuberculosis (TB) rates are 624/100 000. Cure rates increased from 70% to 88% by 2004, with defaulters falling from 20% to 4%. Based on the success of the program, an active case finding (ACF) campaign consisting of door-to-door symptom screening and spot sputum collection performed by Community Health Workers (CHWs) was initiated in June 2005.
Aim: To assess reasons why some TB cases were not detected by the ACF campaign.
Methods: The door-to-door ACF was performed by trained CHWs who lived in the slum and who had been performing the DOTS program for two years. Following completion of the ACF, we interviewed all TB cases from the ACF area who were not detected by the campaign.
Results: A total of 23 865 residents were screened by the CHWs in the ACF campaign. 430 (1.8%) had respiratory symptoms, of whom 12 were AFB positive (2.8%) and diagnosed with TB. During the ACF campaign period and for three months beyond, 19 additional residents of the screened areas presented at the clinic and were diagnosed with TB. Among them, 18 were interviewed. The majority (56%) of these TB cases were missed by the ACF campaign because they did not have symptoms at the time of the survey or moved into the area after the screening. The remaining 44% could be considered missed opportunities for early diagnosis by the ACF campaign. Although many attempts were made to visit each resident in the ACF areas, 6 (34%) symptomatic TB patients were never interviewed. Two (11%) other symptomatic TB patients refused to provide a sputum specimen.
Conclusion: ACF is likely to detect TB cases earlier and therefore contributes to reducing TB transmis-

sion. However, maximizing complete population coverage and compliance with the survey are challenges that must be overcome.

Reason alleged	n (%)
Did not receive the CHW visit	5 (28)
Weren't at home during the CHW visit	0 (0)
Received the CHW visit, but refused to be interviewed	1 (6)
Were interviewed by the CHW but refused to give a sputum sample	2 (11)
Were interviewed by the CHW but did not present symptoms at that time	9 (50)
Did not live in the screened area when the ACF happened	1 (6)
Total	18 (100)

PS-94337-05   Analysis of enhance TB response strategy in Western Cape Province, South Africa

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Motivation: Tuberculosis remains a major public health problem in the Western Cape despite efforts to control the epidemic. In response to the adopted national TB Crisis Management Plan for South Africa in 2005, the Western Cape embarked on an enhanced response strategy to TB in 5 high burdened sub-districts in 2006.
Problem statement: Analysis has shown a relationship between high case loads and poor cure rates under historically proportionate resource allocation. In 2005 these 5 sub-districts, representing 36% of provincial population, carried 41% of the TB caseload. The average cure rate was 63% with an average defaulter rate of 15%.
Approach: Strategy included provision of additional financial resources from provincial management. Sub-district action plans were developed with subsequent area specific human resource expansion. Intensified efforts implemented to improve recording and reporting structures. Training expanded through the PALSA Plus model. Supervision and support strengthened. Non-Governmental and Faith Based Organizations were involved in expanded social mobilization and IEC campaigns. Progress monitored through governmental structures and operational research projects.
Results: Treatment outcomes improved in all 5 sub-districts with a substantial increase in cure rate (72.8%–2007) and decrease in defaulter rate (9.9%–2007). Case holding improved through the increased visibility and support of community health workers who concentrated on recovery of defaulters on treatment, ensuring that follow-up sputa are done in time, recalls of primary defaulters and encouraging suspects to be tested.
Conclusion: Areas with high TB caseloads and con-

sequential poor outcomes can benefit by individually designed interventions. These interventions should be sustained by political and managerial commitment and incrementally replicated in countries with growing TB epidemics.

PS-94376-05 Factors influencing performance of Global Fund-supported tuberculosis grants

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Objective: To explore grant and country characteristics associated with performance of tuberculosis (TB) grants supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) which uses performance-based funding when financing grants.
Methods: We used Global Fund grant data to calculate average programmatic performance of 108 TB grants in 88 countries. Using stepwise regression models we examined the correlation of grant performance with a wide range of grant and country characteristics, such as funding duration, health services, and governance indicators.
Results: Funding duration and grant budget per smear-positive TB case were positively correlated with grant performance. Successful completion of a comprehensive evaluation of a grant conducted during the 2nd year of its funding was linked with higher performance. Two country-specific factors were significantly correlated with performance: political stability (positive correlation) and disease burden (negative correlation).
Conclusions: Higher funding per smear-positive TB case and successful evaluation by the Global Fund in 2nd year of grant life predict higher performance of TB grants. Performance-based funding creates an incentive to countries perform better to secure financing for tuberculosis grants.

PS-94493-05 Evaluation of quality microscopy service using EQA performance on reading and smear preparation

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Background: A newly developed External Quality Assessment (EQA) system for AFB microscopy employing Lot Quality Assurance Sampling (LQAS) was introduced into the NTP by the Department of Health in 2004. The new EQA system was first implemented in 19 provinces/cities nationwide as pilot sites. One EQA center in each site has been established to oversee its implementation.

Objective: To evaluate the performance of all microscopy centers (MC) of the pilot sites in the Philippines by assessing their EQA results on blinded re-checking and smear preparation quality check, from 2005 to 2007.
Method: Data analysis of 361 MC from 19 pilot sites was carried out. The standard targets of no major error for blinded re-checking and at least 90% proportion of good quality smears for each assessment point, which are based on National EQA Manual, were used to evaluate the performance of MC.
Results: Decreasing trend in the proportion of major errors (HFP and HFN) has been observed after the first year of the new EQA implementation. However, three among the six assessment points have not reached the 90% proportion of good quality smears. Collection of specimen may be a contributing factor in poor specimen quality, smear thickness and evenness. EQA results also indicated an increasing number of MC having no major errors from 2005 to 2007.
Conclusion: The quality of sputum smear microscopy service in the pilot areas is generally good based on the assessment of EQA results. The present good quality microscopy services must be maintained if not further improved. Continuing efforts to improve the laboratory services through EQA activities and programmatic initiatives must be sustained in order to maintain or further strengthen the good performance of MC nationwide.

PS-94561-05 Why do TB patients default from treatment? A qualitative research in Myanmar

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Settings: Four selected townships with a higher defaulter rate: Maubin, Thanatpin, Yaksauk and Amarapura in Myanmar.
Objectives: To describe main factors related to defaulting TB treatment among pulmonary TB patients from the view point of both health staff in public and private sectors and patients.
Design: Cross-sectional descriptive study using two qualitative approaches: 1) Key Informant Interview about drug distribution, DOT provider and DOT supervisor with health staff and 2) In-Depth Interview about health education, reasons for default with defaulted TB patients aged 15 or older. All interviews were conducted by medical doctors having trained on structured interview method.
Results: 11 defaulted patients and 18 health staff members were interviewed in Sept 2007–Feb 2008. The main reasons for default could be divided into three: 1) disease related: adverse effects of TB drugs

which is the most common and relief of symptoms, 2) service related: long waiting time for follow-up sputum examination, long interval of drug distribution and insufficient pre-treatment health education, and 3) patient related: unaffordable transportation cost and long distance to DOT supervisor, move to other township without notice, poor understanding about disease and treatment.

Conclusion: The factors related to default are multifactorial and subtly linked together. We concluded in the round table discussion among those concerned that health education at both pre- and on-treatment through effective IEC materials, which is a possible intervention as well as a starting point for action, is the key to reducing the defaulters.

PS-94587-05   DOTS strategy progress and factors associated with treatment interruption in Taiwan, 2006 to 2008

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Aim: Since April 2006, Taiwan has initiated national wide and whole scaled DOTS (Directly Observed Treatment Strategy. As the most recent data indicated that DOTS implementation rate among smear-positive patients reached 92%. This study aimed to analyze the treatment outcomes and sputum conversion among DOTS and non-DOTS groups, as well as the factors associated with DOTS interruption.

Methods: Treatment record data were obtained from 2006 to 2008, and which were from national tuberculosis report and management database in Taiwan Centers of Disease Control (CDC). Due to the cohort analysis, the 2006 case report was within April 1 to December 31, and comparison was the whole year report cases in 2007.

Results: This study revealed as following:

1 In the beginning phase in 2006, there were 377 trained DOTS Observer, and in the end of 2008, the trained observer numbers increased to 625.

2 From DOTS initial phase from April to December 2006, there were 4957 sputum smear-positive TB patients in Taiwan, enrolled in DOTS program were 3545 (72%). In 2007, there were 6808 cases and enrolled in DOTS program were 6324 (93%).

3 As for treatment success rates, for DOTS enrollee: 75% in 2006 vs. 73% in 2007.

4 Treatment success rates for Non-DOTS enrollee: 52% in 2006 vs. 32% in 2007.

5 We analyzed the factors of DOTS treatment interruption in 2008, and found that of 609 interrupted cases, 186 (31%) were physician's advices, 176 (29%) refused to continue treatment, 56 (9%) were

frequent movers, 10 (2%) were loss of follow up, and 181 (30%) were other reasons.

Conclusion: This study indicated in DOTS enhanced the treatment success, but for the non-DOTS groups, we needed to pay more attention to intensively manage cases. As for the treatment interruption, due to many of TB patients are lower social economic status, poor, and homeless or older adults living alone, that needs more care and social support.

PS-94607-05   TB CAP laboratory tools package

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Laboratories have a pivotal role in the diagnosis of TB and treatment monitoring, and surveillance and diagnosis of multidrug resistance. Inequitable distribution and poor quality performance of laboratories are major barriers for DOTS expansion. Lack of appropriate tools is one of the key issues affecting performance. TB CAP, in partnership with the Global Laboratory Initiative, responded to this need by developing generic tools, to be adapted at country level, to strengthen management and technical capacity of laboratories. We describe seven tools:

The Standard Operating Procedures enables standardization of quality laboratory practice at throughout a country or region. These are written instructions on all laboratory procedures.

The External Quality Assurance Package includes EQA procedures and training tools covering all main areas of AFB-microscopy EQA.

The Management Information System is a data-entry and analysis instrument to capture relevant information from laboratory services. The system provides standardized reporting and monitoring of AFB-smears and supplies and also promotes correct analysis.

The Culture and DST package includes 12 training modules to support the expansion of quality culture and DST services.

The Country roadmap is a generic guide for scaling-up nation-wide laboratory services in a systematic manner.

The Logistics Management Tool is a tool for procurement, logistics and management of laboratory equipment and other supplies that are required for TB microscopy and TB culture and DST.

The Bio-safety manual is a guide for laboratories to design, organize and maintain safe working conditions, where TB microbiology procedures are carried out.

PS-94717-05   Steps to scale-up of multidrug-resistant tuberculosis: an experience of Georgia

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Drug Resistance Survey (DRS, 2006) revealed high prevalence of MDR-TB among patients in Georgia (6.8% in new cases, 27.4% in re-treatment cases). By that time there was no adequate resources and infrastructure to manage MDR-TB. The goal to create the universal access to MDR-TB diagnosis and treatment for the population of Georgia was established.

Intervention: The needs to establish MDR-TB management was evaluated and response plan developed as an integral part of the National 5-year TB Control Strategic Plan. Georgia successfully applied to Global Fund and Green Light Committee to cover the financial gap. TB laboratory system was optimized to improve quality of its performance and specimen transportation system created. National reference Laboratory (NRL) was strengthened. Pilot MDR-TB management project supported by the 'Medecins Sans Frontieres' was established in 2006. Human resources were developed countrywide. System for psychosocial support of MDR-TB patients and infrastructure for in- and outpatient treatment was established. Since March 2008 MDR-TB management was expanded countrywide.

Results/lessons learned: Universal access of MDR-TB diagnosis is achieved in 2007. 115 patients were enrolled in the pilot project by March 2008. Since then 485 more patients were enrolled. DRS is an important starting point to plan interventions for MDR-TB management. Lab capacity needed for MDR-TB management should be built on the existing quality laboratory system. Having the National TB control strategic plan helps to apply for domestic or donor support. Piloting the MDR-TB management project has a critical importance to implement universal access to MDR-TB management. Strong political commitment is crucial for scale up of the MDR-TB management.

Conclusions: The system of the MDR-TB management should be supported further by Government and donors to ensure sustainability. NTPs from other countries in the region can benefit from the experience of Georgia.

PS-94795-05   Optimizing community participation in TB care: review of community TB care pilot project in Nigeria

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Background: Limited involvement of the community in TB control in Nigeria misses the opportunity for awareness creation, suspect identification and community based-DOTS. From July 2007 to September 2008, FHI piloted community TB care in the local government areas of Nassarawa (N), (urban, 634000 population) and Yakkur (Y), (rural, 215000 population).

Methodology: This review assessed level of knowledge in community and community volunteer's (CV) participation in TB control activities. Data was derived from i) monthly service statistics; ii) program reports and iii) knowledge, attitude, behavior and practice survey. Outcome measures were the proportions of i) participants knowledgeable about TB; ii) TB suspects referred by CV for testing; iii) TB patients tested for HIV; iv) TB patients receiving DOTS in the community. Differences between these proportions at baseline (July 2007) and September 2008 were analysed.

Results: TB symptoms knowledge rose from 64.5% of respondents (baseline) to 92.3% in N and 58.3% (baseline) to 72.5% in Y. Knowledge of mode of spread increased from 41% to 94% in N and 54% to 90% in Y; that TB is curable increased from 67% to 89% in N and 71% to 100% in Y. At baseline, no CV was trained in TB; HIV testing of TB patients was not routine. By September 2008, 76 CV were trained on DOTS (42 in N, 34 in Y) and 901 AFB sputum tests were done in N and 428 in Y. Of these tests, referrals of TB suspects by CV contributed 521 (57.8%) in N and 202 (47.2%) in Y. CV provided DOTS to 27% of TB patients in N and 25% in Y compared to none at baseline; 90% of TB patients in N and all in Y were tested for HIV. The HIV prevalence among TB patients was 10% in N and 22.5% in Y.

Conclusion: A combination of awareness raising, demand creation and strengthening supply of DOTS services has increased significantly uptake of AFB sputum test. CVs should be supported by the LGA health authorities to cover their costs and sustain motivation.

PS-94903-05   TB control Saskatchewan: Who are we?

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According to the World Health Organization (WHO), approximately one-third of the world population is infected with *Mycobacterium tuberculosis* (TB); TB causes two million deaths per year; one person is newly infected every second; one percent of the world population is infected every year; and 5–10% of those infected become sick or infectious during their lifetime (2004). As TB Control Saskatchewan we are committed to eliminating tuberculosis within our province, using the Canadian Tuberculosis Standards

(6th Ed.) 2007 as our guide. In 2007 there were 96 new (not previously notified) cases of tuberculosis and 10 relapsed (previously known to be active) cases in Saskatchewan. The new case rate for the province was 9.5 per 100 000 (SHSP population data). The new case rate for different ethnic groups per 100 000 was: Status Indian 58; Caucasian <1*; Métis 56*; Foreign born 8.3*. Our program consists of 3 stationary clinics and >10 mobile clinics throughout the province, providing at home and in community treatment designed to meet the need of the client. TB Control is partnered with various federal and provincial health organizations in an attempt to eliminate tuberculosis. However, as TB is a multifaceted disease process, we are continually seeking to increase our partnerships in order to affect a larger and more sustainable health and wellness improvement in the province. Unique to TB Control Saskatchewan is our enhanced Directly Observed Therapy (DOT) initiative, carried out by TB Program Workers (TBPW) in each community. At the end of each 28-day cycle, TBPWs return the empty medication packages to the corresponding TB nurse clinician for their area. Empty medication packages are counted and used along with the TBPWs charting to account for patient compliance. This initiative resulted in a mean drug compliance of 90% (excluding deaths) in 2007, which drastically reduces drug resistance.

*Census Data 2006.

PS-94971-05   Strengthening quality DOTS implementation in Thai prisons

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Background: Quality DOTS implementation in prisons is important to prevent TB transmission and MDR-TB emergence.
Setting: Six prisons in Nakhonratchasima province.
Objective: To assess TB prevalence by TB symptom screening and to evaluate sputum conversion of TB patients being identified by the screening.
Method: During October 2008–February 2009, 11 563 prisons were interviewed by five items: cough > 2 wks, fever >1 month, 5% weight loss in 1 month, large lymph nodes, and night sweats. HIV testing was provided for prisoners with the written informed consent. TB suspects who had any one items had sputum microscopy. TB patients were diagnosed by doctors from hospitals near the prisons according to the national standards. DOT was provided by prison nurses. The patients were pictured when they took anti-tuberculosis drugs.
Results: 87% (10 024) were screened. 12% (1805) were TB suspects. 2% (240) had HIV infection. Smear-positive patients were found to be 0.5% (60).

During intensive phase, 87% (52) of TB patients had DOT photos for everyday. Sputum conversion rate among smear-positive was 70% (42/60).
Conclusion: TB is prevalent in prisons. DOT photos could be an option to ensure that patients take medications regularly. However, interventions to reduce death rate are significant.

PS-94991-05   Involvement of all providers in the slum in TB case finding

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Setting: Nairobi, Kenya where about 70% of the population lives in slums.
Objective: To increase the index of suspicion among slum health care providers with the aim of improving TB case detection and reduce delays in TB diagnosis. Baseline diagnostic delay is on average 7 wks+ 2 wks.
Methods: Mapping was done to identify providers for engagement, followed by a sensitization/training meeting. Providers were asked to refer clients with a 2-week cough to the nearest diagnostic centre. Referral forms from participating providers were analyzed for suspected TB patients who reported to diagnostic centers. The outcome measure was the number of referred patients found to have smear-positive PTB validated by AFB and TB treatment register.
Results: Of the 106 providers mapped 48 (45.2%) attended the sensitization meeting and 25 participated in the initiative. Between July 2008 and January 2009, 267 TB suspects were referred, of whom 71 (26.5%) arrived at diagnostic centers, 35 (49%) had smear-positive PTB. Case finding for smear-positive PTB in the main diagnostic site increased by 46% compared with the third and fourth quarter of the previous year.
Conclusion: Involvement of all providers in the slum offers an opportunity to increase TB case detection and to diagnose patients early, thus contributing to DOTS expansion.

PS-95046-05   Patient centred TB treatment under programmatic conditions in Tanzania

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Background: Patient Centred TB treatment (PCT) was piloted in three districts of Tanzania for three years (2004/6). The targeted population was 1.45 million.
Objective: The study aimed at generating the necessary evidence base, under programmatic conditions,

for the National TB Leprosy Programme (NTLP) to decide whether or not to scale up PCT to the national level.

Design: The cohort analysis was used basing on comparing treatment outcomes of the PCT cohort with that of Historical data.

Setting: One urban district; Arusha municipality and two rural districts; Kahama and Mufindi district councils implemented the study.

Participants: All new, previously untreated, TB patients (Category I and III).

Results: A total of 1576 and 1343 TB patients recruited in historical and PCT cohorts' respectively. In the historical cohort, the treatment success was 69.7% while the treatment success for the PCT cohort was 82.2%.

Conclusion: PCT has proved to be practicable and not inferior to previous norms of HF-DOT in terms of treatment success. PCT may reduce deaths, defaulters and transfer out significantly. PCT approach has now been scaled up in the country to enhance universal access to TB care. Currently more than 90% of our patients are on home based DOT.

PS-95072-05   Routine MDR surveillance in Kenya: serving early case detection and identification

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Background: Culture based methods remain the main stay of determining resistant to Rifapicin and isoniazide. The emergence of MDR is a growing concern in TB control which has become a significant threat.

Methods: The national TB program organized country worldwide trainings to health workers on specimen collection, packaging and transportation and has contracted Courier services to deliver the samples from the initial facility to the central reference laboratory. The laboratory procedures includes decontamination by use of 4% NAOH and SSM; ZN was used then seeded on LJ slopes which were incubated for 6–8 weeks at 37°C. DST was performed on proportion method on LJ, using critical concentrations and also on MGIT. CRL is linked to a Supra reference Laboratory Brisbane for EQA and interventions has been based on the judgment of the SRL

Results:

Year	2004	2005	2006	2007	2008
Retreatment	8482	8975	1190	10462	10444
MDR-TB Cases	36	66	1480	82	102
Samples Sent to CRL	1109	1460	2511	4403	5135

These MDR treads has created a lot of challenges in providing universal culture and DST for treatment failures and relapse case in a setting with limited human and financial resources. Improved specimen turnaround times, reliable transport, sensitization of the Provincial TB coordinators, has enhanced patient management and increased political support from within the Government and other stake holders have been our achievements.

Conclusion: Measures which can lead to the reduction of poverty are our greatest challenge as poor people remain the most vulnerable persons for MDR-TB in a low income setting such as Kenya.

Recommendations: Further laboratory strengthening with external support from the Brisbane SRL is essential. Improved reliability of DST should be achievable through the evaluation and implementation of new technologies for rapid DST.

PS-95096-05   Community health volunteers in TB: role of Shasthya Shebikas in Bangladesh

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Introduction: BRAC an NGO has been implementing community based TB program in Bangladesh since 1984. Currently BRAC and NTP jointly expanded this model to two-thirds of Bangladesh covering 88.5 million populations. Female community health volunteers (Shasthya Shebikas) are playing important role in TB control activities at community level. They are representing the village micro credit organization of BRAC and selected by the own community.

Objective: To develop a community-based cost-effective model to enhance TB case detection and treatment success.

Method: Each Shebika provides essential health care services to an average of 250 households. They receive basic training before starting work and a one-day refresher training every month. They disseminate TB information, identify and refer TB suspects for testing, provide home-based DOT and refer patient for side-effect.

Results: Currently about 70000 Shebikas are working throughout the country. In 2008, a total of 90259 patients diagnosed in BRAC supported areas. Of them, 70045 were new sputum positive and case detection rate was 78.3%. Treatment success rate in 2007 was 94% among new smear-positive patients.

Conclusion: Shebikas are effectively reaching out the community to identify TB cases and treating them successfully with close supervision. They are getting a small incentive for successful treatment of TB cases and from other health services. Respectful attitude of the community and their self spirit in voluntary service drives them to work for the people. Linkage with the micro credit programme has a role to reduced drop out of Shebika.

PS-95120-05 Factors associated with the economic burden of tuberculosis for patients in Rio de Janeiro, Brazil

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Background: Tuberculosis (TB) affects mainly the poor, to whom socio-economic costs from disease can represent a significant financial burden.
Objectives: To evaluate the costs of tuberculosis under patients' perspective.
Setting: Twenty-one primary care units in Rio de Janeiro State, from 8 cities.
Methods: Direct (out-of-pocket expenditures) and indirect (lost hours) costs before diagnosis and during treatment were gathered through a structured questionnaire applied by trained interviewers. Extra help, paid or not, was also computed. Changes in family income due to illness were registered. Hourly wage was calculated base on the gross national income per capita and a 44 hour-week work hours.
Results: The median cost per patient were US$249.6, corresponding to a total of over 3 million American dollars (US$) considering the yearly reported 15 000 cases in the state. Hospitalization was associated with the highest increase in costs, followed by the supervised treatment and type of first facility sought. Additional costs from supervised treatment were US$1.1 million, of which US$930 thousand from lost hours. Thirty-six percent declared a reduction in monthly income due to illness.
Discussion: TB represents a high financial burden to TB patients in Rio de Janeiro. Health system characteristics are more important determinants of costs than individual characteristics. Lost hours of work are the main source of costs. Reduction of costs by other strategies such as treatment supervision by family members should be assessed. Further analyses are needed to evaluate the cost-effectiveness of different diagnostic and treatment strategies, taking into account not only the health system costs but also those incurred by patients and their families.

Table Determinants of patients' total cost (in US$) before diagnosis of tuberculosis

	Median (IQR) costs	P value
Sex		
Female (n = 79)	297.9 (143.3–491.1)	0.122
Male (n = 139)	222.2 (103.1–448.3)	
Age		
<35 (n = 99)	286.9 (135.2–459.0)	0.448
≥35 (n = 119)	210 (103.1–479.4)	
Schooling		
None (n = 29)	151.2 (86.7–382.9)	0.056
Primary (n = 103)	286.9 (98.7–552.1)	
Unfinished High School (n = 21)	108.2 (80.3–233.9)	
Finished High School (n = 53)	285.1 (176.3–474.5)	
University (n = 12)	227.1 (99.2–419.3)	
Household size		
Lives alone (n = 25)	253.4 (85.4–700.3)	0.775
2–4 (n = 143)	262.3 (135.2–474.5)	
>5 (n = 50)	228.1 (107.4–396.2)	
Monthly income (US$)*		
<$55 (n = 92)	271.2 (118.0–420.5)	0.591
55–222 (n = 72)	205.1 (98.3–509.5)	
222–444 (n = 28)	257.9 (181.2–475.9)	
>444 (n = 26)	272.9 (169.4–476.2)	
Household monthly income		
<$55 (n = 40)	236.1 (105.7–452.5)	0.111
55–222 (n = 64)	198.2 (92.1–390.8)	
222–444 (n = 49)	229.9 (149.2–448.3)	
>444 (n = 65)	285.1 (188.7–552.1)	
Employment status		
Employed (n = 118)	251.9 (121.4–437.4)	0.732
Student (n = 12)	393.0 (92.1–390.8)	
Unemployed (n = 71)	229.9 (108.2–474.5)	
Retired (n = 17)	176.4 (69.9–467.5)	
Co-morbidities		
No (n = 145)	**218.4 (108.2–396.2)**	**0.047**
Yes (n = 73)	**305.5 (130.1–647.7)**	
Type of first searched facility		
Public primary care unit (n = 70)	**176.2 (78.3–313.5)**	**<0.001**
Pharmacy (n = 21)	**428.7 (256.8–576.1)**	
Hospital (n = 108)	**301.7 (187.4–511.1)**	
Private clinic (n = 17)	**191.1 (98.9–357.3)**	
Others (n = 2)	**54.7 (43.1–66.3)**	
Treatment strategy		
SAT (n = 103)	**295.1 (149.2–295.1)**	**<0.001**
DOT (n = 115)	**357.4 (213.1–600.9)**	
Time to reach healthcare unit		
<80 min (n = 114)	237.9 (107.4–416.3)	0.750
≥80 min (n = 104)	263.3 (124.5–470.9)	
Personal health insurance		
No (n = 184)	239.4 (111.4–461.3)	0.362
Yes (n = 34)	272.1 (191.1–491.1)	
Hospitalization		
No (n = 189)	**216.6 (108.2–392.2)**	**<0.001**
Yes (n = 29)	**1140.9 (313.5–2209.8)**	
History of previous TB treatment		
New case (n = 187)	229.9 (103.9–459.0)	0.065
Retreatment (n = 31)	314.4 (202.3–629.4)	

At the time of interviews, US$1 = R$1.8.

PS-95253-05 Mejora participativa en tuberculosis en un municipio de alta incidencia, Torreon, Coahuila, Mexico

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Objetivo: Incrementar la participación de la Red TAES en acciones prioritarias para el Programa.

Método : Se identifica municipio con bajo desempeño. En base a medición de actividades críticas se diseña estrategia de intervención mediante instrumentos de medición, Validación y Verificación cruzada. Detección de sintomáticos respiratorios (SR), seleccionando 11Centros de Salud (CS), diseñando metodología para la búsqueda en sala de espera : (Platica breve de 3 minutos, dinámica y con validación) obteniéndose al momento la primer muestra de esputo.
Resultados : Participaron 11 CS involucrando a todo el equipo de salud, Staff jurisdiccional y estatal. Con los siguientes resultados (se adjunta tabla)

Indicador	2007	2008
Tosedor (S.R)	1003	1839
Casos nuevos encontrados	113	113
Curación	79 (70%)	105 (93%)
Estudio de contactos	2%	86%
Defunciones	17	13

Conclusiones : Se demuestra que las actividades de la Red de Enfermería con un enfoque metodológico de sistematización nos ayudan a lograr un mejor control del paciente con tuberculosis.

PS-95443-05   Disminucion del abandono en pacientes con tuberculosis a travès de grupo de autoayuda

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Objetivo : Favorecer la adherencia al tratamiento en personas afectadas por tuberculosis a través del grupo de autoayuda.
Metodología : Se convocó personas afectadas con tuberculosis para organizar el grupo de autoayuda, reuniéndose en la unidad de salud el grupo coordinado por la Red TAES de Enfermería durante 6 meses, compartiendo experiencias, búsqueda de apoyos económicos para transporte, entrega despensas mensualmente a pacientes de escasos recursos. Impartiendo pláticas sobre tuberculosis.
Resultados : El 2007 Ingresaron 25 personas a tratamiento 19 (76%) fueron curados, 2 (8%) recaídas 1 (4%) abandono, 1 (4%) fracaso,1 (4%) traslado, comparado con 2008 de 20 ingresos al tratamiento disminuyó la renuencia 14 curados (70%) 1 (5%) traslado 1 (5%) reingreso 4 (20%) en tratamiento observado : que los 10 asistentes a reuniones de autoayuda el 95% mostraron mayor interés, apego al tratamiento con mejor actitud e interés en recuperarse.
Conclusión : La estrategia de apoyo mediante grupos organizados contribuye a disminuir el abandono al tratamiento de pacientes debido al interés demostrado por el personal de salud para su curación.

PS-95507-05   Comparisons of microscopic and cultural methods for the diagnosis of pulmonary tuberculosis

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Introduction: Early tuberculosis (TB) case detection has been the cornerstone for effective TB control. In many resource poor settings only sputum microscopy is employed for the diagnosis of pulmonary tuberculosis, sputum culture may not be available. This diagnostic tool although rapid and inexpensive is hampered by its low sensitivity of about 25–65%.
Objective: To compare the direct smear microscopy method to the 'gold' standard culture method.
Methods: 969 patients with chronic lower respiratory tract infections were seen in National Tuberculosis Reference Laboratory in Lagos between April and September 2007. Direct smear was done with the sputum samples and stained with Ziehl Neelsen staining technique. Decontamination process was carried out using 4% NaOH (modified Petroffs method). 2–3 drops of the sediment was inoculated unto Lowenstein Jensen medium.
Results: 237 cases of tuberculosis were diagnosed by microscopy and culture. 48 were microscopy positive and culture positive, 57 were microscopy positive and culture negative, 132 were culture positive and microscopy negative while 732 were microscopy negative and culture negative. At 95% confidence interval (CI), there was significant difference between the two methods ($P < 0.0001$).
Conclusion: 44% of all the active tuberculosis cases detected were positive by direct smear. Also, 75% of all the active tuberculosis cases were detected by culture alone and this would have been missed out if culture was not done. Therefore, our findings highlight the need for use of both direct smear microscopy and cultural methods for diagnosis of tuberculosis in the National TB control Programme.

PS-95509-05   Atencion integral por enfermeréa en pacientes con tuberculosis multidrogorresistencia

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Objetivo : Brindar a los pacientes con TB, atención integral, para garantizar su curación, evitando la transmisión de cepas fármaco resistentes.
Metodología : Dictaminación de 3 pacientes que ingresan a tratamiento con fármacos de segunda línea para TB-MDR, durante 24 meses, con historial de 3 fracasos a fármacos de primera y segunda línea, se capacitó, sensibilizó a pacientes, familiares y equipo

de salud responsable del tratamiento ; se firmó carta compromiso de involucrados. Se gestionó apoyo alimenticio, traslado y mejoramiento de vivienda de pacientes ante autoridades municipales.

Resultados : Participaron 6 enfermeras, 6 médicos, 3 nutriólogas, 3 psicólogas, 3 trabajadoras sociales y DIF de presidencia municipal, firmándose carta compromiso por equipo de salud, pacientes y 9 familiares, identificación de 150 sintomáticos respiratorios intradomiciliarios y extradomiciliarios, seguimiento trimestral con cultivo y resultados negativos, y curación del 100% de los casos.

Conclusión : El éxito de esta estrategia radicó en garantizar a los pacientes atención integral y personalizada, que permitió la curación de la tuberculosis MDR, recobrando su salud con una mejor calidad de vida en su entorno social, familiar y laboral.

PS-95637-05 Twelve years of the DOTS strategy in Cameroon: achievements and challenges of a NTP

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Setting: Cameroon.
Objective: To evaluate the achievements of the Cameroonian National Tuberculosis Programme (NTP) after 12 years of DOTS implementation.
Design: Descriptive and retrospective study. Basic indicators for the coverage and annual results of the NTP, including collaborative TB-HIV activities, for the years 1997–2008 were collected from TB registers, Cotrimoxazol registers, and activity reports. Major achievements are highlighted and major challenges identified.
Results: The number of TB Diagnostic and Treatment Centres increased between 1997 and 2008 from 34 to 216. The number of cases notified increased from 544 in 1997 to 25 125 in 2008, among them 15 652 sm+ PTB cases or 93% of those expected. The proportion of patients with treatment success increased from 76% in 1998 to 78% in 2007. The proportion of TB patients accepting HIV testing at time of diagnostic increased from 48% in 2007 to 71% in 2008, the overall HIV-TB co-infection rate being 40%.
Conclusions: The detection rate for sm+ PTB cases in Cameroon is satisfying while the detection rate for sm− PTB and extrapulmonary TB cases has to be increased. The treatment success rate showed increase, but has still not reached the objectif. TB-HIV collaborative activities within the NTP are encouraging. Major challenges are a rising number of MDR-TB cases and a consequent reference system for TB-HIV co-infected patients needing ART.

POLICY AND PROGRAMME IMPLEMENTATION

PS-94087-05 Best practices of HRD policies in NTP

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Background: NTP Pakistan recently get approval of PC-I (Project Cost-I) for worth 1.8 Billion Pak Rupees for DOTS expansion in all over Pakistan for the years 2006–2010.
Methods: NTP Pakistan is mixture of Government, WHO, Global Fund Round-2,6 and several NGO employees working under one Umbrella of NTP and supervision of National Manager. Ministry of Health (MOH) is authority of approvals, instructions and monitoring all activities. All districts send their request thorough provinces to Federal and final approval from the MOH. WHO Office Pakistan is providing financial support to NTP major in trainings and study material.
Key Findings: NTP Pakistan has implemented DOTS program all over Pakistan. Expansion and development of comprehensive strategy for PPM DOTS, Quality assured sputum smear microscopies are main challenges but HRD is one of key challenge we need to actually attain, train and retain employees. Management and leadership Development Programs need to be implemented. Justified remuneration system, performance based appraisal for increments/increases, retain trained staff specially service provider like Microscopist/Lab Technician.
Conclusion: Professional hiring and retaining trained staff and justified professional trainings, performance based (Pay for performance) increase/enhance will boost the output/moral of an employee. In experience Microscopist/Lab Technician increases their performance by providing professional trainings, motivation and incentive. Continuation of Performance.

PS-94025-05 Implementation of an external quality assurance program in Haiti

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Background: Direct smear microscopy of respiratory specimens is the primary means of diagnosis of pulmonary tuberculosis (TB) in low income countries. The WHO in collaboration with IUATLD and APHL developed an external quality control (EQA) exercise

to assess baseline smear diagnostics. This proficiency testing program is based on generation of validated smear microscopy slide panels. These are distributed to local diagnostic laboratories and results returned to the instigating lab. Results are utilized to address deficiencies. Results of the EQA implementation in Haiti are presented.

Method: Standardized panels containing 5 stained and 5 unstained slides of varying AFB quantities were generated and validated by the LNSP Haiti in collaboration with the Massachusetts SRL. Panels were distributed to 20 high volume microscopy centers. Results were assessed and a site score provided. Points were deducted based on degree of variance (max value of 10 points per slide) to the correct score.

Results: Results for 10 sites and 29 technicians identified 66% average site proficiency, with a high of 83% and low of 37%. Over estimation of AFB counts on all slides and discrepancy between pre-stained and locally stained slides was noted. The results yielded recommendations for standardization of panel distribution protocols for future rounds and the introduction of standardized training in AFB Smear methods for the diagnostic labs. Upon completion of all 20 sites, intervention training will be conducted by trainers from the LNSP. The parties will repeat distribution to the original sites to compare progress to baseline data. Initial results support the use of EQA in resource poor settings to monitor microscopy center performance in national tuberculosis control programs, when aligned with an SRL.

PS-94114-05   A SWOT analysis of tuberculosis control and prevention in China

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Background: We used the SWOT (strength, weakness, opportunities and threats) analysis to give a systematic review on policy of tuberculosis control and prevention in China.

Methods: SWOT analysis was used for analysis of the external environmental conditions and strategic factors. All of factors that are closely related to the objective of research would be presented, and they would be arranged in the matrix with a specified order. By using the concept of systematic analysis, we matched these factors properly for analysis in the matrix. The materials used in this paper included laws, regulations, policies and measures related to tuberculosis control and prevention in China.

Results: The strengths are the complete system of health service, DOTS strategy, increased professional personnel and improved equipments supply. The weakness is the still serious status of tuberculosis epi-

demic, unequal health resources and DOTS implementation in different regions; we also have opportunities like high priority of governmental policy on tuberculosis, more funding support from the international organizations and increased awareness of public health. The threats for this issue include funding demand for lower level health service, lack of multi-cooperation and involvement of the entire society, insufficient knowledge and so on. We need to utilize the strengths and opportunities, overcome weakness and mitigate threats to improve the tuberculosis prevention and control.

Conclusion: We list what should be done and how it should be achieved for TB control in China as the table shows.

What should be done	How it should be achieved
Increasing funding input and public health worker's ability	Facility construction; improve staff's salary; free charge for patients' accessorial test; training.
Increasing case detection	Enhancing case report; cooperate between public health and medical units; implement Law of Infectious Diseases control strictly.
Improve quality	DOT quality; diagnose quality; health education quality.
Pay more attention to focus population	Floating groups; prison group; drug-resistance case; TB-HIV case.
Surveillance, monitor and evaluation	Develop indicate list; develop guidelines.
Research and legal system	Conduct more research and develop national TB control regulation.

PS-94210-05   Assessing the problems of giving services to TB inpatients from the point of view of nursing staff

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Background: One of the most important functions of Extension agents is to make accurate assessments of people in their county or region. The situational analysis process is essential in determining the need of individuals and communities. The monumental changes in health care delivery systems have focused attention on more affordable, more available, more efficient, and higher quality health care.

Objectives: Need assessment and ranking problems of the nurses in TB wards to improve the quality of services to TB patients.

Methods and materials: This research was a cross sectional and applied study, the samples include 37 of nursing staff who work in TB wards in NRITLD. The method of data collecting was performed by questionnaire and analyzed using SPSS soft ware.

Results: Results showed that among the opinions of 37 nursing staff in TB wards, 79.3% would like to improve job security and standards in take care of

patients as the nature of TB illness, 48.9% considered that for improving the quality of services to TB inpatients, it is better to have regularly teaching classes about TB, drugs and side effect to bring them on up to date, 62% expressed that the quality of equipments should have improved and 73% would like to consider their interest to work in TB wards.

Conclusions: These results showed the important point that effect on improving services in TB wards is to set a special program to support the nursing staff's security and safety, additionally as the nature of TB, the nurses expect to pay attention to their health and consider some healthy suggestions to protect them against TB.

PS-94225-05   Accounting total direct and indirect cost of TB patients in Iran, 2005, in Masih Daneshvari Hospital

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Objectives:
— Accounting total cost of health services to TB inpatients.
— Accounting of percentage of cost in the health services to TB inpatients.
— Propose a plan to control of cost.

Method: This cross-sectional retrospective experimental study calculated hospital costs and analyzed the data in forms and tables designed especially for this purpose. Also data in regard to capital, current and overhead costs were collected. After calculation, the mean of total costs was assessed. In this study 266 patients with TB from 2004 till 2005 have been followed in Massih Daneshvari Hospital.

Results: Total cost: In base of finding this study, 132 of patients were male and 134 were female. The average cost of each TB direct cost of inpatients in males was 508$ and in female was 548$. From 266 patients 109 P infected by TB and average cost was 469$, 34P suspicious to TB and average of cost was 403$, 42P infected to TB and other disease and average of cost was 617$, 14P infected to MDR and average of cost was 813$, 67P infected to the other disease with 537 average of cost (Table). Distribution of cost: near 96.5% of expenditure are for hoteling (36%), drugs (21.5%), physician (12.45%), laboratory (14%), CT scan (6.33%), radiology (1.9%), consumable material and tools (4.33%) and approximately 4.5% is for the other part of expenditures.

Comparing Direct cost of TB, Iran, 2005

Diagnosis	Frequency	Mean (cost $)	SD	95% Confidence interval		Minimum	Maximum
				Lower Bou	Upper Bound		
TB	109	469	431	387	551	11	2305
suspesious to TB	34	403	403	263	544	21	1844
TB+other diseases	42	671	872	399	942	86	5276
MDR	14	833	574	502	1165	146	1827
Others	67	537	370	447	627	79	2567
Total	266	529	525	465	592	11	5276

Conclusions: In base of modeling cost of expenditure in TB we can find that it is related to sex, age, kind of TB, insurance coverage. If we consider mean of annually income in rural household approximately 4000$ and in urban households near 7200$ and GDP per capita in Iran 8000 $ (ppp) in 2008 the expenditure of TB can be introduced catastrophic payment for any families. We need to determining suitable health insurance coverage and the other social protection systems for families with TB especially MDR.
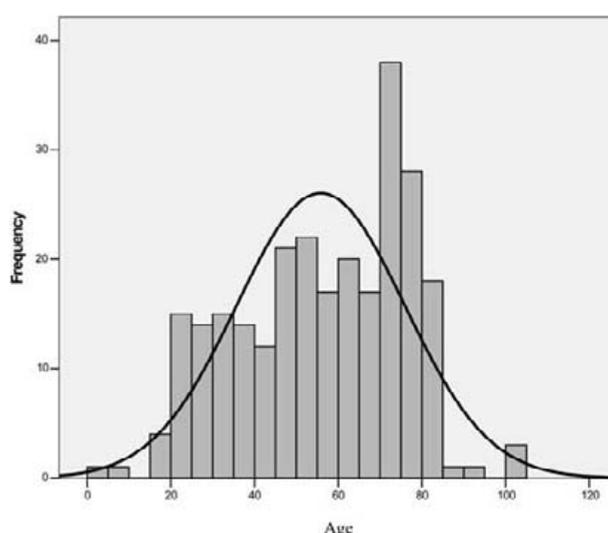
Figure   The age group infected by TB, Iran, 2005.

PS-94325-05   Survey on the status of incentive mechanism in TB control in China

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Objective: To conduct representative survey on incentive mechanism in Tuberculosis (TB) control in China and to develop a frame for incentive measures classification.

Methods: We selected Zhejing, Gansu and Henan provinces as the survey field. In each province two counties were selected. We conducted questionnaire survey among TB dispensaries at province and county level. We also interviewed some stakeholders related to incentive included TB dispensary staff, township and village doctors and TB patients. Data was input using Excel software. The interview data was analyzed using NVivo7.

Results: In term of the object and type the incentive measures were classified as four as follows: 1) Incentive for the health service providers in money such as case reporting fee, case management fee, tracing subsidy, bonus for finishing case detect target and TB staff subsidy; 2) Incentive for the health service pro-

viders in no-money including training and praising; 3) Incentive for the TB patients in money such as traffic subsidy, nutrition assistance and examine/therapy subsidy; 4) Incentive for the TB patients in no-money including health education, family interview and psychological support. In different areas, no matter the economic developed level the administration means for the health service providers is important to improve TB control work. The no-money incentive is equal benefit to the money one.

Conclusion: In China the incentive mechanism included money and no-money mode which play the coequal role in TB control. The specific effects of the incentive mechanism should be evaluated synthetically and further.

PS-94361-05   Tuberculosis and AIDS: epidemiological and social aspects in Sao José Do Rio Preto, SP Brazil

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Aim: To analyze epidemiological and social indicators of tuberculosis and human immunodeficiency virus (TB-HIV) co-infection in São José do Rio Preto-SP.

Methodology: The descriptive epidemiological retrospective study includes all new cases of tuberculosis in HIV co-infected individuals living in the city reported between 1998 and 2006. Incidence indicators were analyzed by direct standardization in the year 2007, as well as demographic (sex, age and education) and clinical-epidemiological (disease classification, treatment outcome, choice of directly observed treatment and the service where the case was diagnosed) indicators.

Results: Three hundred and six cases of TB-HIV were reported. The incidence rates are high, declining in historical sequence. Mostly men are affected and the average age of coinfection for both sexes was 36.3 years old. Most cases had been studied during less than seven years. The predominant clinical form observed was pulmonary tuberculosis. The occurrence of healing increased whereas deaths and abandonment decreased over the years. Sixty percent of cases were diagnosed in the hospital.

Discussion: The findings of the study corroborate with the literature in all the analyzed aspects, which demonstrated the strong social influence in determining the disease.

Conclusion: The rates of TB-HIV co-infection in São José do Rio Preto are high, which reinforces the determination of the disease by socioeconomic and cul-

tural factors. HIV plays an important role in the epidemiology of TB, which points out to the need of greater attention to the issue, mainly on what concerns disease control, and of increased investment in promotion and prevention measures as instruments of Primary Care for the reception and advising of the vulnerable population.

PS-94389-05   Choosing best medication monitor design to achieve optimal supervision of all TB patients

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Background: Giving DOT to all patients is very difficult. Consequently, multiple portable medication monitors, which determine when medication is removed from a container, have been or are being developed in various parts of the world with the objective of providing the appropriate supervision for each patient including DOT if needed.

Methods: Details of all known portable electronic medication monitors, which determine when medication is removed from a container, were sought, and analyzed according to the following criteria.

The devices should dispense:

1 Daily doses because a) intermittent dosing leads to more relapses in advanced cases and more drug resistance in HIV positive patients; b) taking daily doses is easier to remember than intermittent doses, and c) daily regimens avoid adding the scheduled interruptions of intermittent therapy to the interruptions caused by patients who fail to take medication faithfully.

2 Fixed dose combinations (FDCs) of drugs to simplify supply line problems from the factory to the clinic, prevent stock outs of specific drugs in the clinic, and prevent monotherapy.
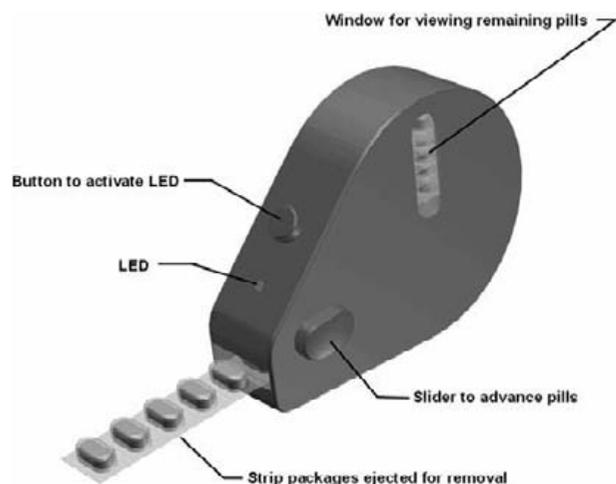
3 Packaged medication to provide protection against ambient moisture, especially if ethambutol is being dispensed.

4 Packaging that permits dosage adjustment for the patient's weight without multiple packages of the same drug in the supply lines.

5 The device should be adaptable to several means to download adherence record including LED in the monitor for resource limited settings or USB ports and cell phone transmission in settings with greater resources.

Results: The advantage and weakness of all known devices and means for displaying the adherence record will be described according to the above criteria.

Conclusions: Display and analysis of these different designs will help decision makers choose the optimal device.

PS-94396-05   Perception of health providers about barriers in accessing nutritional care by tuberculosis patients

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Objectives: The study aimed at understanding the perception of rural health providers regarding TB patients' barriers in accessing nutritional care. A second aim was to know the possible roles of those providers in helping TB patients in accessing to nutritional care.

Methods: A cross-sectional survey was conducted on 202 health care providers in rural areas of Mymensingh district to achieve the objectives.

Results: Majority (90%) of the providers were able to link between tuberculosis and nutrition and were aware (91%) of the necessity of adequate nutritional care during illness. They, however, perceived that the tuberculosis patients were unable to obtain adequate nutrition care due to lack of purchasing capacity (80%), lack of nutritional knowledge and the sources to acquire the knowledge (42%), scarcity of nutritionally adequate food in the local market (25%) and food taboos (12%). The roles that the providers suggested that they can play includes helping the patients increase their purchasing power by raising fund through establishing social networks. They also suggested that with adequate training on nutrition, they would create awareness about the necessity of nutrition care and consuming nutritious food within community. In addition, they reported the importance of encouraging vegetable gardening and poultry rearing. Through frequent home visits, they would also provide nutritional care during illness.

Conclusion: Providers' awareness about nutritional care of TB patients and the willingness in playing role to improve nutritional status of the patients should be brought into consideration by policy makers to take further initiatives.

PS-94463-05   Patients access to TB diagnosis in a large city in Brazil: organisational assessment

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The aim of the present study was to assess access to TB diagnosis as an organizational dimension in Health Services Facilities (HSF) in São José do Rio Preto, Brazil, from the patient's perspective. It is a sectional study for performance evaluation of HSF. One hundred patients were surveyed using a questionnaire designed from indicators based on components of the Primary Care Assessment Tool, which was adapted to evaluate TB attention in Brazil. Performance assessment of health services was represented by four indicators of ingress gateway, mine indicators of access to diagnosis and the local diagnostic variable. A compound index was designed for the dimension studied and the χ^2 test was used to associate independent variables. Indicator performance was 'not fair' (average scores close to 1 and 2), 'fair' (average scores close to 3), and 'satisfactory' (average scores close to 4 and 5). The health units were identified as an ingress gateway when a specialist was needed. Patients went to the health unit three times (IC {2, 80–3, 45}; DP = 1, 68) on average before being diagnosed. Indicators related to difficulties commuting, information and scheduling consultations by phone, missing a work day were found to be 'fair'. Those related to expenses with transportation fares, scheduling consultations within 24 hours were among the 'fair' and 'satisfactory' indicators. The health services facilities that diagnosed most TB cases were the university hospital (38%), primary care facilities (21.3%) and seven others (40.7%). Our study suggests that it is necessary that the city administration prioritize and reorganize actions to detect SRs at primary care level facilities.

PS-94466-05   DOT versus self-administered treatment in five cities in Brazil

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Setting: Expanding DOTS has been proposed as a necessary goal in order to eradicate tuberculosis (TB), which is a public health problem worldwide. Directly Observed Treatment (DOT) is only one component of the full DOTS strategy. The concrete reality of DOT is an important determinant of the overall success or failure of the program and has implications regarding equity and access to treatment.

Aim: To compare DOT efficiency with that of Self Administered Treatment (SAT) using eight indicators of access to treatment, four indicators of longitudinality and six indicators of comprehensiveness.

Design: Interviews with 496 patients in five different cities in Brazil where DOTS strategy has been implemented. Data analysis was done by means of logistic regression models.

Results: Proportions were 52.6% DOT and 47.4% SAT. DOT predominated in cities such as Ribeirão Preto, RP (80.8%); Itaboraí, ITA (81.3%), and São José do Rio Preto, SJRP (83.2%). SAT, on the other hand, predominated in Feira de Santana, FS (98.9%) and Campina Grande, CG (83.9%). The main results stemming from the comparison between patients undergoing DOT or SAT were more likelihood to (odds-ratio): never miss a work day (OR = 1.87); never pay for transportation fares (OR = 1.71); have a health professional visit them (OR = 5.92); undergo treatment near home (OR = 2.49); be assisted by a nursing assistant regularly (OR = 2.39); be offered a basket of staple foods regularly (OR = 10.35).

Conclusion: In this study, Ribeirão Preto, Itaboraí and São José do Rio Preto were found to have higher proportions of patients under DOT, which presented more satisfactory indicators than Feira de Santana and Campina Grande, where SAT is predominant.

PS-94618-05   Spatial analysis of TB-HIV: association with socio-economic levels in a city in southeastern Brazil

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Objective: Analyze spatial distribution of TB-HIV coinfection and associate it with socioeconomic indicators (1998–2006).

Design: New cases of TB-HIV coinfection in the city of São José do Rio Preto were geographically encoded. Incidence coefficients for each spatial unit were calculated and values for socioeconomic and demographic variables were obtained. Moran's index was used to evaluate spatial associations of incidences. Multiple regressions selected variables that could best explain spatial association of incidences and the local indicator of spatial association (LISA) was used to identify significant spatial clusterings.

Results: Moran's index was 0.0635 ($P = 0.0000$) indicating that association of incidence occurred, explained by six socioeconomic and demographic variables. Among those, the one that best explained the spatial association of incidence was the percentage of heads of families with up to three years of education. The LISA cluster map for TB-HIV incidence coefficients showed clusters of high incidence in the northern area and low incidence in the south western area of the city.

Conclusion: The study showed the spatial geographic distribution of TB-HIV coinfection and evidenced its association with socioeconomic variables, thus providing data for a concerted planning in prioritizing socially disadvantaged regions which present a higher incidence of the disease.

PS-94634-05   Knowledge, attitude and practices towards tuberculosis among population in Orissa State, India

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The technical assistance project is aimed at improving RNTCP performance in Orissa State through support to ACSM component. Key focal interventions include advocacy addressing operational challenges of RNTCP; development of ACSM strategy/policy; human resource capacity building of public/private providers; promotion of patient charter/facilitating formation of patient associations at state/district and sub-district levels. Promoting public-private partnerships involving NGOs, PPs, and alternative health providers are among other activities implemented by the project. Baseline knowledge, attitudes and practices (KAP) survey was conducted to generate baseline information and inform strategy relevant to the project. The study covered general population, TB patients and health care providers as respondents. The objectives were to assess KAP among general public and newly affected patients; assess stigma among general population and TB patients; assess health seeking behaviour among men, women and vulnerable groups; and study the role of HCPs in TB control. Stratified random sampling method was employed covering 540 general popn respondents, 270 TB patients, and 150 health care providers from 9 districts in Orissa. 12 FGDs each were conducted in general population and TB patients. 99% of general population were aware of TB, 66% respondents aware that cough (>3 weeks) as TB symptoms. 99% respondents believe that TB is curable, 74% respondents

aware that TB drugs were available free of cost at public health facilities. 81% of patients accessed services from public facilities (proximity behind choice for 60% respondents). 97% of TB patients faced no discrimination within the community. Stigma for TB was low with 73% general popn respondents opining that community offered help to TB patients. TV (49%) and health worker (28%) were the main sources of TB information to the general population. Post intervention or endline KAP survey is planned at end of project period.

PS-94658-05   Assessment of services offered for TB control in Sao Jose do Rio Preto, Sao Paulo, Brazil

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Setting: The offered services can ensure comprehensiveness in care because require that health services recognize and provide resources to answer to the patients, family and community needs.

Objective: To assess the offered services in tuberculosis (TB) care in Sao Jose do Rio Preto, Sao Paulo, from the patient's view.

Materials and methods: An exploratory research was performed and 108 TB patients from Sao Jose do Rio Preto were surveyed by means of the Primary Care Assessment Tool (PCAT), that was adapted and validated to be used in Brazil for TB care. The respondents answered each question according to a pre-determined scale (Likert's scale) ranging from zero to five. The data was analyzed by frequency analyses and χ^2 test to examine the correlation between the indicators.

Results: 22.5% of the patients were not submitted to sputum smear examination during the treatment and 12% was not submitted to anti-HIV screening test. 21.3% didn't receive food stamps and of this ones, 87% didn't receive transportation support. This study still shows that only half of patients who were under supervised treatment received home visits related to TB treatment. Patients under self-administered treatment have never received home visits.

Conclusion: Many actions indicated for adequate TB treatment and epidemiological indicators improvement haven't been being offered regularly to the TB patients in the city, indicating a lack of commitment of the managers and health professionals with the disease control, being necessary to accomplish of sputum smear examination during the treatment and investi-

gate TB-HIV co-infection cases, beyond other services that compete to the Primary Health Care services offer and evaluate its effectiveness in TB control.

PS-94669-05   Reduction of asthma-related hospitalisation and the asthma program of Rio de Janeiro City

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Background and challenges to implementation: Brazil rates 8th in world asthma prevalence in children and asthma was the 3rd cause of hospital admissions by 2000. Rio de Janeiro is the 2nd great city in the country with about 6 million inhabitants by 2005 with about 20% living in slums. Until 1999 corticosteroid inhalers were not available at health centers (HC), the medical staff was not up to date with asthma treatment and in consequence a large number of patients were looking for care at the emergency room with around 100 deaths from asthma by year in Rio de Janeiro city.

Intervention: The program starts in 2000 and the main steps were: development of an information system, purchase inhaler medications and oral drugs for asthma and allergic rhinitis and an education program for health professionals based on the III Brazilian Consensus on Asthma and the ARIA Initiative Guideline.

Results and lessons learned: Analyzes of the Brazilian surveillance system for hospital information and mortality shows an important and consistent reduction (79.9%) in the number of asthma related hospital admissions in Rio from 1997 to 2007. It is crucial to enroll local public health managers, training nurses, provide educational material for patients and a simplified information system.
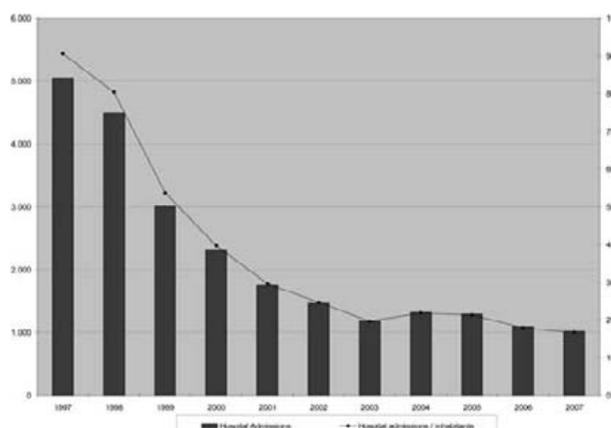
Figure Asthma-related hospital admissions.

Conclusions: This reduction may be attributed to the intervention. In 2004 there was a rise in hospital admissions concurrent with the interruption of the delivery of drugs that year. Besides, data from other cities where no intervention was implemented do not show similar tendency. We recommend a continued educational program for health professionals focused on patient education.

PS-94670-05 Adherence to antiretroviral therapy: HIV/AIDS patients treated in an infectious disease service

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Setting: The acquired immune-deficiency syndrome (AIDS) is an advanced clinical manifestation of infection by human immunodeficiency virus (HIV). Generally, HIV infection leads to a gradual immune suppression, especially the cellular immunity. This immune suppression results in opportunistic infections, cancer and events that are defining conditions for AIDS, which is characterized by lymphocytes TCD4+ counts lower than 200 cells/mm^{3}. The advent of antiretroviral therapy and prophylaxis has changed the natural history of AIDS, increasing the average survival of the infected patients by the virus. The Federal Law 9.313 of 1996 ensures universal access to antiretroviral for people infected by HIV. The antiretroviral therapy join failure entails serious offenses to the seropositive individuals and is considered as one of the most threatening dangers to the virus-resistance spread, in the collective environment. **Methods:** This study used a sample that includes 100 users of antiretroviral medicines for at least 6 months and aged or exceeding 18 years, followed at the Hospital de Base, Sao Jose do Rio Preto. The analysis was performed by using the data obtained by the review of medical records and pharmacy files entries. **Results:** By setting as an adherence criterion the intake of 80% or more of the prescribed antiretroviral medicines, was observed that 34% of patients followed by this service does not adhere to the antiretroviral therapy, and that 13% of these had a lymphocytes TCD4+ counts lower than 200 cells/mm^{3}. **Conclusion:** By identifying the degree of ARV compliance, a multidisciplinary team, including nursing, must prepare supervised surveillance and educational programs related to the treatment compliance.

PS-94789-05 Workload study: nationalizing human resource planning for tuberculosis control

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Background and challenges: Adequate Human Resources for Health (HRH) are a crucial precondition in achieving the millennium development goals which include the control of tuberculosis (TB). Given the current HRH crisis, program managers are faced with the challenge to calculate staff requirements accurately to be able to plan services effectively and to have solid evidence supporting requests for (additional) staff. The overall aim of the study is to develop a management tool to assess the workload, in order to plan for HRH staffing in TB control programs. The study will be carried out in 40 health facilities and 20 laboratories in 6 districts (selected through maximum variation sampling) in Tanzania. **Design and methods:** The research project consists of 2 phases: 1) a workload study, and 2) develop a workload management tool. The workload study is a descriptive case study, using quantitative and qualitative methods to assess the actual workload and to explore perceived workload. Quality of care will be linked to workload. Actual workload assessment will be measured by observing TB service delivery with use of a checklist and clocking TB diagnostic and treatment consultations. The time required for sputum smears will also be measured. Perceived workload will be explored by interviewing managers and health workers using an interview guide. **Results:** The results will provide insight in workload (actual and perceived) at service delivery level. The final results will be available in time for the 2009 Union conference. **Conclusions and recommendations:** Conclusions and recommendations will focus on justifications for additional staff requests and ways to assure efficient staff performance linked to adequate quality of TB services.

PS-94951-05 Preliminary results of asthma management intervention in Benin

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Setting: Five National Tuberculosis Programme centres in Benin. **Method:** Management of asthma is one component of the Union's Comprehensive Approach to Lung

Health initiative. After situation analysis and personnel training, asthma patients were included in the asthma management intervention from February to December 2008. At each centre, an information system, peak-flow meter and asthma drugs were set up and regular patient follow-up organised.

Results: Situation analysis results before intervention: patients were usually treated only for attacks without long term treatment, peak-flow meters were not available and inhaled steroids were not affordable to patients. During the intervention 219 patients were suspected of asthma but only 158 were followed up, 89% had asthma confirmed by PEF variability, 42% were male and 82% aged >55 years. These patients reported 566 emergency room visits and 46 hospitalisations during the previous year. Asthma was confirmed for 141 patients (89%): 38% were severe persistent, 50% moderate persistent, 8% mild persistent and 5% intermittent. Recommended treatment was prescribed and inhaled steroids were given to patients at affordable prices. During the asthma intervention period, TB case detection did not decrease in any of the 5 sites and improved in 2.

Conclusion: The implementation of asthma management with the introduction of affordable drugs is feasible and TB health personnel are able to identify asthma and prescribe adequate treatment. The large number of defaulters is a new challenge to improve asthma management. The introduction of this new intervention undertaken by the same health staff did not jeopardise the performance of the NTP.

PS-94983-05   Home-based environmental interventions to reduce asthma morbidity: systematic review

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Aim: Indoor environment has a significant effect on health status and quality of life of asthma patients. This review aims to summarize economic evaluation studies of home-based environmental interventions that targeted primarily low-income families with an asthmatic child. Previous research demonstrated the effectiveness of these interventions.

Methods: These interventions involve home visits with asthma patients to reduce exposures to indoor asthma triggers. A total of 1551 studies were identified and 12 studies were included in this systematic review based on the Community Guide methods for economic reviews. Of these 12, 6 papers reported intervention costs only and were classified as cost-analyses, 3 papers were cost-benefit analyses and 3 papers reported cost-effectiveness results.

Results: Cost and benefits data were reported with varying degree of completeness. The main drivers affecting intervention costs, in addition to completeness, were the intensity of environmental remediation (minor, moderate or major), whether the intervention included educational components, the professional status of home visitors, and numbers of home visits. In studies with complete cost information, interventions cost from $231 to $1720 per participant (in 2007 US dollars) and involved minor or moderate remediation combined with educational component. Benefit-cost ratios ranged from 5.3 to 14.0. The range in incremental cost-effectiveness ratios was $12 to $57 per asthma symptom-free-day.

Conclusions: The complexity of the interventions and the variability in the completeness of the cost and benefits included in the studies result in a broad range of economic outcomes. Cost-benefit and cost-effectiveness results suggest that investments in these programs provide good value in terms of reducing medical care cost and improving quality of life for persons with asthma.

PS-95436-05   Forging synergy for tuberculosis control through partnership

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Objective: To contribute to India's TB control efforts through a unified response from civil society and multiple stake holders.

Setting: The Revised National TB Control Programme (RNTCP) aims to widen the scope for providing standardized, good quality treatment and diagnostic services to all TB patients. However, civil society continues to be viewed as fragments of a whole and there is limited synergy in their function despite significant contribution to the programme.

Methods: Different stakeholders from civil society interested in coming together for TB control met in March 2008. In June 2008, India Country Coordinating Mechanism (India CCM) endorses and submits civil society proposal to the Global Fund in Round 8. In August 2008, USAID through a World Vision grant supports 'Jump-start' of some project activities. First meeting of 44 partners (NGOs, Technical Agencies, and Academia) was held in November 2008 at Delhi. A working group was formed in December 2008 and the Secretariat to support the partnership hosted in the Union South East Asia office. In the month of February 2009, Steering committee development was initiated by the Secretariat. The first partnership News Letter 'Partners Speak' was published in March 2009 and the draft Memorandum of Association was circulated among partners.

Discussions: With a vision to support and strengthen India's TB control efforts, the partnership articulates a common vision within the private and NGO sectors for TB Care and control. The partnership brings together civil society partners working across the

country, harnessing strengths/expertise in various technical and implementation areas and empowering greater involvement of affected communities in TB care and control.

PS-95480-05   The tuberculosis laboratory network in Serbia: external quality assessment

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The TB laboratory network in Serbia currently comprises 37 laboratories: 4 laboratories perform acid fast microscopy only, 25 culture, and 8 drug susceptibility testing (DST). Over the period 2005–2009, strategy for the strengthening of existing laboratory services was implemented in the country: appropriate equipment, standardization of diagnostic procedures, training courses for stuff and quality assurance program for microscopy and DST. Out of the total number of laboratories, 25 have been involved in external quality assessment program of smear microscopy in 2008. The average agreement in reading of slides was 97.5%. The overall sensitivity was 99.4% and specificity was 95.4%. Proportion of false positive results was considered significant (2.2%). The NRL has successfully performed proficiency testing for DST organized by SRL in Borstel, Germany. NRL carried out quality assurance program for DST in 4 local laboratories. At least 90% agreement with NRL for both isoniazid and rifampicin has been achieved in all tested laboratories. Results of external quality assessment for smear microscopy demonstrate relatively high proportion of false positive findings in only one laboratory. This problem was solved after implementation of retraining of staff. The quality of DST is on satisfying level. There is a need to introduce external quality control for culturing in all laboratories in the network.

TB IN HIGH-BURDEN COUNTRIES I

PS-94022-05   Assessment of the management procedures for pulmonary tuberculosis in Khartoum State, Sudan, 2002–2020

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Introduction: Tuberculosis is a greatest killer and it is out of control in many parts of the world. The disease is preventable and treatable, and has been grossly neglected; no country is immune to it.
Methods:
• A community based descriptive study was conducted in Khartoum state to assess and determine

the management procedures carried out for the detection, treatment, prevention and control of tuberculosis.
• Trained interviewers using pre-constructed questionnaires, interviewed the selected groups.
• Recruitment of study subjects were carried in 13 health centers out of 28 health centers, 22 public and private clinics and a smple of community members were selected.

The data obtained was analyzed using statistical soft ware programme Statistical Package for Social Sciences (SPSS).
Results:
1 The community lack awareness towards the occurance of tuberculosis, treatment and control measures.
2 Most of physicians in private and public sectors lack training in DOTS implementation and they were not following NTP Protocol in TB treatment.
3 There were no sufficient staff within health center level.
4 Some health centers lack laboratory services and there was a shortage in laboratory reagents, syringes and stationery.
5 There was number of defaulters and no procedures were carried out for them.
6 No immediate notification and no procedures carried out for TB patients contacts.
7 The registration system was very poor.

PS-94068-05   Evaluation of causes of delay in diagnosis of pulmonary TB cases in an RNTCP district of South India

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Introduction: The RNTCP has been implemented all over India since 1993. A high rate of high-grade sputum positive cases is noted in many districts. Reasons of late reporting (advance stage) needs to be explored. As early detection and treatment is the main strategy of controlling TB, this study to detect various causes of late reporting is being attempted.
Aim: To study various factors contributing delay in diagnosis of pulmonary TB cases in a RNTCP district.
Material and methods: All high grade (2+ and 3+) cases detected in Alappuzha TU were interviewed as per a pre-tested questionnaire by Principal Investigator. The study was conducted between January 2007 and June 2007 at District TB Center, which is the Head Quarters of Alappuzha TU.
Observations: 42 cases qualifying the inclusion criteria were analyzed. 30 (71%) cases were 3+ and 12 were 2+, of which 38 were male. Only 18 (43%) were aware about TB disease, its symptom, mode of

diagnosis and treatment. Majority are having only primary education, i.e., 24 (57%) and 13 (31%) studied up to secondary education. Nearly 57% has co-morbid condition with following distribution. Diabetes Mellitus-11 (26%), COPD-5 (12%), Cardiac Disease-7 (17%), Multiple Disease-2 (4.76%), Chikungunya-1 (2%). 17 (40%) made initial consultation with private practitioners and 25 (60%) with Govt. doctor and an average of 6 week delay was noted before referral to RNTCP and is more predominant among private practitioners. 3 (7%) reported to the microscopic center by their own initiative. 10 children qualifying for INH prophylaxis in family were not advised about it.

Conclusions: Late reporting of TB cases to microscopic center is of multi factorial causes. Delay in referral to RNTCP for diagnosis, Low literacy, co-morbid condition, awareness about the tuberculosis is all probably the major contributing factors. More elaborative studies in this matter are required.

PS-94112-05   Feasibility of achieving the Millennium Development Goals for China's tuberculosis control

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Background: This paper aims to examine the possibility and challenges of achieving the millennium development goals (MDGs) and to provide reference for the implementation and adaptation of China's tuberculosis (TB) control strategies.
Methods: The trends of both TB prevalence rate and number of TB cases in China were estimated based on average decrease rate of prevalence and TB case detection rate. These two methods corroborated each other. First, the average decrease of smear-positive TB prevalence rates from year 1990 to 2000 was calculated, and this decrease was used for estimating national average TB prevalence rates during 2001 and 2010. Then, the numbers of TB cases during 2006 and 2010 were estimated using Gong Youlong's mathematical model of combing four indicators: detection rate, treatment coverage rate, cure rate and death rate.
Results: Based on average annual decrease rate of TB prevalence in the project regions during 1990 and 2000, the national prevalence rate of smear-positive TB would be 68 per 100 000 people by 2010, dropping by 49.3% than in 1990. The total number of smear-positive TB cases would decrease by 43.4% using Gong's model, from 1 500 000 in 2000 to 848 300 by 2010.
Conclusion: We concluded that with the steady and efficient enforcement of the present TB control measures, it was possible, in the perspective of theory and practice, to achieve the TB control goal under the 2006–2010 Implementation Plan of National Tuberculosis Control Program of (2001–2010) and UN MDGs of TB control.

PS-94130-05   Survey of physician use of radiography and smear microscopy for pulmonary tuberculosis diagnosis

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Setting: A cross-sectional survey was carried out in August 2004–March 2005 among registered physicians with the Syrian Medical Association, whom specialized in Chest Medicine, Infectious Diseases, Internal Medicine, and General Practitioners.
Aim: To assess the use of physicians to national guidelines for TB diagnosis and monitoring.
Results: A total of 2000 registered doctors were interviewed. 864 reported to be working in the both public and private sectors and 715 in the private sector and 421 in public sector. Over 45% of doctors had treated TB patients during the last 12 months, most of the physicians (99.6%) stated sputum smear microscopy as the diagnostic test. 92.7% of physicians have mentioned that they notified the TB centre about TB cases. 69.5% of physicians have stated the correct drug regimen and 79.4% of physician have stated the correct treatment duration.
Conclusion: Distributing the NTP guidelines with the regular training of medical practitioners in the diagnosis and case management of tuberculosis patients are needed to improve tuberculosis control. More importantly, functional collaboration need to be established between private medical practitioners and national TB control programme to provide quality TB care services.

PS-94227-05   Assured quality through scale-up of external quality assessment of tuberculosis smear microscopy

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Background: Scale up of external quality assessment (EQA) system in five provinces from December 2006 to 2008 to support the Ministry of Health by the USAID funded Tuberculosis Control Assistance Program has provided for improvement in the efficiency of laboratory performance, resulting in enhanced DOTS.
Methods: We evaluated district level diagnostic centres from five administrative provinces in all compo-

nents of EQA, onsite evaluation, panel testing and blinded cross re-checking. Proficiency testing of each laboratory staff was done by reading of AFB smear results. A five day refresher training in Tuberculosis microscopy was given to 74 staff between visits from all five provinces, including laboratory technologists and technicians. Blinded cross re-checking was conducted in each facility following training to assess laboratory performance. Equipments and supplies were provided following findings through supervision.

Results: Improved proficiency in correct reading of sputum smear microscopy was observed in all the five provinces. In one province average laboratory performance in correct reading of sputum smear increased from 81.2% in 2007, to 98% in 2008 in nine out of twelve diagnostic centres. In another province, there was improvement from an average of 73.5% in 2007 to 92% in 2008, in 10 of the 12 facilities analyzed. Equipments and supply needs were identified per laboratory and were procured, including ten light microscopes, one fluorescent microscope and 250 laboratory coats.

Conclusion: EQA in laboratories performing TB microscopy should be implemented through external quality assessment systems to achieve good clinical practice in TB microscopy, accurate laboratory needs, and ensure high, consistent and accurate, case detection rate. Refresher trainings in microscopy in Zambia increased the proficiency.

PS-94240-05   Measuring the prevalence of sputum smear-positive tuberculosis in a rural district of Ethiopia

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Objective: To measure the prevalence of smear-positive pulmonary tuberculosis among TB suspects in a rural district in the Amhara Region, Ethiopia.

Methods: Study kebeles were randomly selected in a cross-sectional study design. House-to-house visits including individuals above 15 years of age in all households of the kebeles were conducted. Subjects with TB symptoms were interviewed using a semi-structured questionnaire. Eligible suspects provided three sputum samples for smear microscopy.

Results: Among 1006 TB suspects, 38 (3.9%) cases were positive for acid fast bacilli. Hence, the prevalence of smear-positive TB in the study district was estimated to be 80/100 000 population (95%CI 57, 103). The ratio of active versus passive case detection was 2.5:1 indicating 2.5 undetected TB cases in the community for every smear-positive TB case receiving treatment during the survey period. A higher proportion of female patients were detected by the survey.

Conclusion: The study revealed a very high proportion of undiagnosed TB in a rural district of Ethiopia. This indicates that the potential for a large infectious pool and significant transmission of TB in the community is very high. Expanding diagnostic facilities and the involvement of health extension workers is necessary to expedite early detection, timely referral and treatment of TB cases.

PS-94244-05   Poverty, wood smoke and tuberculosis

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Aim: Increased probability of becoming infected with TB and of developing active TB are both associated with malnutrition, crowding, poor air circulation, and poor sanitation—all related to poverty. A large proportion of the world population is exposed to indoor pollutants produced by biomass fuels. The objective of this study was to identify an association between TB and use of biomass fuels.

Methods: This is a retrospective case-control, hospital-based study performed at the National Institute of Respiratory Diseases (INER), México. We evaluated the clinical records of a group of 565 consecutive PTB patients assisted at INER from 2000 through 2007. Diagnosis of PTB was made based on smear or culture (WHO). The control group was conformed by 1187 patients that consulted at INER with ear nose and throat problems but without lung disease. Two controls were individually sex and age-matched to each case patient. The protocol was accepted by the institutional committee. Environmental exposures were obtained from a standardized questionnaire applied by the Social Worker Department. The questionnaire includes report of diabetes, smoking, alcohol drinking; occupational exposures; location and characteristics of the home; home exposure to wood smoke, coal, side stream tobacco smoke, birds, carpets, humidity and insecticides.

Results: The mean age in the group was 38.8 ($\pm$ SD 14.3) years and there were a higher proportion of males (56.3%). After adjusting by passive smoking and crowding, multivariate analysis revealed that three independent predictors were associated to PTB risk: type 2 diabetes (18.8% versus 1.2%; OR 15.2, 95%CI 7.8–29.4, $P < 0.0001$), alcohol use (40.9% versus 23.5%, OR = 2.1, 95%CI 1.5–2.9, $P < 0.0001$) and past exposure to biomass smoke (54.2% versus 29.7%, OR = 2.2, 95%CI 1.7–2.9, $P < 0.0001$).

Conclusion: These findings provide additional evidence of a strong association between PTB and wood smoke.

PS-94336-05   Reinfection: academic interest or worthy of concern?

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Aim: Reinfection with TB is an event that has been shown in both low and high burden countries, but is often dismissed as being mainly of academic interest since it it thought that the relative burden of disease from this source is low. We examine this concept.
Methods: Examination of the literature and existing methods for data analysis, TB isolate genotype analysis, analysis of results and mathematical modelling.
Results: We show that reinfection and multiple infection is common in a high burden society. We show that persons with repeat episodes are more susceptible to developing active TB. Beijing strains are not more common in reinfection cases. We show that reinfection correlates with the log of the incidence rate. We show that national surveys need to take this into account to understand the true nature of the epidemic. We consider that most individuals in a high incidecen society show signs of infection at an early stage and that therfore recent infection through reinfection is driving the epidemic.
Conclusion: Intuitively, one can expect an increase in incidence to drive an increase in reinfection, in the absence of effective immunity induced by a prior episode. The high incidence of true reinfection cases contradicts the belief that immunity is conferred on successfully treated cases. In high incidence communities, reinfection may contribute a very substantial case load to TB programs. Repeat episodes in patients cannot therefore be assumed to be relapses and treated as such, since this can lead to unnecessary use of additional antibiotics. We argue that drug trials need to measure true relapse and reinfection in order to understand true relapse rates, rather than assuming that recurrence is relapse. Such recurrences are important for studies to identify biomarkers which may be early predictors of outcome of therapy.

PS-94495-05   Factors associated with pulmonary tuberculosis mortality in Los Altos region of Chiapas, Mexico

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Aim: Chiapas is one of the Mexican states having the highest rates of pulmonary tuberculosis (PTB), due to the numerous factors impeding its management and control (poverty, poor housing and nutrition, shortage of health resources, among others). We analyse the PTB mortality of a cohort of patients in Los Altos region of Chiapas, who had been diagnosed with PTB from January 1, 1998 to December 31, 2002; and, to identify demographic, socioeconomic and health services utilization factors, associated with death from PTB.
Methods: Analysis of a cohort of patients aged over 14 years diagnosed with PTB in the above mentioned period ($n = 431$) in Los Altos region of Chiapas. The records of the tuberculosis programme were reviewed, and patients were located through a search attempting to locate them in their homes. Those found alive were interviewed and asked to provide sputum samples. In the case of deceased patients, a verbal autopsy was obtained from a member of their family.
Results: The records of the PTB programme in the area were incomplete and erroneous in many cases. The results of the home follow-up visits were: 208 (48%) patients located alive, five of whom were still PTB positive (three with multidrug resistance); 145 (34%) could not be located and 78 (18%) had already died. Apparently, in at least 40 cases, the deaths were associated with PTB. Of these forty, 33 (83%) died without having received any medical care. The factors associated with dying from PTB were: 45 and over years of age (OR = 1.3; 95%CI = 0.98–1.3), 0–3 schooling years (OR = 3.3; 95%CI = 1.1–9.6), engaged in agriculture (OR = 2.2; 95%CI = 1.1–4.4), not living in main villages of their municipality (OR = 1.2; 95% C = 1.0–1.3), living in a rural community (OR = 2.7; 95%CI = 1.1–6.8), not having been treated in DOTS (OR = 1.2; 95%CI = 1.0–1.3) and having defaulted from treatment (OR = 11.5; 95% CI = 5.3–24.8).

PS-94535-05   DM and drug-resistant tuberculosis in a University Hospital in Eastern Taiwan, 2004–2008

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Background: To understand the influence of diabetes mellitus on the prevalence of antituberculosis drugs resistance in a University Hospital in Eastern Taiwan.
Design: We conducted a retrospective study of patients with sputum culture positive for tuberculosis at Tzu Chi General Hospital from 2004 to 2008, with the diagnosis of diabetes mellitus. Drug susceptibility testing (DST) patterns of first line drugs were analized.
Results: A total of 799 sputum culture positive pulmonary TB patients were included in the study; 199 (24.91%) had co-existing diabetes mellitus (PTB-DM) and 600 (75.09%) did not (PTB). From the DST for the first line drugs, the overall resistant rate to 1 or more drugs was 21.11% ($n = 42$) for PTB-DM and 16.17% ($n = 97$) for PTB. The rate of strains resis-

tant to individual drugs to PTB-DM and PTB was 16.58% ($n = 33$) and 11.83% ($n = 71$) to isoniazid, 9.05% ($n = 18$) and 6.67% ($n = 40$) to rifampin, 0.50% ($n = 1$) and 1.67% ($n = 10$) to ethambutol, and 10.55% ($n = 21$) and 8.00% ($n = 48$) to streptomycin. Fifty-two (6.51%) isolates were resistant to at least isoniazid and rifampin, of them, 17 (8.54%) was in the PTB-DM group and 35 (5.83%) in the PTB group.

Conclusion: From our study, there was increased but no statistical significant association between diabetes and drug resistance tuberculosis, even MDR-TB, in sputum culture positive patients in Eastern Taiwan.

	Total	PTB-DM		PTB		
	n	n	%	n	%	P value
	799	199	24.91	600	75.09	
Any resistance	139	42	21.11	97	16.17	0.111
INH	104	33	16.58	71	11.83	0.084
RIF	58	18	9.05	40	6.67	0.262
EMB	11	1	0.50	10	1.67	0.221
SM	69	21	10.55	48	8.00	0.266
MDR-TB	52	17	8.54	35	5.83	0.179

PTB-DM = coexisting pulmonary tuberculosis and diabetes mellitus; PTB = pulmonary tubercolosis without diabetes mellitus.

PS-94616-05   Can treatment delay be utilized as a key variable for monitoring the pool of infectious tuberculosis?

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Background: One goal of tuberculosis control programs is to reduce the transmission of *Mycobacterium tuberculosis* in the community. However, this cannot be rapidly accomplished. In endemic areas most of the population is already infected and serves as a reservoir that continuously contributes to the pool of infectious cases. There are serious methodological constraints with tuberculin surveys that are used to monitor the infectious pool, and these surveys require resources and expertise that are often unavailable. There is an urgent need for alternative means to monitor TB epidemics at the local level.

Methods: We investigated whether or not a systematic registration of treatment delay reported in the tuberculosis program records from Amhara Region, Ethiopia could be utilized to estimate the infectious pool of tuberculosis.

Results: The total number of infectious days and an estimate of the infectious pool was calculated by recording the treatment delay for new TB cases, retreatment cases and failures, and by estimating the number of undiagnosed cases. The treatment delay of new sputum smear-positive tuberculosis cases contributed the greatest number of infectious days.

Conclusion: A systematic recording of treatment delay as a quantifiable variable may be used to monitor the infectious pool of TB and may also provide a key indicator of TB control program performance.

PS-94641-05   Socioeconomic profile of Brazilian municipalities belonging to TB spatial high detection clusters

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Setting: Brazil is included among the 20 countries carrying 80% of the global tuberculosis (TB) burden, being a priority for international action.

Objective: To define high risk areas based on epidemiological data and describe the socioeconomic profile of the municipalities included in these areas.

Method: Data on reported TB cases from 2005 to 2007 by the Brazilian Ministry of Health (BMoH). Socioeconomic (SE) data were provided by country census. High risk areas with a maximum diameter of 100 km were defined by spatial scan statistics, using a Poisson model. Logistic models described the association of SE variables and high risk areas.

Results: Ten high risk clusters were defined with around 50% of TB reported cases. Logistic model showed that those areas correspond mainly of urban areas of big metropolies with high demographic density, inserted in modern economy, with higher GDP than the rest of the country.

Conclusion: The spatial scan statistics was able to define ten high risk areas responsible for half of the country's TB reported cases. Those are mainly metropolitan areas with a better access to medical care, where government provides more than one medical consultation by inhabitant per year, what points that a critical issue in TB control is for primary health care organization and health workers capable of its diagnosis and treatment.

PS-94666-05   Using household distributions of tuberculosis to describe the transmission dynamics in Lima, Peru

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Aims:
1 To develop a simple mathematical framework to explore the relative contribution of household and community transmission to tuberculosis (TB) dynamics

2 To fit this model to distributions of TB disease within households in Lima, Peru

3 To compare the distribution of TB within households of index cases infected with multidrug-resistant (MDR) and extensively drug-resistant (XDR) *M. tuberculosis* and to use these data to make inference on the transmission dynamics of highly drug-resistant TB.

Methods: In Lima, Peru, between 2004 and 2006, we enrolled 6280 household contacts of 948 index patients who had been treated with individualized regimens for drug-resistant TB between 1996 and 2003. We examined the distribution of incident cases of active disease among these household contacts and developed mathematical models to estimate the secondary attack rate and the relative probability of household and community transmission of tuberculosis.

Results: The prevalence of latent infection and active disease among people sharing a house reflects the overlapping contribution of community and household transmission. The distribution of disease within households examined in Lima deviated from the simplest models that assume identical transmission processes in the community and at home; we found a greater concentration of disease within households than would be expected under the null. This effect was most pronounced in the largest households. Factors including heterogeneity in the intensity and frequency of contact, re-exposure/re-infection, and host genetic factors related to susceptibility contribute to the shape of these observed distributions. Differences in the distribution of disease within homes of index cases with MDR and XDR-TB may reflect differences in the reproductive potential of these phenotypes.

PS-94688-05   Alcohol use among male tuberculosis patients in pastoralist settings in northern Kenya

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A relationship between alcohol and tuberculosis (TB) has been established in both epidemiological and clinical studies in many industrialized settings. However, few data exist to describe alcohol patterns and TB in relatively remote pastoralist communities. Using in-depth interviews, focus groups and a case-control study, this research examined the relationship between TB and alcohol consumption and explored risk behaviors related to alcohol use among adult male patients (>15 years) in two district hospitals in northern Kenya. In an age- and sex-matched case-control study comparing TB patients with outpatient controls, at the time of diagnosis, 34% of 125 TB patients were current drinkers compared with 39% of 249 outpatient controls. Among drinkers, TB patients were more likely to drink alcohol frequently (4–7 days per week) (OR 2.9; 95%CI 1.3–6.5), binge drink at least once per week (OR 2.9; 95%CI 1.4–6.1), be a problem or dependent drinker (OR 1.5; 95%CI 1.1–2.0), primarily consume home-brewed alcohols (OR 2.4; 95%CI 1.0–5.5) and daily go to bars (OR 2.47; 95%CI 1.23–4.94) or beer huts (OR 2.29; 95%CI 1.00–5.23). Qualitative research showed that illegal and potent home brewed alcohols (e.g. changaa) were cheaper and more accessible than commercial alcohols. Drinking alcohol often took place in small, closed and crowded spaces, which may increase risk of exposure to TB infection and indoor smoke inhalation, and thus risk of TB disease. Recommendations include screening for heavy alcohol use among all men in TB wards for referral to counseling or treatment, targeting men in community education campaigns linking TB and alcohol and encouraging health care workers to discuss the dangers of alcohol abuse among men during routine care.

PS-94689-05   Effectiveness of a score for TB diagnosis in nursing assessment at a Brazilian outpatient clinic

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Background: The WHO recommends a rapid identification of pulmonary tuberculosis (PTB) patients in outpatient clinics (OPC) with a correct reception and triage to minimize the risk of tuberculosis (TB) among health care workers and other patients.

Objective: Assessment the sensitivity (SE), specificity (SP), positive predictive value (PPV) and negative predictive value (NPV) of a nurse clinical score for TB diagnosis among PTB suspect subjects attended at Triage Sector in an OPC.

Methods: Between September 2006 and July, 2007 in a OPC of Rio de Janeiro city (an area of TB incidence of 100/100 000 hab.) all patients evaluated at Triage Sector by the first time or returned after defaulting TB treatment were interviewed with a standardized form by trained nurses, pursuing the identification of usual symptoms related to TB. Points were allocated for the sum of key variables mentioned by TB suspects and a score was established from zero to 20 points. Clinical and bacteriological evaluation was used for the PTB diagnosis. Non TB diagnosis was defined after 6 months of follow-up.

Results: Among 1219 interviewed subjects, PTB and extrapulmonary TB was diagnosed respectively in

239 (85.4%) and 41 (14.6%) cases. Among the 504 PTB suspect patients that fulfilled the definition criteria, the clinical score was applied in 454 (90%). The cut-off of nine points was chosen with highest accuracy. For the PTB, SE, SP, PPV and NPV of clinical score were respectively 79.4%, 55.5%, 31% and 91.5%. For smear-positive PTB, SE, SP, PPV and NPV of clinical score were respectively 83.3%, 50.3%, 22.9% and 94.5%.

Conclusions: The clinical score used by nurses at Triage Sector showed a good sensitivity for rapid identification of smear-positive patients and enabled the prompt adoption of administrative measures for TB infection control in OPC. Neural network analysis is underway and may provide higher accuracy.

PS-94734-05   Oral tuberculosis: a rare and misdiagnosed disease

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In Romania, the incidence of extrapulmonary tuberculosis (TB) has slightly decreased over time. Still, some rare extrapulmonary TB diseases are often misdiagnosed. The present retrospective study included 15 cases diagnosed with oral TB between 2003–2007. Patients were aged between 28–78 years, with a peak at the 5th decade. All patients were males, HIV negative. None of the patients had diabetes or other immune disorders. The time between the onset of the first symptoms and the moment of diagnosis varied between 1 week–1 year, with an average of 6 months. The main symptoms were: throat pain (66.7%), oral edema and inflammation (26.7%), gum ulceration (26.7%) and hoarseness (6.7%). The distribution of the oral lesions was: the tonsils (40%), the tongue base (30%), gum (26.7%), oral sealing (20%), palate (13.3%), oral mucosa (6.7%) and lips (6.7%). Multiple oral lesions were found in 46.7% cases. Oral ulcerations (53.3%) and edema (40%) predominate. 8 patients were suspected of malignancy before biopsy. The histological findings were TB positive for all cases. Ziehl-Neelsen was positive in 73.3% cases. Smear sputum was positive in 66.7%. The radiological pattern suggested pulmonary TB in 93%. Miliary TB was found in 33.3%. Though only 4 patients had a medical history for TB, later almost all patients were diagnosed with active pulmonary TB. The clinical outcome was favorable in all cases after antituberculosis therapy. In countries with high incidence of tuberculosis, dentists should be aware that oral tuberculosis could be a possible differential diagnosis of some difficult to treat cases.

PS-94801-05   Chest X-ray changes at end of tuberculosis treatment

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Background: Often Physician use chest X-ray findings to make a decision regarding treatment for tuberculosis. We assessed baseline and end of treatment chest X-ray findings of confirmed TB patients and explored possible factors associated with abnormal chest X-ray at end of treatment.

Methodology: Retrospective review of data on TB patients treated between 1993 and 2006 at the Uganda–Case Western Reserve University Research Collaboration. Chest X-ray findings were graded as follows: 0, 1, 2, 3 for normal, minimal disease, moderate and far advanced disease respectively.

Results: Chest X-rays for 1051 adults with newly diagnosed culture-confirmed TB were analysed. 572 of 1048 (55%) were women, and 628 (60%) were HIV-infected with mean age of 29 (SD 7.6) years. Baseline X-ray findings: 6 (1%) grade 0, 60 (6%) grade 1, 309 (29%) grade 2 and 676 (64%) grade 3. End of treatment findings: 238 (23%) grade 0, 367 (35%) grade 1, 312 (30%) grade 2 and 134 (13%) grade 3. A higher proportion of males had abnormal X-ray findings at the end of treatment compared to females, 82% vs. 72% OR 1.8, (95%CI 1.3–2.3, P value 0.0001). Being HIV-positive was associated with more abnormal X-ray findings at the end of treatment compared to HIV-negative subjects, 80% vs. 73% OR 1.5, (95%CI 1.1–2.0, P value 0.006) and patients who had cavities at baseline were more likely to have abnormal X-ray findings at end of treatment, OR 82% vs. 66% OR 2.4, (95%CI 1.8–3.3, P value < 0.0001). There was no difference in sputum culture results at end of treatment between subjects with normal abnormal findings.

Conclusion: A good proportion of patients remain with abnormal chest X-ray findings despite completion of TB treatment. Decision to start or end treatment should not be based on chest X-rays only.

PS-94817-05   TB relapses in a region with high prevalence of drug resistance

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Aim: To study frequency, time of relapses of TB and associations with documented drug resistance and registration category.

Methods: 8835 new pulmonary TB patients registered in 1997–2008 in Tomsk, Russian Federation, and relapsed later were included. Registration category, treatment outcomes and DST analyzed.

Results: 77.4% patients were treated successfully after first course of treatment, 8.3% had re-treatment courses because of failure or default, 6.7% died, 2.2% transferred out and 5.3% were still on treatment. 359 (4.1%) patients relapsed. During 5 years the median time for relapses was 3.4 years, [0.2; 11.0]; the average rate of relapses was 4.33%. Patients who had re-treatment courses less likely relapsed then those initially treated with success: 2.4% vs 4.9%, OR = 2.12, 95%CI [1.35; 3.37], $P < 0.05$. 64.1% of patients without relapses had drug-sensitive TB, 12.2% MDR-TB, 9.6% mono DR TB, 14% PDR TB. 72.6% patients with relapses had drug-sensitive TB, 5.6% MDR-TB, 10.7% mono DR TB, 11.1% PDR TB. Negative association was found between initial MDR-TB and occurrence of relapses: 5.6% vs 12.2% in controll group, OR = 0.42, 95%CI [0.24; 0.73], $P < 0.05$. When relapses occurred 26.6% patients had drug-sensitive TB, 59.5% MDR-TB, 3.6% mono DR TB, 10.2% PDR TB.

Conclusion: Longer treatment provides fewer relapses rate. Further investigations required to understand nature of TB relapses and explain why we didn't find association between initial MDR-TB and occurrences of relapses.

PS-94909-05   Tuberculosis among children less than 15 years old in Brazil, 2001–2006

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Introduction: Tuberculosis (TB) in children causes considerable mortality and morbidity.

Objective: To describe all cases of TB among patients <15 years old in Brazil.

Methods: An analysis of all TB patients <15 years old registered at the National TB Surveillance System in Brazil, from 2001 to 2006. Software for analysis were TabWin 3.4 and EpiInfo 6.04D.

Results: A total of 19 543 TB cases (6.1 per 100 000 population) were reported in children <15 years old during the study period (4.3% of the total of cases); most (51.8%) were male. Highest notification rates were seen in children <1 year old (10.2 per 100 000 population) and median is 4 years old. Pulmonary TB was seen in 77.1% of the cases. Sputum smear microscopy was realized in 6703 (44.5%) patients; of these, 3997 (26.5%) had sputum smear positive. Treatment success and default rates were of 72.1% and 7.2%, respectively.

Conclusion: Childhood TB is regressing in recent years where in Brazil, high BCG coverage (99%) is one of important factors. Though the highest TB notification rates were seen in <1-year-old.

PS-95553-05   Tendencia de la resistencia primaria, adquirida y multidrogo resistencia en Lima, Peru

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Objetivo : Evaluar la tendencia de la resistencia de *M. tuberculosis* a los medicamentos antituberculosos en Lima capital del Perú, realizados en los tres estudios de vigilancia nacional.

Métodos : Analizamos de manera separada a los pacientes de Lima y Callao de los estudios de vigilancia nacional de 1995–1996, 1999 y 2005–2006. Los estudios nacionales fueron realizados y coordinados con la OMS. Se evaluó la tendencia de la resistencia a drogas antituberculosas en cada estudio.

Resultados : En el primer, segundo y tercer estudio nacional la proporción de personas procedente de Lima fue de 52,5% (1028/1958) 54,9% (1153/2101) y 51,7% (1121/2169) ($P > 0,05$) respectivamente. Se presenta la prevalencia de resistencia a drogas antituberculosas con sus intervalos de confianza al 95%, en Lima en el primer, segundo y tercer estudio de vigilancia : resistencia primaria : 14,3% (11,9–16,9%), 17,6% (15,3–20,2) y 29,5% (26,4–32,7) ($P < 0,01$) ; resistencia adquirida : 33,3% (27–40,1), 21,2 (15,3–28) y 36,8 (31–43) ($P < 0,01$) ; MDR primaria : 2,2% (1,3–3,5), 3,3% (2,2–4,6) y 9% (7,2–11,1) ($P < 0,01$) y MDR adquirida : 11,9% (7,9–17,1), 13,7% (8,9–19,7) y 16,5 (12,3–21,6) ($P > 0,05$).

Conclusión : La resistencia primaria, tanto global como MDR, en Lima en los años 1996 a 2006 se ha incrementado significativamente, igualmente la resistencia global adquirida. Es necesario implementar estrategias efectivas de control de TB resistente en la capital del Perú.

PS-95598-05   Monitoring DR-TB treatment outcomes and epidemiological indicators in Brazil

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Setting: All MDR-TB cases treated in Brazil have been notified and followed-up through the web-based management information system accessed by all references health facilities and TB coordinations in country. All patients have been treated by a standardized treatment regimen of 18–24 months with quality assured 2nd line drugs provided free of charge by the MoH.

Methods: The e-TB Manager was developed and implemented by the partnership between Projeto MSH and CRPHF since 2004, allowing online extraction of epidemiological reports.

Results: From January 2000 to December 2008, 3013 new cases were notified. Among them, 50% referred three or more previous treatments for TB; 98% were pulmonary cases; 66% bilateral cavitary; 49% of patients registered related adverse effects, with the following frequency: 68% skin hiperpigmentation, 35% joint pain, 21% gastro-intestinal disorder, 18% hearing disorder, 17% insomnia, and 13% psyche disorder; 30% related comorbidities were recorded, among them, 13% alcoholism, 7.6% diabetes, and 7% Aids. Treatments outcomes registered from 2000 to 2007 for 2684 cases show a significant increase of cure rate from 47.1 to 66.8%, while death was reduced from 23.1 to 7.8%, and failure reduced from 18.3 to 7.6, but the default rate remains around 9%.

Conclusions: The e-TB Manager is an innovative tool allowing a rapid extraction of key data and epidemiologic reports for rapid action taking and strategic allocation of resources. Data collected show the severity of the pulmonary disorders after many irregular previous treatments for TB. Regular monitoring of adverse effects, such as hearing and psyche disorders were crossed with data recorded by physician for adequate drug substitutions. Alcoholism contributed to lower patient's adherence. Treatments outcomes are improving progressively, consequence of permanent assistance network strengthening for better diagnosis, clinical practices and information sharing at all levels.

ABSTRACT PRESENTATIONS SUNDAY 6 DECEMBER 2009

FEATURED ABSTRACT PRESENTATIONS

PROGRESS IN HIV AND TB PROGRAMME LINKAGES

FA-95176-06   Rapid assessment of tuberculosis infection control practices in peripheral HIV clinics, Uganda

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Background: TBIC is crucial in light of increasing drug-resistant TB which is transmissible, deadly and represents a public health emergency.

Objective: To evaluate TBIC practices in rural HIV/AIDS clinics.

Setting: 18 ART-clinics in Uganda [PEPFAR-funding], providing free HIV testing and treatment whilst TB services are delivered by the National TB Programme. Study design: Routine support supervision using a structured checklist based on the World Health Organization TBIC essential actions administered to Health Care Workers [HCWs] and data analyzed by STATA®.

Outcome measures: Administrative; Environmental and Personal TBIC steps.

Results: Available for 5/18 clinics. Administrative: despite all the HIV clinics having a TB Focal Person, none had a written TBIC plan or received training on TBIC in the past year. In none of the HIV clinics were finances directed to TBIC. In all the facilities HCWs regularly offered TBIC health education [cough hygiene] and passively screened for TB at baseline but none implemented systematic Routine TB Screening for all PHAs at follow-up. 2 facilities performed 'fast track' triage for PTB suspects with only 1 facility reporting sputum smear results in 24-hours but 3 had 48-hours turn-around-time. Median times [IQR] for the 5 HIV clinics initiating PHAs on TB therapy after confirmed PTB diagnosis were 0.5 [0–2]; 2 [2–2]; 2 [1–3]; 3 [2–7] and 4 [2–8] days respectively. Environmental: 2 of the 5 clinics had well ventilated patient waiting areas [different air inlet and outlet] but all had poor airflow in corridors and consultation rooms. Only 1 facility implemented separate TB-HIV clinic days.

Personnel: While no facility routinely provided masks for suspected or confirmed PTB cases, 3 rarely

did so. In no facility were HCWs aware of [N-95] respirator masks.

Conclusion: These findings highlight critical gaps in TBIC and call for innovative and sustainable interventions targeting resource-poor TB-HIV settings especially in this era of MDR-TB.

FA-95217-06   *Mycobacterium tuberculosis resistance in HIV-infected TB patients in Russia*

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Background: *Mycobacterium tuberculosis* resistance (TR) including multidrug-resistant (MDR) tuberculosis (TB) has emerged as a global epidemic. The human immunodeficiency virus (HIV) infection epidemic has caused explosive increases in TB incidence and may be contributing to increases in MDR-TB prevalence.
Objective: To describe all cases of *Mycobacterium tuberculosis* resistance among HIV-infected TB patients in tuberculosis hospital in Saratov region, Russia.
Methods: All cases of TR-TB-HIV identified by intensive case-finding were described in terms of clinical characteristics, drug resistance, results of treatment. All patients aged 33.5 ± 6.97 had tuberculosis cultured from sputum. Tuberculosis susceptibility to first and second-line drugs was determined by testing the diagnostic, pre-treatment sample.
Results: Between December 2007 and January 2009, 61 newly registered cases of MDR-TB-HIV were identified. Resistance to two or more first-line anti-TB drugs was found at 37 (60.6%) of patients. 68.9% of all patients were men, 68.3% were unemployed. Destructive TB was found among 80% of patients. 54.1% of TB-HIV patients have resistance to first-line drugs defined as MDR-TB plus resistance to three drugs of six classes. The polyresistance rates to three and more of second-line drugs were found among 29.6% patients. 26.2% of TR-TB-HIV patients out of 61 were cured in 2008; 11.5% died; 49.2% defaulted the treatment; and treatment failed in 13.1% of cases. Successful treatment among MDR-TB-HIV patients was registered in 34.4% of cases.
Conclusions: The management of MDR-TB-HIV requires an individual approach to the problem of treatment efficiency. The most important is to improve the adherence to treatment of MDR-TB-HIV patients.

FA-95311-06   Strengthening TB-HIV program performance monitoring using monthly facility-based reporting, Nigeria

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Background: The objectives of the intervention was to initiate monthly facility-based TB-HIV MandE

reporting with the aim of facilitating improved access to TB-HIV services. In Nigeria, the national TB program monitors performance through quarterly local government area (LGA) reports, in contrast to monthly facility-based reporting by the Ministry of Health (MoH) for all other health services. A lack of timely facility-based data results in missed opportunities for improving TB case detection and access to HIV counseling and testing (CT) for TB patients.
Methods: In September 2007, GHAIN reviewed and piloted the national TB data recording and reporting system: a) introducing facility TB registers and summary forms which feed into local government (LGA) TB registers; b) simplifying the aggregation of TB-HIV data; c) generating facility-level monthly reports from the national HMIS platform of the MoH; and conducting monthly facility performance analyses and feedback. Pre and post intervention data were analyzed to evaluate changes in performance.
Results: This is an analysis of the data collected over a 2 year period in 119 TB-HIV facilities. Since the introduction of the monthly facility reporting and related data analysis, the average number of patients initiating TB treatment on monthly basis doubled from 847 at baseline to 1750 in year 2. The uptake of HIV CT among TB patients also improved, with the proportion of patients knowing their HIV status when starting TB treatment improving from 65 to 84% over the same time period. In addition, facility-based reporting has been harmonized with the quarterly LGA and national reporting cycle.
Conclusion and recommendation: The monthly facility-based TB-HIV MandE system is compatible with the quarterly LGA-based national system, and positively impacts on program performance. The revised data recording tools and reporting system is recommended for countries desiring to improve the management of TB-HIV services.

FA-95317-06   Short and medium term impact of implementing one-stop comprehensive TB-HIV care in rural Kenya

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Background: In July 2005, Médecins Sans Frontières in collaboration with the Kenyan Ministry of Health implemented a joint TB-HIV management program at the Chest Clinic of Homa Bay District Hospital in a rural area of western Kenya. After the implementation, TB patients were proposed HIV testing and those found co-infected with HIV were treated for both conditions at the same consultation. We aimed to evaluate the impact of this implementation on HIV testing results, TB patients on antiretroviral treatment (ART) and TB program outcomes.

Methods: Retrospective analysis. Average HIV testing and TB treatment outcome rates were measured in three periods of time: before implementation (January to June 2005), shortly after (January to June 2006) and at medium term after (January to December 2008). The proportion of TB patients receiving ART and cotrimoxazole prophylaxis was measured before and shortly after the implementation.

Results: Documented HIV testing of TB patients increased from 1% (5/463) before implementation to 79% (354/446) shortly after implementation, and to 91% (403/443) medium term after implementation. The HIV positive rate among the patients with an HIV test done varied from 100% (5/5), to 88% (313/354), and 74% (300/403) in the 3 periods of time respectively. Before and shortly after the intervention, the proportion of patients documented to be on ART by the end of TB treatment increased from 1% (4/463) to 40% (177/446) and the proportion of patients receiving cotrimoxazole prophylaxis from 1% (5/463) to 70% (313/446). The TB program outcomes before, shortly after and at medium term after implementing one-stop TB-HIV care are shown in the Table.

	Success rate (*n*)	Death rate (*n*)	Failure rate (*n*)	Default rate (*n*)	Transfer rate (*n*)
Before (*n* = 463)	39% (181)	8% (37)	0% (0)	40% (186)	13% (59)
Shortly after (*n* = 446)	57% (256)	10% (45)	1% (5)	12% (52)	20% (88)
Medium term (*n* = 443)	72% (318)	3% (15)	1% (6)	18% (77)	6% (27)

Conclusion: The implementation of one-stop TB-HIV comprehensive care in a resource-limited setting has a very positive impact on the HIV detection and management as well as on the TB treatment outcomes, both at short and medium terms.

FA-95338-06   Using quality improvement programs to accelerate the implementation of the 3 Is

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Background and implementation: In 2007 the Ministry of Health and Social Services launched the HIVQUAL project to support quality improvement (QI) processes in TB-HIV care within public health facilities. Katutura Health Centre was one of the pilot sites selected for the project.

Response: Since June 2007, Katutura Health Centre has completed 3 successive performance measurement review periods. Analysis of the second performance report revealed a very low coverage (2%) of isoniazid preventive therapy (IPT). TB-IPT is very effective in preventing TB disease in individuals who have latent TB infection. 6 months of daily IPT reduces the risk of TB disease in HIV-infected patients by at least 60%. Guided by performance data and consistent with the WHO 3 'Is strategy', the facility decided to target TB screening and IPT for improvement. A route-cause analysis by the QI team identified participation of community counselors (CC's) at the time of adherence counseling as essential. CC's were trained on the need for IPT, duration of treatment and possible side effects, and a check-list was distributed to the community counselors. Patients suspected of having TB were referred to nurses who requested sputum smears and gave appointments to doctors. The IPT register was used to register patients at the pharmacy.

Results: Using performance measurement and QI, Katatura Health Center managed to rapidly and significantly increase the proportion of eligible patients on IPT from 2% for the period Jan–June 2008 to 42% for the period July–Dec 2008. Although not specifically targeted for improvement, increases in performance in other indicators of care were noted.

Conclusion and recommendations: Implementation of the 3 Is can be accelerated through the use of well structured QI programs at the facility level. Use of QI tools can lead to tangible improvements and empower facility staff to create innovative solutions to problems that inhibit quality of TB-HIV care.

Table HIVQUAL serial performance reports for Katutura Health Centre, 2007–2008, Windoek, Namibia

Indicator	July-June2007	Jan-June2008	July-Dec 2008
Continuity of care	99%(n=145)	96%(n=112)	83%(n=102)
Access to antiretroviral therapy	52% (n=145)	80%(n=82)	86%(n=35)
CD4/VL monitoring	87%(n=145)	71%(n=112)	53%(n=102)
TB screening	****	96%(n=118)	94%(n=71)
PCP Prophylaxis	****	97%(n=96)	93%(n=46)
TB prevention through IPT	****	2%(n=121)	42%(n=123)
Adherence assessment	****	57%(n=112)	84%(n=102)
Weight monitoring	96%(n=145)	87%(n=146)	89%(n=145)
Alcohol screening assessment	0%(n=145)	12%(n=146)	12%(n=145)
HIV prevention education	0%(n=145)	5%(n=146)	11%(n=145)
Food security assessment	0%(n=145)	0%(n=146)	6%(n=145)

FA-95411-06   Healthcare utilization and costs of a support program for patients living with HIV and TB in Peru

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Background: Interventions that augment medication adherence and improve treatment coordination for patients co-infected with HIV and tuberculosis have become more commonplace. However, few examine the costs and benefits associated with their intervention, a practice necessary to identify effective and financially feasible features of these interventions.

Design/methods: We compared co-infected patients receiving Community-Based Accompaniment with Supervised Antiretroviral (CASA) to matched patients receiving standard of care in two health districts of Lima, Peru. In the intervention cohort, community health workers performed twice-daily home visits to directly observe antiretroviral treatment (ART) and offered additional medical, psychosocial and economic support to CASA participants. Home-based directly observed treatment (DOT) for TB was also performed if health centers agreed. We compared costs and healthcare utilization among the CASA group and the control group, assessing hospitalization rates, outpatient visits, and DOT.

Results: There were 33 patients in each group, representing 21 053 person-days in the intervention group and 16 611 person-days in the control group. At 24 months of follow-up, the intervention group had experienced reduced hospitalization rates (0.45 admissions per person-year in the intervention group vs. 0.99 adm./p-y in the control) and fewer total hospital days (5.67 days/p-y in the intervention group vs. 16.63 days/p-y in the control), compared with the control group. We will calculate savings associated with home-based DOT; the cost of the intervention per patient-year; and the estimated savings in reduced healthcare utilization from this intervention.

Conclusion and recommendations: Our intervention was associated with significantly reduced hospitalization rates. A comparison to costs of the intervention will yield an accurate estimate of the true costs of this intervention, which can be used in future cost-effectiveness analyses.

FA-95470-06   Use of lay health workers 'TB Warriors' to improve hospital-based TB services in South Africa

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Background: South Africa (SA) has one of the highest TB incidence and lowest TB treatment completion and cure rates globally. At Edendale Hospital in 2006, a representative large (900-bed) government hospital in SA, inadequate systems, HR shortages and poor knowledge of National TB Guidelines contributed to low TB bacteriologic coverage (23%) and prolonged sputum TAT (4d), while high rates of HIV co-infection with smear negative TB, resulted in missed and/or delayed diagnosis and treatment initiation. Lack of clear task allocation resulted in recurrent stock outs of basic supplies including sputum specimen cups and lab request forms, low TB suspect reporting and case registration, absence of patient TB education and infrequent HIV-testing and referral for HAART. Discharge and transfer from hospital to community clinics, resulted in patient 'leakage' and treatment default with less than 60% of patients arriving at the clinic.

Methods: In May 2007, an NGO (iTEACH) based at Edendale Hospital, trained two lay persons as 'TB Warriors' to improve inpatient TB services. The 'warriors' were made responsible for each step of hospital TB services, from ensuring adequate supply of specimen cups, to assisting doctors with sputum request forms, sputum transport to the lab, return of results to the wards, patient TB education, TB case reporting and provision of VCT to all pTB suspects.

Results: Less than 1-year after launch of the 'TB Warriors', bacteriologic coverage increased from 23 to 85%, sputum TAT decreased from 4 d to ±24 hrs. VCT is offered to 100% of pTB suspects and those who test HIV+ve and qualify are fast-tracked for HAART initiation.

Discussion: Multiple challenges contribute to TB program failure in South Africa. Significant improvement in hospital-initiated TB care and treatment may be achieved with few highly leveraged lay persons, who are trained, empowered and held accountable for ensuring that each step in TB services is successfully completed.

FA-95575-06   Missed opportunities for treatment of latent tuberculosis infection among HIV patients

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Objectives: To evaluate missed opportunities for treatment of latent tuberculosis infection (LTBI) among HIV infected patients.

Methods: An interventional study was performed at a Brazilian University hospital. Patients, adults (age superior 18 years), with HIV infection diagnosis, from January 2004 to December 2006 were evaluated. The clinical records were reviewed regarding the following variables: tuberculin skin test (TST) results, management and treatment of LTBI; HIV infection status (stage and TCD4+ count). LTBI was considered when TST result was equal or superior to 5 mm. The intervention consisted on the evaluation of TST coverage among HIV patients and the discussion with health care professionals (HCW) about guidelines of LTBI treatment, difficulties and strategies to implement the guidelines.

Results: 387 patients were selected, of this, 271 cases were included and 116 (23.4%) patients were excluded due to active TB. Solicitation of TST was performed in 219 (80.8%) cases: 64 (29.2%) patients didn't perform all steps of TST. The results of TST were: inferior to 5 mm in 118 (53.9%) and superior or equal to 5 mm in 37 (16.9) cases. Of this, 22 (59.5%) patients receive full isoniazid treatment. In 44.0% of cases without TST, the T-CD4+ was superior to 350 cels/mm³. During the intervention, 25 HCW interviewed related the following difficulties: multiples steps of TST, delay of TB active investigation, long distance of Hospital and residence of patients. The intervention defined with HCW were: the inclusion of TST protocol in all charts of HIV infected patients, update of TST status during the follow-up, immediate evaluation of patients with LTBI without isoniazid treatment, involvement of health care primary facility for TST application.

Conclusion: TST opportunities were lost in 42.8% cases. We hope better coverage with TST and LTBI treatment after full implementation of defined strategies.

DOTS EXPANSION: COMMUNITY AND PROGRAMME MODELS

FA-94335-06   Impact of training of religious leaders about tuberculosis on case detection rate in Balochistan, Pakistan

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Setting: Three randomly selected and three matched control districts from 28 DOTS implemented districts of Balochistan province.

Objective: To study the impact of involving religious leaders in increasing awareness of the community regarding timely care seeking with the ultimate goal of increasing case detection rate of tuberculosis in Balochistan.

Methods: An intervention study conducted between April 2005 and March 2006, in which baseline knowledge of religious leaders about tuberculosis was assessed by a questionnaire interview and than one day orientation workshop arranged for religious leaders of intervention districts. A campaign of awareness about TB was launched by religious leaders by delivering speech about TB in weekly prayers. The impact of this campaign was assessed by interviewing the patients attending the TB clinics of six districts and recording of case detection rate (CDR) of 2nd, 3rd, 4th quarter of 2005 and 1st quarter 2006 in these districts.

Results: The knowledge of religious leaders about TB was mostly on folklore and non scientific. A significant increase in knowledge about TB was noted among the religious leaders after training. They conveyed the message to masses successfully, 27.88% patients attended the TB clinics on advice of religious leaders. The relation and trust of religious leaders on TB clinics increased significantly (100%). The religious leaders became aware about the presence of TB clinics in their area and after intervention the religious leaders advised people to visit TB clinics. The CDR increased in intervention districts from 13 to 15%.

Conclusion: Involving the religious leaders in raising awareness of the community proved to have a beneficial impact on the health seeking behavior of TB suspects, and on increasing the case detection rate in the community.

FA-94397-06   Patients' perceptions of health system barriers to access to tuberculosis care in rural China

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Aim: To explore the health system barriers to TB diagnosis and treatment under the expanded DOTS program in rural China; and to analyze the impacts of pro-poor policy under DOTS and the New Cooperative Medical Scheme on removing financial barriers to access to TB care.

Methods: Qualitative in-depth individual interviews were performed to 24 TB and 24 suspected TB patients with longer than three weeks cough. Content analysis was applied in data analysis.

Results: It was found that the health system barriers to access to the free TB diagnosis and treatment under China DOTS program could be categorized as lack of awareness of free TB care; barriers to financing,

diagnosing and referring in access to TB care; perceived incapability of the New Co-operative Medical Scheme and the free TB care being not for free.

Conclusion: It could be concluded that the drawbacks of partial health system reform and the inadequacy of the current rural health insurance system were crucial barriers to access to TB care. The supplier-induced demand and antibiotics abuse result in improper, ineffective and delayed treatment. Findings from this study also underline the importance of integration between the general health system and DOTS program, and the importance of patients' awareness of the pro-poor DOTS program.

FA-94554-06 Effectiveness of community health workers for the control of tuberculosis

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Background: The important increase in immigration during recent years has changed the epidemiology and control strategies for tuberculosis (TB) in many places. The objective of this study is to evaluate the effectiveness of intervention by community health workers (CHWs).

Methods: The study included all TB cases detected by the Barcelona TB Program from 2000 to 2005 and compared a period without CHW intervention (2000–2002) to a period with CHW intervention (2003–2005). Adjusted variables include age, birthplace, district of residence, HIV infection, drug consumption, cigarette and alcohol use, incarceration, and homelessness. The influence on contact tracing (CT) and treatment outcomes were analyzed by logistic regression. Odds ratio (OR) with 95% confidence intervals (CI) were used.

Results: 960 immigrant patients were detected; 502 within the period with CHW intervention. CHWs worked with 79.5% of these cases There was no difference in treatment outcomes between the two periods. CT was performed on 81.6% of the smear-positive TB cases during the intervention period, compared to 65.7% of the cases during the pre-intervention period ($P < 0.001$). The risk of not accomplishing CT among smear-positive immigrants was highest among homeless cases (OR = 3.1; 95%CI 1.3–8.0), those born in India-Pakistan (OR = 3.7; 95%CI 1.5–9.1), and Maghreb (OR = 3.9; 95%CI 1.6–9.7), HIV-infected patients (OR = 5.3; 95%CI 2.1–13.2) and those not provided CHW intervention (OR = 2.3; 95%CI 1.3–4.2).

Conclusions: The effectiveness of TB programs in areas with high immigration can be improved by incorporating CHWs who act as translators, cultural mediators, and who accompany cases and contacts through treatment and follow-up.

FA-94911-06 Developing a district-level DR-TB treatment ward in Namibia: responding early to a growing problem

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Background: In 2007, Namibia had a tuberculosis (TB) case notification rate of 722 per 100 000, and drug-resistant tuberculosis (DR-TB) statistics were not routinely captured. In 2008, due to increasing cases, district hospitals were required to manage DR-TB. Grootfontein district hospital already faced the challenge of being a referral center for the San community, which has one of the highest rates of DR-TB.

Response: In October 2007, Grootfontein hospital established a 32 bed DR-TB ward and began treating patients. Administrative and environmental infection control measures were developed, and patients were treated according to national guidelines. Clinical mentors (CM) from International Training and Education Center on HIV (I-TECH) assisted with installation of extractor fans, obtaining N95 masks, and establishing communication between staff and TB specialists. By June 2008, all district DR-TB cases were referred to Grootfontein. Each case also was reviewed by the National Tuberculosis Control Program (NTCP) for treatment recommendations.

Results: To date, 33 adults have been registered: 3 (9%) were HIV positive, and 28 (85%) were San. 26 cases (79%) had multidrug-resistant TB, and 7 (21%) had poly-drug-resistant TB. 3 patients have achieved sputum culture conversion, 3 have died, and 2 refused hospitalization. Challenges include long wait times for sputum culture results, no isolation facilities, inpatient socioeconomic deprivation, and diagnosis of DR-TB in children. San individuals with DR-TB now access dedicated inpatient care in their district, hopefully increasing chances of completing treatment.

Conclusions: With NTCP and I-TECH assistance, Grootfontein established one of the first district-level DR-TB wards in Namibia. More DR-TB care facilities are needed, as well as effective infection control and staff education. Utilizing CMs to coordinate efforts between district hospitals and the NTCP has moved Namibia closer to its goal of controlling DR-TB.

FA-95055-06   Factors associated with delay in help-seeking among patients with pulmonary tuberculosis

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Introduction: Tuberculosis (TB) diagnosis delay increases disability, mortality and transmission of the disease. Patients in developing countries are often diagnosed with severe, advanced disease. Delay in diagnosis of TB may be due to delay in seeking for medical help or to health-care system issues. The objective of the present study was to evaluate factors associated with patients' delay for seeking for help.

Methods: We conducted a questionnaire-based survey among 218 patients with bacteriologically confirmed pulmonary TB in 21 health posts distributed in 8 cities of Rio de Janeiro state (RJ), Brazil. Previously trained medical students interviewed patients in the 2nd month of treatment who signed an informed consent.

Results: Median patients' delay was 30 (IQR = 15–60) days. Informal work, female sex, home distance from the health post (measured by the time to reach the unit) and productive cough were significantly associated with longer delays (Table).

Conclusions: Although anthropological and cultural subjective factors may be associated with feeling ill and medical help seeking, in the present study we identified a few objective factors for patients' delay. The poorest, with informal work were at increased risk for diagnosis delay. Access to the health system may be a reason. People who rely on informal can not afford to line up in the overcrowded public health posts or emergency rooms available for immediate assistance. Distance from facility may be another reason and affects most the poorest. We also confirmed the vulnerability of women in help seeking in Brazil, confirming gender inequities found in other developing countries. Shorter delay for those without cough may be explained by the few patients detected in regular door-to-door campaigns for finding respiratory symtomatics. Campaigns especially targeted to women, as well as transport vouchers and other financial incentives may shorten this delay.

Table Patients' characteristics and time between first symptoms and search for medical help

Characteristics	Time (days) Median (IQR)	P value*
Sex		
Female (n = 79)	45 (30–90)	**0.019**
Male (n = 139)	30 (9.9–60)	
Age		
<35 (n = 99)	30 (21–60)	0.402
≥35 (n = 119)	30 (15–60)	
Schooling		
None (n = 29)	30 (15–60)	
Primary (n = 103)	30 (15–60)	
Unfinished High School (n = 21)	45 (30–60)	0.413
Finished High School (n = 53)	30 (7.5–60)	
University (n = 12)	30 (12.5–135)	
Household size		
Living alone (n = 25)	30 (15–60)	
2–4 (n = 143)	30 (15–60)	0.382
≥5 (n = 50)	37.5 (15–90)	
Individual monthly income before diagnosis (US$)†		
<$55 (n = 92)	37.5 (15–90)	
55–222 (n = 72)	30 (22.5–60)	0.059
222–444 (n = 28)	30 (12.5–37.5)	
>444 (n = 26)	30 (5–60)	
Formal work		
No (n = 105)		
Yes (n = 83)	30 (22.5–90)	
Missing/non-applicable (n = 30)	30 (7.5–60)	**0.005**
Co-morbidities		
No (n = 146)	30 (15–60)	**0.054**
Yes (n = 72)	30 (15–60)	
Cough		
No (n = 11)	1.8 (0.0–15)	<**0.001**
Yes (n = 207)	30 (15–30)	
Sputum		
No (n = 55)	30 (5.1–60)	**0.045**
Yes (n = 163)	30 (15–60)	
Hemoptysis		
No (n = 152)	30 (15–60)	0.103
Yes (n = 66)	45 (15–90)	
Fever		
No (n = 52)	30 (15–60)	0.506
Yes (n = 166)	30 (15–90)	
Fatigue		
No (n = 48)	30 (15–90)	0.754
Yes (n = 170)	30 (15–60)	
Weight loss		
No (n = 34)	30 (7.5–60)	0.310
Yes (n = 184)	30 (15–60)	
History of previous TB treatment		
New case (n = 187)	30 (15–60)	0.547
Retreatment (n = 31)	30 (15–90)	
Type of first searched facility		
Public primary care unit (n = 69)	45 (21–60)	
Pharmacy (n = 21)	30 (22.5–90)	
Hospital (n = 84)	30 (15–60)	0.368
Private clinic (n = 41)	30 (15–60)	
Others (n = 2)	15 (0–30)	
DOTS in area of residence		
No (n = 94)	30 (15–90)	0.151
Yes (n = 124)	30 (15–60)	
Time to reach healthcare unit		
<80 min (n = 112)	30 (7.5–60)	**0.009**
≥80 min (n = 106)	37.5 (22.5–90)	
Health insurance		
No (n = 184)	30 (15–60)	0.097
Yes (n = 34)	30 (7.5–60)	
Hospitalization		
No (n = 189)	30 (15–60)	0.324
Yes (n = 29)	30 (15–60)	

* From Kruskal-Wallis or Wilcoxon non-parametric tests, as appropriate.
† At the time of interviews, US$ 1 = R$ 1.8.
IQR = interquartile range.

FA-95150-06   Measuring the impact of an intensified case finding program in North Rift Valley and Western Kenya

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Introduction: Kenya remains one of the 22 high burden TB countries in the world with persistent diagnostic challenges in rural communities. A FIDELIS grant established an Intensified Case Finding (ICF) program in western Kenya through the use of community-based cough monitors (CM). The goals of the project were 1) To promote community sensitization, 2) To increase number of suspects screened, and 3) To improve case holding.

Methods: A retrospective analysis of the diagnostic registries of 49 clinics from 5 districts in western Kenya was performed. Data included all TB suspects screened between July 2005–December 2007. Comparison of sited with ($n = 37$) and without ($n = 12$) ICF activities was performed.

Results: ICF sites averaged 515 suspects screened compared to 197 suspects in non-ICF sites ($P = 0.0039$). ICF sites averaged 63 smear positive diagnoses compared to 26 smear positive diagnoses in non-ICF sites ($P = 0.0149$). The smear positivity rate was 11.94% at ICF sites and 14.97% at non-ICF sites ($P = 0.1587$).

Conclusion: ICF significantly increased TB screening and case finding compared to non-ICF sites. Both ICF and non-ICF sites had similar smear positive rates, despite the large differences in numbers screened. In non-ICF sites, patients present with more advanced symptoms than in the ICF sites, equalizing the smear positivity rates. ICF efforts can impact community transmission rates by facilitating earlier diagnosis.

FA-95162-06   Lessons learnt: procurement of drugs through the GLC/GDF mechanism for treatment of MDR-TB patients

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Introduction: The Russian Health Care Foundation (RHCF) is the primary recipient of a 4th Round Global Fund (GF) grant for a TB control project (2005–2010) in the Russian Federation (RF). The WHO Country Office in Russia provides technical assistance in project implementation. One of the main tasks of the project is expansion of treatment of MDR-TB patients, with one project indicator being 3800 MDR-TB patients starting treatment by December 2008. The Green Light Committee (GLC) approved 25 regional projects with 6973 patients to be treated; however only 1702 MDR-TB patients were enrolled by the end of 2008.

Methods: Problems in second-line drug (SLD) procurement through the GLC/GDF mechanism for the RF were analyzed.

Results: The main problems of the SLD supply mechanism for the RF were identified: shortage in SLD to be supplied by the IDA; lengthy procurement procedures (11 months on average); IDA procedures not fully meeting the strict RF pharmaceutical and customs regulations; no motivation from manufacturers to register SLD in the RF; complicated national system for approval of non-commercial shipments. In the framework of the GF project the following tools were developed: 1 year planning of patient enrollment, monthly needs of SLD and covering treatment with partial shipments; monthly recording/reporting system with regions, quarterly redistribution of SLD among regions. The time period of shipments decreased from 16 to 7 months, but there is still no guarantee of further regular shipments.

Conclusions: Although positive momentum was achieved at the end of 2008 in the procurement of SLD the Russian experience shows that the GLC/GDF procurement mechanism lacks enough supply of SLD and is not flexible to national regulations. This resulted in a 1 year delay with enrollment of patients. In the future it is necessary to take into account the long time period of shipments, inflexibility and limitations of SLD quantities in the GLC/GDF procurement mechanism.

FA-95359-06   Can family members be recruited as DOT providers? A preliminary report from Chennai

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Setting: TB patients registered through Public Private Mix (PPM) Partnership in an urban area with more than 5 million population.

Objectives: To assess the social situations requiring the necessity of DOT (Directly Observed Treatment) by family members in the treatment of TB and to determine its social determinants.

Methodology: An exploratory retrospective analysis of TB patients from the private health care providers registered in a PPM involving the Non Governmental Organization, private practitioners, private hospitals and the Chennai Corporation for the period between 1999 and 2005.

Results: Of the 2216 patients registered in the PPM, patients who received DOT from family members,

hospital staff, community volunteers were 232 (10.5%), 1121 (50.6%), 863 (38.9%) respectively. The social determinants that favoured patients to receive DOT from family members were unmarried girls, immobility due to old age, type of TB, religion and type of occupation. Most of the family members providing DOT were females and belonging to the 21 to 30 years age group. The cure rate for patients on DOT from family members (81.2%) was more as compared to patients on DOT from community volunteers (79.6%) and hospital staff (78.8%).

Conclusion: This study has highlighted the performance of family DOT providers is on par with community and hospital providers. The inclusion of family members can be considered under special circumstances with careful monitoring in order to bring more patients into the DOTS program who would have otherwise opted for unsupervised treatment.

POSTER DISCUSSION SESSIONS

TB TREATMENT INTERVENTIONS AND CASE MANAGEMENT

PC-94305-06   TB control among persons using substances: a randomized directly observed therapy study

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Aim: Directly observed therapy (DOT) has been successful in controlling tuberculosis (TB) in the United States. However, vulnerable populations remain at increased risk for TB disease and treatment failure, which may increase the risk of transmission and drug-resistance. This study compares TB treatment adherence and completion of adult substance users using enhanced versus standard DOT strategies in Chicago, IL USA.

Methods: Participants were randomized to the two DOT strategies and interviewed about their life circumstances, including drug and sex practices, and TB knowledge. In the enhanced arm, DOT was performed by former substance users. In the standard arm, Chicago Department of Health workers administered DOT. Treatment adherence was defined having taken at least 80% of prescribed doses. Treatment comple-

tion was also defined as having taken at least 80% of prescribed doses of TB medication, or a physician's determination of adequate treatment. Participants' completion and adherence data were obtained from DOT cards and medical records.

Results: Of 94 patients, 46 patients were randomized to standard DOT and 48 to enhanced DOT. Eighteen (39%) standard DOT patients failed to complete treatment, compared with 7 (15%) in the enhanced DOT arm (RR = 2.7, 95%CI 1.24–5.82). Likewise, patients in the standard DOT arm had a higher risk of not being adherent to treatment (RR = 2.5, 95%CI 1.15–5.48) and missing a DOT appointment (OR = 2.91, 95%CI 1.46–5.81). In the final models for completion, adherence, and missing a DOT appointment the enhanced treatment strategy and having one's own housing were significantly associated with outcome.

Conclusions: TB treatment completion and adherence in hard-to-reach populations was improved by using indigenous DOT workers who are more familiar with the social norms of the patient population, and thus perceived as peers. Improving the housing stability of substance users with TB could also improve treatment completion.

PC-94501-06   Evaluation of the role of community health workers in the provision of DOTS in urban Brazil

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Setting: Rio de Janeiro City, Brazil.

Objective: To evaluate community health worker (CHW) self-perception of barriers to care in an urban community-based directly observed treatment (DOT) for tuberculosis (TB).

Design: Cross-sectional study of CHWs involved in a community-based DOT for TB in an urban favela, utilizing a self-administered questionnaire.

Results: Of 48 CHWs, 95.8% participated. The majority was satisfied with training in DOTS (89%) and TB-related community education (83%). Fifty-nine percent of CHWs felt they could do more to improve community health. The most commonly identified barrier was a need for more services at the clinic (63%), particularly psychological and social services (59%). Notably, 63% of CHWs reported providing education for patients' family members on topics outside of TB, identical to the percent providing education for patients themselves. Major priorities for improving community health included increasing social services for patients (87%), improving communication with other city health services (65%), and

improved community education (63%). For 61% of CHWs, their family's overall income was reported as insufficient for basic items, and 96% held additional paid positions. CHWs expressed strong dissatisfaction with their salary (87%), and 63% considered changing jobs for this reason. Finally, 41% responded that violence served as a barrier to care, with 80% saying that it has prevented patient visits. In the CHW role, 39% reported having been victims of violence at least once.

Conclusions: The CHWs in the DOT program often became involved in other aspects of care, including education of patients and their family members. Expanded training in community education, psychological and social services and better integration into other primary health care services are identified means of improving CHW efficacy. CHW payment and violence in the community are important factors that should be explored in the future.

PC-94877-06   Adherencia al tratamiento a traves del TAES comunitario en municipios de alto riesgo de Oaxaca

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Introducción : La Tuberculosis Pulmonar en la región del Istmo y de la Costa de Oaxaca, representa un serio problema de Salud Pública, sobre todo lograr una eficaz adherencia al tratamiento para reducir la tasa de abandonos y fracasos hasta alcanzar niveles de curación mayores al 85%. Se estableció la estrategia del TAES comunitario mediante alineación de recursos del nivel local, municipal, estatal, nacional, internacional incorporando como puntos clave la abogacía, comunicación y la movilización social.

Intervención : Se identifican 6 municipios de alto riesgo ; Juchitan de Zaragoza, Salina Cruz, Tehuantepec, Pinotepa Nacional, Pochutla y Puerto Escondido, todos con alta tasa de incidencia, mortalidad y tasa de curación menor al 85%. Se incorpora un promotor comunitario exclusivo, responsable del seguimiento y control de los casos, estudio de contactos, y obtención de recursos, difusión en medios locales y participación comunitaria diversa y de personas afectadas por la TB.

Resultados : Incremento gradual mayor 70% de la tasa de detección, seguimiento y curación mayor al 85%, obtención de recursos municipales y gubernamentales, disminución del estigma y discriminación, mayor nivel de conocimientos del personal de salud publico y privado, reducción en la tasa de abandonos y fracasos, participación comunitaria, interés por tomadores de decisiones, mayor interacción con la población cuando el promotor conoce el dialecto o lengua materna de la población.

Conclusiones : Es importante la alineación de recursos

a un solo objetivo, un programa permanente debe considerar paralelamente un programa de acciones intensivas focalizadas, la acción especifica y conocimiento de la lengua materna permite un mayor seguimiento de las acciones establecidas y las acciones de abogacía permiten obtener recursos importantes ante la falta de presupuesto necesario.

PC-94967-06   SPECT-CT en la evaluacion y manejo del fracaso del tratamiento de la tuberculosis multi-resistente

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Introducción : Poco se ha estudiado en la biodisponibilidad de los fármacos en las lesiones crónicas con destrucción pulmonar como causa de la falla a tratamiento. Con la Tomografía por emisión de positrones (SPECT-CT) es posible ver lesiones metabolitamente activas y perfundidas. En publicaciones previas se ha demostrado que las lesiones tuberculosas, son 'metabolitamente activas'. Nosotros presentamos dos casos con TB-MDR con fracaso a tratamiento en quienes se realizó SPECT-CT y se documentaron lesiones 'frías' y se les realizó resección quirúrgica como tratamiento adyuvante.

Objetivos : Generar una nueva perspectiva de evaluación y manejo del fracaso al tratamiento en TB-MDR por medio del SPECT-CT.

Metodología : Se describen dos casos de pacientes con tuberculosis MDR con fracaso a tratamiento con fármacos de segunda línea. Las pruebas de susceptibilidad en los cultivos de seguimiento no mostraron amplificación de la resistencia. Para esto, generamos la hipótesis de la falta de biodisponibilidad de fármaco en las lesiones (cavernas) de mayor carga bacteriana. Se realizaron estudios de SPECT-CT en los que se demostró ausencia de captación en las lesiones tuberculosas a pesar de cultivos positivos en lavados bronquiales selectivos. Los pacientes fueron llevados a resección de las lesiones. En los cultivos del tejido hubo crecimiento sin que se modificara la susceptibilidad inicial. Los pacientes continuaron mismo tratamiento hasta completar 10 meses con cultivos negativos. A un año de seguimiento se encuentran asintomáticos y sin evidencia bacteriológica de enfermedad.

Discusión : Por medio del SPECT-CT confirmamos la ausencia de perfusión como una explicación al fracaso farmacológico debido a la pobre biodisponibilidad en áreas mal irrigadas por las fibrosis y la destrucción pulmonar. Esto representa una nueva perspectiva de evaluar a pacientes con altas posibilidades de fracaso, además de considerar el tratamiento quirúrgico adyuvante.

PC-95136-06   Participacion de la red de enfermeria, en la busqueda activa de casos de TB en zonas marginadas

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Objetivo : Demostrar el impacto del trabajo de la enfermera TAES en la detección de casos nuevos de tuberculosis.

Metodología : La población del proyecto se constituyó con personal de: instituciones de todo el sistema sanitario, prisiones, escuelas de enfermería, Sistema Estatal para el Desarrollo Integral de la Familia, Programa Estatal de Adicciones, Programa Estatal de VIH/SIDA, colegios de profesionales de salud y auxiliares comunitarios. Se inicia la activación aprovechando los tiempos muertos del personal de salud en todas las instituciones para llevar el tema TB, con el único recurso existente-motivación de la Red de Enfermeras y el valioso apoyo del programa de TB- en un horario abierto de 24 horas, a petición del nuevo adherente a la Red.

Resultados : De enero de 2007 a diciembre de 2008, se realizaron 80 cursos focales, integrando a más de 1500 personas de diferentes profesiones, instituciones, niveles de atención y población marginada ; impacto en el incremento de detección de sintomáticos respiratorios, comparando 2005/06 con el 2007/08 hubo un incremento del 27,3% ; disminución de la tasa de mortalidad en ese mismo periodo de 1,31 a 0,72 ; incremento en los casos nuevos entre el 2007 y 2008 de 36%.

Conclusiones : El rol de la enfermera TAES dentro del Programa de TB es fundamental por su creatividad y esmero para llevar el tema TB a todos los rincones del estado, en horario abierto, cualquier día del año con escasos recursos y alto impacto.
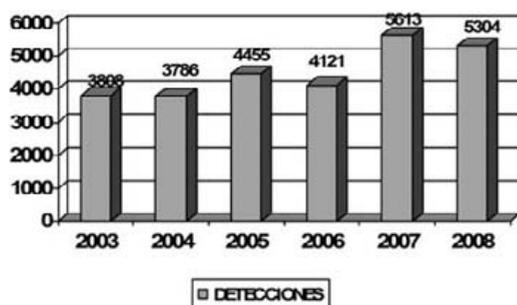
FUENTE:
SIS: DE 2003 A 2008. SED: DE 2003 A 2007.
PROGRAMA ESTATAL DE TB: 2003 A 2008

PC-95274-06   Strategies to improve tuberculosis treatment success in an urban setting, Kampala, Uganda

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Background: Kampala, the capital city of Uganda has 2 million people and notifies aprroximately 25% of the national Tuberculosis (TB) cases. Despite the high case detection rate of over 145% since 2006, the treatment success rate (TSR) remains low: 17.2% in 2006 cohort. This is mainly explained by the fact that majority of TB patients diagnosed in Kampala return to the neighbouring district without proper transfer making it difficult to assess treatment outcome.

Methods: In July 2008, a patient tracking system using telephone and physical tracing was established and since then patients who do not honour appointments to collect medicine are traced. In addition, inter-district meetings are held every quarter to exchange data on patients based on where they initiated TB treatment. Furthermore, health workers were trained on data management and are supervised regularly.

Results: One hundred and forty-three patients (56.3%) out of 254 who initiated TB treatment in July to September 2008 who were thought to have interrupted treatment were traced. Of these 63 (44.0%) had interupted treatment. The rest had self-transfered to other health facilities in neighbouring districts and were still taking their medicine. In addition, through the first inter-district quarterly meeting, data were exchanged on treatment outcome for the 2007 cohort leading to improvement of TSR for Kampala City from 17.2% (2006 cohort) to 58.2% (2007 cohort).

Conclusions: Using modern telecommunication such as cellphone in addition to quartely inter-district meetings may improve case holding in urban settings like Kampala.

PC-95384-06   Strengthening the follow-up of TB patients using HIV programs

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Background and challenges to implementation: Kawempe Home Care Initiative (KHCI) is a community based organisation in a large urban slum of 269 000 people with HIV prevalence 8.9% in Kampala district Uganda. A high TB surveillance default rate of 15% in 2007 in Kampala district raised concern among TB control stakeholders. A CB-DOTS program was set up at KHCI in collaboration with Mulago hospital TB Unit.

Intervention: KHCI recruited 15 community volunteers, 87% of who are HIV positive were trained to monitor and support TB and ARV medication adherence. Patients from the hospital were transferred for DOTS at KHCI. It is done on a regular schedule during initial and continuation phases ensuring adherence to the TB medication.

Results: By 31st December 2008, a cumulative total of 161 TB patients had been enrolled for DOTS of whom 121 (75%) were HIV co-infected and 52 (43%) where on HAART. 137 (85%) were treated as new cases and 24 (15%) were retreatment cases of who 5 (20.8%) were defaulters. 60 patients were expected to complete treatment by end of 2008, of these 52 (86.7%) patients completed and were declared cured. 2 (3.3%) were lost to follow up and 6 (10%) died while on treatment. The program therefore retained 58 (96.7%) of the 60 patients and had a cure rate of 87%.

Conclusion/key recommendations: Expert patients used as community volunteers in providing ART/TB adherence support can lead to good treatment outcomes and retention of patients in HIV-TB care programs.

PC-95512-06   Outcomes in HIV co-infected versus uninfected patients with extensively drug-resistant tuberculosis

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Background: There is little data on extensively-drug-resistant tuberculosis (XDR-TB) treatment-related outcomes in HIV high-burden resource-poor countries.

Methods: We reviewed the case records, of 236 South African patients diagnosed with XDR-TB, in four provincial TB facilities, between January 1992 and February 2008. Analysis was stratified by HIV status.

Results: The median age was 36 years, 45% were HIV co-infected, 84% were sputum smear-negative at diagnosis, and 86% were previously treated for multidrug-resistant (MDR-TB). The median delay from sputum acquisition to treatment-initiation was 60 days. In those who had received therapy the culture-conversion rate was 18% (37/200). The 12-month survival was 60% and 25% (26/103) of deaths occurred before XDR-TB treatment initiation. HIV-infected patients had a poorer survival than uninfected patients (12 month survival of 49.1% vs. 67.8%; *P* = 0.04) but culture converted at the same rate. HIV-infected patients receiving antiretroviral treatment (ART) had better survival than ART-naive patients (12-month survival of 65% vs. 25%; *P* = 0.02). In Cox multivariate regression models, body weight was the only independent predictor of conversion failure whilst HIV status, use of ART, unilateral disease, and treatment with ofloxacin and PAS, were independent predictors of survival.

Conclusions: In South Africa, despite intensive supervised multidrug treatment, the prognosis of XDR-TB, regardless of HIV status, is poor. Survival in HIV infected patients is better than those previously reported on from South Africa.and is improved by ART. These findings have implications for case-finding strategies, utility of rapid diagnostic tests, and the urgent development of alternative XDR-TB-related immunotherapeutic interventions for high HIV-prevalence environments.

PC-95548-06   Intervencion personalizada periodica abandono del tratamiento antituberculosis en Zapopan Jalisco

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Introducción : Los fármacos usados para tratamiento primario de la TBP, hacen que el apego al tratamiento continué siendo un problema. En Zapopan Jalisco, se diagnostican anualmente 140 pacientes de TB ; 85% logra curación y 2% abandona el tratamiento.

Objetivo : Disminuir abandono del tratamiento de tuberculosis pulmonar en pacientes del municipio de Zapopan, a través de estrategia de seguimiento personalizado y periódico en consulta externa.

Material y metodos : Estudio observacional, cuasi experimental, comparativo y analítico, se realizo estrategia en dos modalidades : Entrevista al paciente en consulta externa y seguimiento, de Agosto 2007 a Septiembre 2008.

Resultados : Se detectaron 32 pacientes; 20 hombres y 12 mujeres, con un rango de edad de 9 a 78 años. Encontrando cuatro domicilios falsos. Los teléfonos proporcionados fueron reales en el (100%). Veinte llamadas entrantes a la línea contratada. Hubo dos reconquistas ; una padece, además, diabetes, aspergíloma y alcoholismo, debido a esto había abandonado su tratamiento ; otra abandonó y posteriormente reinicia tratamiento. El estudio de contactos y seguimiento se realizo al 100%. Trece pacientes se han dado de alta. Durante el proyecto fallecieron tres por enfermedad agregada.

Conclusión : El seguimiento de los pacientes, a través del método utilizado, es útil. Por vía telefónica fue buena, ya que se obtuvieron mejores resultados comparados con el manejo tradicional, se logro más contacto con el paciente y familiares, se dio una relación más humana, con las personas afectadas y familiares, logrando un apego al tratamiento del 100% y permitió un mayor acercamiento de los servicios de salud.

PC-95641-06   Tuberculosis stigmatization is associated with treatment non-adherence in impoverished areas of Peru

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Background: Individuals with tuberculosis (TB) often suffer from social stigmatization. Consequently, TB related stigma has been implicated in delayed testing, treatment intermittency and default, which increase the risk of multidrug-resistant TB. The objective of this study was to identify predisposing demographic factors linked with TB stigmatization, and to test for associations between stigma and subsequent treatment adherence.

Methods: This nested cohort study involved 787 recently diagnosed TB patients and their 1466 household contacts in peri-urban shantytowns in Lima, Peru. Subjects were administered a questionnaire, which included 22 questions concerning perceptions and experiences of TB-related stigma. Linear and logistic regression, χ^2 and t-tests were used for the analysis.

Results: Patients who reported being stigmatized were 2.5 times more likely to be non-adherent to TB therapy ($P < 0.01$). Patients experienced more stigma than their household members who did not have TB ($P < 0.001$). Women were more stigmatized at home and in the community, while men were more stigmatized at work ($P < 0.05$ for all). Greater income and education was associated with less stigmatization overall ($P < 0.05$). Amongst patients who had previously had TB, men were significantly less likely to adhere to drug therapy ($P < 0.01$). Patients who were lost-to-follow-up were less likely to adhere to therapy than those who completed the study. Details of results are in the table.

Conclusions: TB patients who suffered stigmatization were at greater risk of treatment intermittency and default from therapy in these impoverished communities. Men and women experienced TB-related stigma in differing contexts. Stigma is a social barrier that interferes with TB treatment. Intervention efforts should therefore address this factor in targeted settings as a means of improving treatment compliance.

Completed patients vs. lost to follow-up					
	Lost to follow-up	Completed	OR	CI	p-value
Total	197 (100)	786 (100)			
Men	129 (65.5)	449 (57.1)	1.4	1-2	0.03
Women	68 (34.5)	337 (42.9)	0.7	0.1-1	0.03
Non-adherence during study	42 (21.3)	101 (12.8)	1.8	1.2-2.7	<0.01
Adherent vs. non-adherent patients in completed group					
	Adherent	Non-adherent			
Total	685 (100)	101 (100)			
TB Stigmatization	476 (69.5)	86 (85.1)	2.5	1.4-4.4	<0.01
Men vs. women in completed group					
	Men	Women			
Total	449 (100)	337 (100)			
Stigma at home	194 (43.2)	183 (54.3)	1.6 (a)	1.2-2.1	<0.01
Stigma in the community	216 (48.1)	195 (57.9)	1.5 (a)	1.1-2	<0.01
Stigma at work	195 (51.2)	142 (42.1)	1.4 (b)	1-1.9	<0.01
Mistreatment at home (1)	65 (14.5)	85 (25.2)	2 (a)	1.4-2.6	<0.001
Change in function at home (1)	116 (25.8)	109 (32.3)	1.4 (a)	1-1.9	<0.05
Change in function at work (1)	80 (17.8)	39 (11.6)	1.7 (b)	1.1-2.5	0.02
Previous TB	91 (20.4)	50 (14.9)	1.5 (b)	1-3.1	0.04
Non-adherence during previous TB	28 (30.8)	6 (12.0)	3 (b)	1.1-7.9	0.03
Non-adherence during study	55 (12.2)	46 (13.6)	-	-	0.6

All data n (%)
(a) OR greater for women
(b) OR greater for men
(1) Outcomes attributable to TB stigmatization

MDR-TB MANAGEMENT

PC-94308-06   Experience with a 21-month standardized regimen for the treatment of multidrug-resistant tuberculosis

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Setting: The two specialized units for the treatment of MDR-TB patients in Cameroon.

Objective: To assess the outcomes of patients with multidrug-resistant tuberculosis (MDR-TB) with a 21-month standardized regimen.

Design: Clinical study of patients with laboratory confirmed MDR-TB disease put on a 21-month standardized treatment regimen for the period of 1/2004–4/2007 with follow-up to 2009. Treatment regimen contained Km, Ofx, Pto, E, P, H, and Cfz. Clinical and bacterial progress was monitored during treatment quarterly until completion, then clinical with or without bacteriological control for up to one year.

Results: A total of 68 patients were put on treatment during the study period, 39 (57.4%) being men and 29 (42.6%) being women. The mean age of the patients was 34.7 years (range 19–74). Ten (14.7%) of the patients were HIV-seropositive. Six patients had been formerly treated with Ofx for <4 weeks; non had taken any other second-line ant-TB drug. The following anti-TB drug resistance patterns were identified: HR = 26 patients; HRE and HRS = 13 patients,

each; HRES = 16 patients. Treatment outcomes were the following: Cured 44 (64.7%); Treatment completed 4 (5.9%); Died 8 (11.8%); Failure 2 (2.9%); Defaulted 10 (14.7%); no Transfer. During a total follow-up period of 138 months, no patient relapsed, but one patient died.

Conclusions: The results of our experience confirm those of van Deun et al. and underscore the fact that a standardized approach may be the best pragmatic alternative to individualized treatment of MDR-TB in resource poor settings with little exposure to second-line anti-TB drugs. The duration of the treatment is quite long however and poses significant difficulties for patients, socially and professionally.

PC-94418-06   Prevalence of multidrug resistance TB in Karachi, Pakistan: identification of at risk groups

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Background: Despite a TB prevalence of 263/100 000 in a population of over 160 million Pakistan lacks information on prevalence of drug resistance. A nationwide drug resistance survey though an urgent need is difficult in the absence of DOTS PLUS Program.

Objective: To estimate prevalence of MDR tuberculosis at a community level, and to identify factors associated with drug resistance in Karachi.

Method: 640 TB patients were recruited from field clinics (July 2006 to August 2008) using convenient sampling. Consenting subjects were interviewed and sputum samples obtained for culture and sensitivity testing. Logistic Regression analyses were performed for risk factors associated with MDR.

Results: Overall MDR rate was 5.0%, 95%CI 3.3–6.6% (2.3% in untreated and 17.9% in treated patients). The factors independently associated with MDR were; female gender (OR 2.3; 95%CI 1.11–6.2), marital status (OR 3.04; 95%CI 1.15–9.6), absence of BCG scar (OR 1.9; 95%CI 1.15–8.36) and a prior history of TB (OR 14.3; 95%CI 5.6–24.5). At risk ethnic groups included Sindhis (from South East of the country) with (OR 5.05; 95%CI 1.28–21.45) followed by Pashtoons (from North West Frontier Province) OR 4.5, 95%CI 1.3–17.6).

Conclusion: This is the first report of community based prevalence of MDR-TB from Pakistan and suggests 21 000 MDR cases in the country. Given the limited resources available for addressing MDR in the country, the need for TB control programs to aim at MDR prevention through re-focusing DOTS delivery with emphasis on high risk groups (including women) becomes paramount.

PC-94640-06   MDR-TB among sub-categories of previously treated TB cases: an analysis in 12 settings

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Background: Past exposure to anti-tuberculosis drugs is a known determinant of drug resistance. However, previously treated tuberculosis (TB) cases are a heterogeneous group composed of relapse cases (recurrence after treatment success), cases returning after failing treatment, cases returning after treatment default, and others.

Objective: To evaluate proportions of multidrug-resistant TB (MDR-TB) among patient groups, including new cases and sub-categories of previously treated cases

Methods: 12 settings in 10 countries provided data on new cases and sub-categories of previously treated cases to the WHO Global Project on Anti-tuberculosis Drug Resistance Surveillance. Countries were from Latin America, Europe, Africa and Asia, and mostly low/middle-income. Differences in proportions were evaluated using Fisher's exact test.

Results: MDR-TB proportions were significantly higher ($P < 0.05$) among relapses than new cases in 7 of 12 settings. Combining all settings, relapses had 6.7 times higher odds of MDR-TB (95%CI 5.8–7.8) than new cases (32% MDR among 1283 cases vs 7% MDR among 9722 cases, respectively). Relapses did not have significantly different MDR-TB proportions than returns after default (32% MDR among 208 cases) in any setting. Returns after failure had significantly higher MDR-TB proportions than relapses in 4 settings and returns after default in 3 settings. Combining settings, returns after failure (49% MDR among 206 cases) had 2.0 times higher odds of MDR-TB than relapses (95%CI 1.5–2.8) and returns after default (95%CI 1.3–3.1). In some settings, few cases in sub-categories hindered the ability to find significant associations.

Conclusions: Past treatment failure is a strong determinant of MDR-TB. Also, relapse cases may be more at risk of having MDR-TB than is generally believed, due to weaknesses in treatment delivery and/or methods for declaring a patient successfully treated, or re-infection with resistant strains during hospitalization.

PC-94925-06   Relapse rate of pulmonary tuberculosis patients according to the initial drug resistance pattern

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Background: There is controversy in the standard short course chemotherapy to the pulmonary tuberculosis (PTB) patients with a drug resistance (DR) This study aims to compare treatment success and relapse rate of the PTB patients treated with standard short course chemotherapy irrespective of DR pattern.

Methods: We evaluated treatment outcomes of the PTB patients enrolled in 1998–99 and 2003 DR survey. Bacteriologically relapsed cases were traced with the laboratory registry of 2000 to 2007. Active follow up examinations were conducted in 2008. Bacteriologically positive patients within 90 days after treatment completion were excluded in the relapsed cases. Cases not traced or recorded as bacteriologically negative results in the registry were assumed to be non-relapsed cases. DR group was divided by all susceptible (G1), any isoniazid resistance [(except rifampicin), G2], any rifampicin resistance [(except isoniazid), G3], MDR (G4), and other drug resistance group [(except isoniazid or rifampicin), G5].

Results: Among 4600 cases enrolled in the DR survey, 2870 (79.8%) of 3595 new and 656 (65.3%) of 1005 retreated cases were successfully treated with first line drugs. 1218 (34.5%) among them were not traced. Relapsed cases were 129 (4.5%) in new and 54 (8.2%) in retreated cases. Total relapse rates were 5.2% (183); 4.7% (148) in G1, 7.7% (18) in G2, 30.4% (7) in G3, 27.0% (10) in G4, and 0% in G5. Hazard ratio was 1.55 (95%CI 0.81–2.99) in G2, 5.12 (95%CI 1.26–20.8) in G3, 3.7 (95%CI 1.17–11.7) in G4 compared with G1. By multivariate analysis, relapse rate was significantly high in male (OR; 1.67, 95%CI 1.15–2.38), retreated (OR; 1.63, 95%CI 1.16–2.31), G3 (OR; 7.56, 95%CI 2.99–19.1), and G4 (OR; 6.93, 95%CI 3.22–14.87).

Conclusion: Standard short course chemotherapy to the patients with rifampicin resistance seems to be not appropriate in terms of relapse.

PC-95065-06 Predictors of reconversion to culture-positive during MDR-TB treatment

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Background: Preserving Effective TB Treatment Study (PETTS) is a multi-country prospective study that aims to determine the frequency of, risk factors for and consequences of acquired resistance to second-line TB drugs (SLD). The Tropical Disease Foundation (TDF) in the Philippines, is one of the PETTS sites.

Objective: To determine the risk factors for reconversion to culture positive after having converted to culture negative during treatment.

Method/design: We analyzed a cohort of 225 patients who had positive baseline cultures (taken within 30 days before or after the start of MDR-TB treatment), with monthly sputum cultures until the end of treatment with SLD. and known treatment outcomes as of February 2009. All patients underwent direct observation treatment throughout the course of MDR-TB therapy. Reconversion to positive culture was defined as any positive culture after two consecutive monthly negative culture during treatment.

Results: Of the 225 patients available for analysis, 27 (12%) reconverted while on treatment. Univariate analysis showed no significant correlation between co-morbidity with diabetes mellitus, number of prior TB treatment, previous treatment with 2nd line drugs, extent of disease based on chest radiography, BMI, and DST at start of treatment. On multivariate analysis, unemployment (OR = 2.8, 95%CI = 1.1–7.2). and initiation of treatment within 6 months from screening (OR = 3, 95%CI = 1.2–7.4). were significant risk factors for reconversion.

Conclusion: These characteristics have been postulated to indicate severe disease since those unemployed are too sick to be able to work and those that are treated within six months after consultation are likely to have heavy bacterial load, hence a shorter time to culture isolation and DST. Further investigation is underway to determine whether this hypothesis is correct.

Table Multivariate analysis of factors for reconversion to positive among 225 MDR-TB patients

Variable	Reversion	No reversion	Crude odds ratio OR	Crude odds ratio 95% CI	Multivariate regression Adjusted OR	Multivariate regression 95% CI
Employment prior to TB reatment						
Unemployed	19	78	3.7	1.4–9.6	2.8	1.1–7.2
Employed	8	120				
Waiting time from screening to enrollment						
Less than 6 mos	14	60	2.7	1.1–6.6	3	1.2–7.4
6 mos or more	12	137				

PC-95205-06 Overcoming barriers to improve multidrug-resistant tuberculosis surveillance in Western Kenya

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Background: In 2008, the WHO reported the highest rates of MDR-TB to date, despite many countries reporting incomplete surveillance data. With the Nairobi-based Central Reference Laboratory (CRL)

serving country-wide drug susceptibility testing (DST) needs, multiple utilization barriers exist for peripheral sites in accessing service: specimen transport, tracking, resource availability (bottles), time to results delivery, and training of eligibility criteria for DST. The Mycobacterial Reference Laboratory (MRL) located in Eldoret has addressed these barriers to facilitate MDR surveillance capacity for the western portion of the country.

Methods: MRL staff visited 19 clinic sites in western Kenya for re-training of patient eligibility criteria for DST testing. Infrastructural support was established for a stable supply chain of culture bottles, specimen transportation from clinic to MRL to CRL, and accession and tracking system for all specimens. A retrospective study of the MRL tracking database and the CRL laboratory registry was performed.

Results: At baseline, the MRL facilitated 9.1 specimens/month. In the 12 months post program institution, the MRL handled 23.4 specimens/month ($P = 0.0058$). Of the 285 specimens, 27.7% ($n = 79$) revealed positive *M. tuberculosis* cultures. 10.5% ($n = 30$) were resistant to at least one drug (INH, streptomycin, rifampicin, or ethambutol). During the 5 years prior to MRL tracking, the MRL encatchment area produced 1.2 MDR cases annually compared to 8 cases post site visits ($P = 0.0089$). The average turnaround time was 11.7 weeks.

Conclusion: The challenges of accessing the centralized MDR surveillance system of the national TB program can be overcome through local retraining, supply chain stabilization, and the institution of accession and tracking systems. These interventions are reproducible and serve to establish improved MDR-TB surveillance within the national guidelines of Kenya's TB program.

PC-95412-06   Comparison of the sputum culture evolution between Peruvian patients with XDR- and MDR-TB

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Background: The pattern of sputum culture evolution during treatment reflects the likelihood of cure during treatment. Little is known about this pattern in extensively drug-resistant tuberculosis (XDR-TB).

Methods: The NTP MDR-TB database (1996–2008) contains information of patients receiving second-line drugs treatment. To understand the bacteriological evolution pattern of sputum culture in bacteriological confirmed MDR- and XDR-TB patients, we analyzed the longitudinal data of sputum cultures during treatment using Generalized Estimating Equations (GEE). Adjustment for potential confounders like sex,

age, type of treatment-regimen and drug sensibility was performed.

Results: A total of 8076 (97.6%) patients were MDR confirmed and 202 (2.4%) patients were diagnosed with XDR-TB. Among these patients, 34.1% were treated with individualized regimens, 37.8% received a standardized scheme with five drugs, 17.8% received a standardized regimen with seven drugs, and 10.4% received empiric treatments by considering the drug susceptibility pattern of the contacts. After adjustment, the GEE model showed that XDR-TB patients had 3.05 fold higher risk ($P = 0.03$) of a persistent positive culture compared to MDR-TB patients. Other factors associated with risk of positive culture were age (OR = 1.02; $P < 0.01$), and resistance to kanamicine (OR = 1.96; $P < 0.01$). Non-individualized schemes had higher probabilities to have a persistent positive culture as compared to an individualized regimen: the standardized scheme with 5 drugs (OR = 2.6; $P < 0.02$), the standardized scheme with 7 drugs (OR = 1.9; $P < 0.01$), and the empirical scheme (OR = 1.8; $P = 0.07$). Figure shows the total proportion of positive cultures during the second line drugs treatment.

Conclusion: The proportion of positive-cultures in XDR-TB patients during treatment is significantly higher than in MDR-TB.
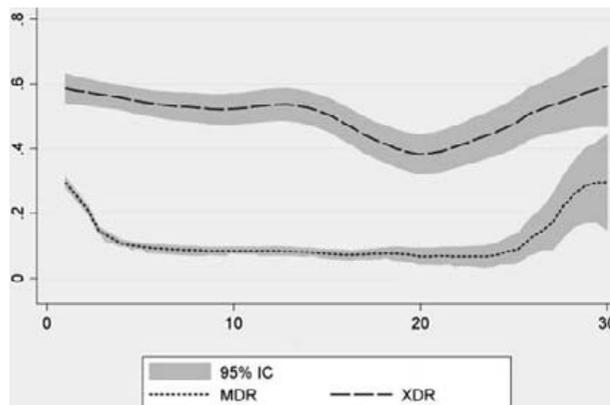
Figure Bacteriological evolution.

PC-95476-06   Addition of moxifloxacin to XDR-TB treatment regimen in Eastern Cape, South Africa

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Rationale: XDR-TB is MDR-TB with additional resistance to a quinolone and any injectable second-line

drug. Treatment options are by definition limited. Moxifloxacin (MFX) is a newer-generation quinolone with known efficacy in drug-sensitive TB. MFX has been included in XDR-TB regimens elsewhere with high rates of successful treatment outcomes.

Setting: A cohort of XDR-TB patients treated from 2006–2008 in Eastern Cape Province, South Africa (EC), a setting with high HIV co infection.

Background: Treatment for XDR-TB in EC began in late 2006 with individualized regimens of 4–7 drugs (standard treatment). MFX was included in XDR-TB regimens in EC after 04/2008. We conducted a case-control study on 6-month mortality in patients treated for XDR-TB with and without MFX. Controls received standard treatment. Cases were initiated on standard treatment after 04/2008, with MFX added.

Methods: Sputum specimens of patients with suspected XDR-TB were tested at a central laboratory for resistance to rifampicin, isoniazid, amikacin, and ofloxacin (i.e., XDR-TB). Early death was defined as death within 6 months of XDR-TB treatment initiation.

Results: Treatment records of 198/207 control patients initiating standard XDR-TB treatment from 10/2006–01/2008 were reviewed. From 05–07/2008 26 case patients started XDR-TB treatment including MFX. 10/26 (38.5%) cases treated with standard + MFX died within 6 months, as did 80/144 (55.6%) controls on standard treatment (OR 1.1, 95%CI 0.5, 2.7). Among HIV-positive patients, 6/14 (42.9%) cases had died and 41/107 (38.3%) controls (OR 1.2, 95%CI 0.4, 3.8). Among HIV-negative patients, 4/12 (33.3%) on MFX had died and 24/87 (27.6%) on standard treatment (OR 1.3, 95%CI 0.3, 4.8).

Conclusions: There was no difference in early mortality with the addition of Moxifloxacin to the XDR-TB treatment regimen. We are cautiously optimistic that in surviving patients adding of MFX may increase sputum culture conversion.

PC-95508-06   Drug sensitivity profile of *Mycobacterium tuberculosis* among children

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Background: Drug resistant tuberculosis (DR-TB) is a worldwide problem; in low incidence TB countries in Europe, DR-TB is concentrated in particular populations like previously treated elderly or immigrants from Eastern Europe. Transmission of drug-resistant *M. tuberculosis* to children can become a real threat if DR-TB cases prevalence increases.

Objective: To assess the drug sensitivity profile of *M. tuberculosis* isolated from children at two outpatient TB clinics of Northern Italy over a ten year period.

Methods: We carried out a retrospective analysis of all consecutive subjects under 15 years of age with culture-positive TB diagnosed at Institute of Infectious and Tropical Diseases of Brescia and Villa Marelli Institute of Milan from 1999 to 2008. Drug sensitivity testing for first-line TB drugs was performed. The association of DR-TB with sex, country of origin, site of disease and year of diagnosis was determined.

Results: 218 cases of TB were included, all were new cases; 60 (27.5%) were culture-positive TB cases. Drug resistance to at least one first line drug was identified in 10 (17%) patients: 3 strains were resistant to pyrazinamide, 1 was resistant to pyrazinamide and streptomycin, 2 were resistant to isoniazid, 2 to streptomycin and 1 patient had *M. tuberculosis* resistant to both isoniazid and streptomycin. Resistance to rifampicin occurred in only one case and no multidrug-resistant (MDR) strain was identified. In the univariate analyses there was no statistically significant association between sex, being foreign born, site of disease or year of TB diagnosis and drug-resistant TB. However, among nine Peruvian children, 4 (44%) had drug-resistant TB.

Conclusions: In this study setting DR-TB was an unusual event among children. Nevertheless, surveillance of drug resistance in this population should continue as an early indicator of the local transmission of MDR-TB strains.

PC-95600-06   MDR-TB patients with poor treatment outcome in Green Light Committee approved projects, 2000–2006

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Background: Treatment projects for multidrug-resistant tuberculosis (MDR-TB) approved by the Green Light Committee (GLC) include many patients who have received several previous treatments with unknown or unsuccessful outcomes, categorised as 'Other'.

Methods: Data were analysed for 9107 MDR-TB patients started on treatment in 2000–2006 in GLC approved projects; Arkhangelsk, Armenia MSF, Bolivia, Costa Rica, Dominican Republic, Egypt, El-Salvador, Estonia, Georgia/Abkhazia, Georgia GF, Guinea, Haiti PIH, Honduras, Jordan, Kyrgyzstan, Latvia, Lebanon, Mexico, Moldova, Mongolia, Nepal, Nicaragua, Orel, Peru, Philippines, Romania, Russia/Tomsk, Uzbekistan MSF, Uzbekistan GF and Tunisia. Annual cohorts from each project were divided into 'Other' and 'not-Other' categories based on initial registration.

Patients classified as 'treatment complete' or 'cured' were grouped as 'success'.

Results: Thirty-six percent of cases registered in the 30 projects were classified as 'Other'. Several projects demonstrated differences in treatment success between 'Other' and 'not-Other' categories however aggregate data from all projects showed equivalent outcomes (59%). In 17 projects success was lower in the 'Other' compared to the 'not-Other' patients, in seven there was no difference and six reported better treatment outcomes for the 'Other' patients. Seven projects from former Soviet Union (FSU) countries and Romania ($n = 4165$ cases), treatment success was lower in 'Other' cases than in 'not-Other' cases (46.7% vs. 58.3%: RR = 0.8, $P < 0.01$). This may reflect the more chronic or virulent nature of DR-TB in this region.

Conclusion: The 'Other' group of MDR-TB patients represent a large percentage of the patients in GLC approved projects. Less favourable outcomes are seen in this group of patients in well established projects in FSU countries and Romania, a cause for concern in the control of MDR-TB.

PC-95602-06   Lack of nosocomial transmission of drug-resistant TB in an open-air ward in Kampala, Uganda

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Background: Nosocomial transmission of *M. tuberculosis* is a global concern. There is increased interest in infection control strategies in low-income settings where respiratory isolation facilities are virtually non-existent and patients are frequently cohorted in large, open-air wards.

Methods: We recorded admission and discharge dates, bed numbers and stored all *M. tuberculosis* isolates for all adult patients with suspected TB admitted from Jul-03 to Aug-07 to the Mulago TB Hospital. Subjects were followed for at least two years for recurrent TB; subjects who died were evaluated for TB recurrence before or after death. Recurrent *M. tuberculosis* isolates were compared using drug susceptibility testing (DST) and IS*6110* RFLP with the patient's initial isolate. Non-matching *M. tuberculosis* isolates were compared to isolates from same-ward neighbors using spolygotyping and RFLP. Before the study began, we instituted simple infection control measures.

Results: Of the 474 subjects enrolled, 421 (89%) were hospitalized once. During the study period, subjects

with drug-resistant TB (DR-TB) were admitted to the same ward. The mean number of days in the ward for the entire cohort was 53.3 days (SD 28.1) corresponding to an average exposure to other individuals on the TB ward of 1065.7 person days (SD 622.0). During the 667.4 person years of follow up, we observed 48 subjects with possible TB recurrence, of which 35 have RFLP results. Of the 7 (20%) subjects with non-matching RFLP, 6 had a drug-sensitive *M. tuberculosis* isolate with no change in DST between the initial and recurrent isolates. Two additional subjects were culture negative at admission and became positive during follow up. The remaining molecular typing results will be available for the meeting.

Conclusions: Our preliminary results suggest limited nosocomial transmission of DR-TB in this prototypical low-income setting. Because of the lack of a control group, we cannot attribute our results to using simple infection control measures.

TB AND HIV PROGRAMMES AND CARE

PC-94420-06   Isoniazid prevention therapy: outcomes among HIV patients at St. Martin's Oshikuku Hospital, Namibia

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Background: Oshikuku Hospital started providing Isoniazid Preventive Therapy (IPT) for eligible HIV patients, based on the National TB guideline, since September 2006. However, there has been a huge debate among clinicians on the use of IPT in high TB prevalence settings vis-a-vis INH resistance. There also have been emerging concerns that patients might not be completing the recommended 6 months of IPT, thus increasing the likelihood of INH resistance. These concerns have worsened reluctance by clinicians to use IPT. We therefore sought to establish the IPT outcomes based on the follow up register.

Methodology: The district IPT register was reviewed for the period 1/10/06 to 31/12/07 for patients registered and started on IPT during this period. The outcome was recorded as completed, died, stopped treatment due to side effects, defaulted, transfer out and 'not indicated'.

Results: A total of 971 HIV patients were registered in the District of whom 828 (85%) were females. The mean age was 39 years. All patients were screened by a Medical Officer. Of the total 971 patients, 865 (89%) completed the course, 1 (0.1%) died while on IPT, 19 (2%) were stopped due to side effects, 69 (7%) defaulted, 12 (1.2%) were transferred out, and 5 (0.5%) had outcome not indicated.

Conclusion and recommendation: The treatment

completion rate for IPT is relatively high compared to TB treatment success rates (52–80%) for the same district and period. Thus, not providing IPT for fear of poor treatment completion rates has no basis in this district. There is still need to intensify follow up of patients started on IPT to reduce defaulters. The follow up mechanisms being used for patients on IPT should be duplicated to increase TB treatment success rates in the same district. Implementation of the IPT guidelines should be strengthened to ensure compliance by clinicians and promote the 3 'Is' approach. A follow up study to establish effectiveness will be needed.

PC-94744-06   Access to care and follow-up for TB-HIV co-infected patients

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Setting: Uganda–Case Research Collaboration TB clinic offering HIV screening in all TB patients but not able to offer HIV care to all dually infected.
Objectives: To describe the patterns of care seeking, follow-up and major challenges faced by TB-HIV co-infected patients in accessing HIV care.
Methods: Retrospective review of counseling records for 470 TB-HIV co-infected patients from 2005 to 2008 and still on follow up.

New patients are offered VCT for HIV as part of clinical research activities. Follow up is done by health visitors who escort patients home and identify nearby health facility of patients' choice to carry out daily treatment supervision of anti TB-HIV drugs.
Results: 207 (44%) received both TB and HIV care at the TB clinic through the community based-Directly Observed Treatment (DOT), 17 (8%) were lost to follow up. 263 received only self administered anti-TB drugs and were referred to other HIV care clinics. 36 (14%) who honored referrals were registered for HIV care. 227 (86%) patients who didn't honor referrals clinically deteriorated as evidenced by frequent sick visits. Reasons for not accessing HIV care included; preferred to access both care at the TB clinic (46%), too weak to visit the recommended clinic (16%), had no transport to the clinic (10%), believed TB needed much more attention than HIV (21%), attempted several times but were not attended to due to long queues at the HIV care clinics (7%).
Conclusion: Patients on community based DOT system are less often lost to follow up. TB patients who don't receive the needed HIV care deteriorate rapidly. The main emerging reason for patients' failure to honor referrals to other HIV care clinic is preference to receive TB-HIV care at once service point. This highlights the need to further strengthen TB-HIV integrated services at all levels for quality health care delivery.

PC-94809-06   Severe adverse events and mortality on tuberculosis treatment in Rwanda: a prospective cohort study

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Objectives: To determine incidence of adverse events (AE) and mortality in a cohort of HIV positive and negative patients being treated for tuberculosis.
Methods: Prospective data collection, with 6 months follow-up, of all patients presenting to the Internal Medicine department of the Kigali University Hospital for TB treatment from May 1, 2008 till February 1, 2009. Epidemiological (age, sex, outcome), clinical (TB localization, AE) and paraclinical (HIV, CD4, ALT) parameters were recorded. Severe AE include hepatotoxicity, concurrent infection and paradoxical reaction. We used Chi2 for comparison of groups, and ANOVA for comparison of means.
Results: Of the 92 patients recruited, 13 were lost to follow-up, 2 were excluded because of proven nontuberculous disease and 77 were retained (52% male, median age 35 years [range 21–63]). Pulmonary or mixed TB was diagnosed in 51 patients. Sixty-six percent were HIV-1 positive (median CD4 count 90 cells/mm3 [range 1–554]). Thirty-four received antiretroviral treatment (ARV) before or soon after the start of TB treatment. Severe AE occurred in 12/77, all HIV positive patients: concurrent infection (5/12), hepatotoxicity (3/12), paradoxical reactions (2/12), treatment failure (1/12) and treatment noncompliance (1/12). Overall mortality was 31%, AE associated mortality was 42% (5/12), mainly due to a concurrent infection (4/5).There was a trend towards a higher mortality risk for HIV positive patients (RR 2.5, 95%CI 0.97–6.68). Adverse events were not associated with higher mortality. Mortality was lower in HIV patients on ARV (RR 2.4; 95%CI 1.26–4.73) while similar mean CD4 (126 vs 131, $P > 0.1$).
Conclusion: The excess mortality of TB is probably due to factors related to HIV co-infection, but need confirmation. AE are exclusively associated with HIV. Concurrent infection is the most frequent adverse event. Mortality is lower in HIV patients on ARV treatment. Our data support an early start of ARV in this setting.

PC-94867-06   Advocacy, communication and social mobilisation in Kenya: exposure to the tuberculosis campaign

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Background: Intensified Advocacy, Communication and Social Mobilisation (ACSM) activities were implemented by the ACSM working group countrywide in Kenya between 2007 to 2008. The activities included, Mass media campaigns on television, radio and newspaper, use of drama to pass the TB messages, training of TB community based health care workers to disseminate messages and the school TB programme.
Aim: To determine the exposure to TB messages in the Kenya population.
Methodology: Two cross-sectional surveys were conducted on the general population: a baseline survey to determine the level of exposure to TB messages before implementation of activities and another conducted at the end of year 1 post-intervention. One cross sectional survey was conducted among the upper primary school children at post intervention.
Results: At baseline 1279 respondents were interviewed and 1378 at post intervention. The most accessible media channel was radio and in particular the vernacular stations which increased exposure of respondents to TB messages from 36.6% at baseline to 47.8% post intervention within 1 year. There was increase of people attending TB public meetings from 55% (baseline) to 64% (post-intervention). Exposure to the TB messages varied among the respondents with less exposure in the hard to reach areas. A majority of upper primary school children had been exposed to TB messages through health workers 65%, teachers 55%, radio 12%.

Table   Access to media & TB educational activities

Media type	Baseline (n=1,279)		Post-intervention (n=1,378)	
	General listen/ readership	Source of TB information	General listen / readership	Source of TB information
KBC (Radio)	27.7%	40.3%	27.7%	21.4%
Nation (radio) Easy FM	10.8%	2.2%	14.2%	7.8%
Citizen Radio	25.0%	20.9%	26.5%	23.0%
Radio stations of limited coverage	36.4%	36.6%	32.9%	47.8%
KBC (TV)	31.4%	31.4%	25.4%	30.0%
Nation TV	15.6%	23.5%	13.4%	14.6%
Citizen TV	6.9%	9.0%	19.3%	25.7%
KTN	20.5%	34.5%	20.5%	25.4%
Daily Nation newspaper	79.2%	14.7%	66.5%	26.8%
Standard newspapers	18.4%	-	20.2%	-

Conclusions: The various channels for ACSM activities should be maintained to reach diverse audiences. The most accessible TB messages were from radio and in particular the vernacular stations. The ACSM working group should utilize more of these stations that seem to have health programmes that could incorporate TB messages.

PC-94977-06   Monitoring TB-HIV co-infection activities in Burkina Faso, 2008

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Introduction: The HIV epidemic is generalised in Burkina Faso with an HIV prevalence of 1.6% in the general population in 2007. In 2006, the incidence of smear positive tuberculosis (TB) is estimated at 108 cases per 100 000. The National TB Program (NTP) endorsed a policy of generalised offer of the HIV test to all TB patients and to provide cotrimoxazole preventive therapy (CPT) and antiretroviral therapy (ART) to TB-HIV co-infected patients since 2004.
Purpose: To report the prevalence of HIV among TB patients and the proportion of HIV positive TB patients under CPT and ART in Burkina Faso.
Methods: Data on TB and HIV were collected through routine quarterly reports to the NTP.
Results: In 2008, a total of 3972 new TB cases were registered, of these 2737 (68.9%) had smear-positive TB (SSPTB), 633 (15.9%) smear negative TB (SSNTB) and 602 (15.2%) extra-pulmonary TB (EPTB). Before TB diagnosis, 442 patients were already known to be HIV-infected. We tested 2744/3406 (80.6%) patients with unknown HIV status, of these 339 were HIV positive. The overall prevalence on HIV was 12.4% (339/2744). In SSPTB patients the HIV prevalence was 11.2% (228/2037), in SSNTB it was 21.6% (80/370) and 9.2% (31/337) in EPTB. Of the HIV infected TB patients, 91.9% (718/781) had initiated CPT and 41.7% (326/781) received antiretroviral treatment.
Conclusions: The NTP in Burkina Faso has established an effective monitoring system for TB-HIV co-infection. Data show that TB patients have a high rate of HIV-coinfection, that the CPT policy is widely adopted and that the ART policy still need to be expanded.

PC-94978-06   Scaling up HIV counseling and testing among tuberculosis patients in Burkina Faso

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Introduction: Burkina Faso is a west African country with a HIV prevalence of 1.6% in 2007 and high burden of tuberculosis (TB). The incidence of TB is estimated at 248 cases per 100 000. In 2004 the national TB programme policy introduced and scaled up HIV

counselling and testing to all newly diagnosed TB patients.

Purpose: To evaluate the implementation of HIV counseling and testing policy in terms of percentage of TB patients being counselled and tested for HIV.

Methods: Data from 4 years (2005–2008) were analysed to describe trends. Information was collected through the TB case registration form at quarterly intervals.

Results: In 2005, 53.1% (1764/3321) tuberculosis cases were counselled for HIV, 62.3% (2496/4005) in 2006, 80.2% (2906/3623) in 2007 and 90.5% (3523/3894) in 2008. In 2005, 848 (25.5%) of TB patients with unknown HIV status were tested for HIV, 938 (23.4%) in 2006, 2195 (60.6%) in 2007 and 3138 (80.6%) in 2008. The proportion of TB patients who were HIV infected among those being tested was 267/848 (31.5%) in 2005, 312/938 (33.3%) in 2006, 173/2195 (12.4%) in 2007 and 388/3138 (12.4%) in 2008.

Conclusions: In Burkina Faso, the policy of a generalised offer of the HIV test to TB patients has been associated with an increase in the proportion of TB patients being counselled and tested for HIV and with the decrease in the estimated prevalence of HIV among TB patients.

PC-95023-06   Coordination between TB and HIV services for the co-infected TB patient: a real challenge

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Background: Mozambique promotes integration between TB and HIV Services and HIV counseling and testing for TB patients has been implemented at TB services since mid 2006. Co-infected patients are referred to HIV services for care and treatment. HIV services and TB services are sometimes located in different health units.

Methods: After almost two years of implementation, the National TB Program organized an evaluation of the TB-HIV collaborative activities. In March 2008 the Provincial TB supervisors performed the evaluation using standard tools in 22 TB facilities in 11 provinces. Data of a random selection of co-infected patients from the TB register of the second and third quarters of 2007 were compared with the patient files at the HIV services in the same facility.

Results: Of 446 TB-HIV patients included in the evaluation, corresponding patient files at an HIV service were available for 265 (59%). For 160/265 (60%) patients, the information in the TB register was confirmed from the patient file on receiving co-

trimoxazole preventive therapy. According to the TB register 154 patients were on antiretroviral therapy (ART), which was confirmed for 97 (63%). Of 154 patients with a known date on ART start, 68 (43%) initiated ART prior to TB treatment. Of the remaining 86 patients 29 (19%) started ART less than 2 weeks, 38 (25%) between 2–8 weeks and 39 (25%) more than 8 weeks after start of TB treatment.

Conclusions: For 41% of TB-HIV co-infected patients it could not be verified whether they were receiving HIV services at another health facility or not at all. Some of the co-infected patients started ART within 2 weeks of the start of TB treatment, which is not according to existing guidelines and might compromise clinical outcome. Coordination between TB and HIV services needs strengthening in order to improve co-infected patients' tracking for better clinical care, especially when services are located in different health facilities.

PC-95248-06   Integrated TB-HIV care in a public hospital in Buenos Aires

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Background: In our hospital patients with TB-HIV are managed by HIV specialists while monoinfected TB patients are seen by pneumonologists. In our district DOT is not available, resulting in a high rate of lost to follow-up (LFU).

Intervention: In January 2008 a new model of integrated TB-HIV service was implemented, which includes a specific clinic for TB-HIV in the HIV unit using an electronic medical record (EMR) which allows recording all clinical information and printing out reporting forms. Procedures for blood test and drug provision were simplified. A weekly meeting with pneumonologists and microbiologists was settled to report cases to the national TB program, discuss complex patients, identify LFU, and coordinate activities. We reviewed cases enrolled in this new model during 2008 and compared with cases assisted during 2007.

Results: Guidelines for latent and resistant TB were established. Of 40 evaluated patients (24 in 2008 and 16 in 2007) 85% of cases were males, median age was 37 y/o (IQR 30–42). Pulmonar TB was diagnosed in 55%, disseminated 25% and ganglionar 20%. Resistance test showed MDR in two cases (5%), and resistance to at least one drug in 7 (17.5%). Comparing 2008 with 2007, ARV was started in 63 vs. 44% (pNS), a new CD4 after TB was available in 70 vs. 38% and the mean CD4 increase was 74 vs. 3 cel/mm^3

($P = 0.03$). In 2008 LFU were 17% (4/24 patients) vs 69% (11/16) in 2007 ($P < 0.05$). Availability of information related to alcohol, tobacco or drug use, education, employment, and mortality, was uniformly higher in patients cared under the new model.

Conclusions: The implementation of a new approach to treat TB-HIV patients (EMR, integrated care, multidisciplinary team) resulted in better quality-of-care-indicators, earlier ARV-treatment, and better immunological recovery than regular care. LFU, although improved, continued being significant. Policy commitment, technical and logistic support are needed in order to improve care and avoid LFU.

PC-95316-06   Treatment outcomes of smear-positive TB stratified by HIV status for the year 2007 in Kenya

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Background: Cohort analysis of TB patients completing treatment has traditionally not been based on HIV status. Existing Monitoring and Evaluation tools in Kenya were revised in 2007 to enable analysis by HIV status. This has shed more insights into treatment outcomes for the different categories.

Methods: The PTB+ cohort notified to the Kenya's TB control program in the year 2007 was evaluated by considering the treatment outcomes when stratified by HIV status. Treatment success rates were calculated for each group of the PTB+ cohort.

Results: A total of 38 360 PTB+ patients were evaluated. The cure rates and treatment success rates for HIV+ TB patients were 71% and 83%, while for HIV− TB patients results were 80% and 89%. The results for those whose HIV status was unknown were 66% and 81% respectively. The death rates were 6% for the HIV+ TB cases, 2% for the HIV− and 4% for those patients whose HIV status was unknown.

Discussion: The stratification of the PTB+ cohort treatment outcomes by HIV status demonstrated that patients who were HIV positive and those whose HIV status was unknown have poor treatment outcomes compared to HIV negative patients.

Conclusions: The findings demonstrate that patients dually infected and those whose HIV status remain unknown perform poorly compared to TB patients not infected with HIV.

Recommendations: There is need to ensure universal HIV testing for all TB patients and barriers to HIV testing should be addressed if countries in resource limited and high HIV prevalence are to improve favorable treatment outcomes in dually infected patients.

PC-95482-06   HIV prevalence among tuberculosis patients in coastal districts of Gujarat, India

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Background: No information about HIV prevalence among general population in coastal districts of Gujarat was available till 2005–06. Little information exists regarding the burden of HIV among tuberculosis patients in Gujarat, and no population based surveys have been previously reported. A community-based HIV prevalence survey was conducted among tuberculosis patients treated under the Revised National Tuberculosis Control Programme (RNTCP) to evaluate the HIV prevalence among tuberculosis patients in Coastal district of Gujarat.

Methodology: Two coastal districts (Junagadh and Porbandar) from 1600 km long sea coast line were stratified based on non availability of HIV prevalence in antenatal clinics and randomly selected. From December 2006 to April 2007, remnant serum was collected from patients' clinical specimens taken after 2 months of anti-tuberculosis treatment and subjected to anonymous, unlinked HIV testing.

Results: Serum specimens were obtained and successfully tested for 409/569 (71%) tuberculosis patients eligible for the survey. HIV prevalence ranged widely among the 6 surveyed Tuberculosis Units (TUs) from 1.4% in Una TU to 7.2% in Vanthali TU. HIV prevalence among Tuberculosis patients was 3.4% in Junagadh district and 5.9% in Porbandar district. HIV infection was 4.4% among males and 3.1% among female tuberculosis patients. HIV infection was 1.9 times more likely among Smear-negative patients and 4.5 times more likely among Extra-pulmonary patients relative to Smear-positive tuberculosis patients.

Conclusion and recommendations: The burden of HIV among tuberculosis patients is found to be very high in coastal districts of Gujarat. HIV prevalence was higher among Smear Negative and Extra Pulmonary Tuberculosis patients compare to Sputum Positive Tuberculosis patients. Intensified efforts from programme managers are required to implement comprehensive TB-HIV services in areas with the highest HIV burden among tuberculosis patients.

EPIDEMIOLOGY AND SPECIAL POPULATION

PC-94069-06   Pulmonary tuberculosis in eastern Ethiopian prisons: an important agenda for the NTP

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Aim: Prisons are known to have high prevalence of tuberculosis (TB), including multidrug-resistant (MDR-TB). TB infection is easily disseminated to the general population. We determined prevalence and associated factors of pulmonary TB (PTB) in three prisons, in eastern Ethiopia from July to November 2008 with a total population of 2300.

Methodology: Structured questionnaire were administered to prisoners who had $\geqslant 2$ weeks of cough. Sputum samples were analyzed by direct microscopy and culture on LJ medium. Data were analyzed using logistic regression model.

Table   Multivariate logistic regression model of PTB predictor among inmates in eastern Ethiopia prisons, March 2009

Factors	AOR	SE	P value	95% CI	
Agequan2*	1.44	0.71	0.461	0.55	3.76
Agequan3	1.64	0.77	0.287	0.65	4.14
Agequan4	0.32	0.21	0.087	0.08	1.17
Urban resident	2.79	1.13	0.011†	1.26	6.17
Chest pain	2.07	0.94	0.108	0.85	5.05
Twice or more imprisonment	2.09	0.90	0.088	0.89	4.87
1–3 times visit to clinic	2.05	1.06	0.165	0.74	5.67
More than 3 times visit to clinic	3.33	1.80	0.026†	1.15	9.60
More than 4 weeks duration of cough	2.69	1.09	0.015†	1.20	5.98
Imprisoned with TB patient	2.82	1.08	0.007†	1.33	6.00
Imprisoned with chronic coughing inmate	3.61	1.41	0.001†	1.68	7.76

* Age as a quartile variable.
† $P < 0.05$ (significance level).

Result: Using an active screening strategy, we identified 371 PTB suspects. Out of this, 33 (8.9%) were smear-or-culture positive PTB. Fifteen (36%) of them were sharing cell with already known TB cases. Including 11 PTB cases on anti-TB treatment (passively identified), the point prevalence of PTB was 1913/100 000 (CI = 1410–2580); about seven-fold higher than in the general population. We found 3 previously undetected PTB cases for every 1 case that was identified passively. Being urban resident (AOR = 2.79, CI = 1.26–6.17); having >3 visits to clinics for TB related symptoms (AOR = 3.33, CI = 1.15–9.60); cough >4 weeks (AOR = 2.69, CI = 1.20–5.98); sharing cell with a TB patient (AOR = 2.82, CI = 1.33–6.00) or an inmate with chronic coughing (AOR = 3.61, CI = 1.68–7.76) were significant predictors of PTB.

Conclusion: Active surveillance for PTB among inmates with chronic cough is highly rewarding and could potentially strengthen TB control achievements in the community. The present findings will be discussed in relation to TB transmission and future strategies for control.

PC-94358-06   The use of capture-recapture method in estimating tuberculosis incidence in Egypt

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Objectives: To estimate tuberculosis (TB) incidence for 2007 in Egypt using active patient reporting from three sources of information.

Design/methods: A study was carried out during the period October–December, 2007, in all non-national tuberculosis programme (NTP) laboratories and clinics/hospitals of a representative sample of Egyptian governorates. Modified laboratory and suspect registers were introduced in each of the non-NTP facilities of these governorates. All non-NTP facilities were subjected to weekly visits by research assistants to record information about patients with suspected and confirmed TB diagnosis and to check whether they have reported to the NTP surveillance system. Three-source loglinear models including pairwise interaction terms were fitted to data from the NTP, non-NTP private and non-NTP public sources of data using the R statistical software.

Results: Cases could be reliably matched across sources within each country by using the set of three Arabic names for each case. A total of 162 TB cases were diagnosed by non-NTP providers. The majority of cases were diagnosed using sputum smear microscopy with or without X-Ray. The estimated incidence rate was 9.8/100 000 population in 2007 and the case detection rate (notifications/incidence) for smear
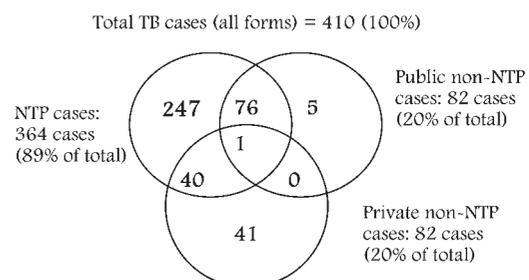
Figure   Detected TB cases (all forms) during Quarter 4, 2007, in NTP, public and private non-NTP facilities. NTP = national tuberculosis surveillance system; public non-NTP = public facilities outside NTP; private non-NTP = private facilities outside NTP.

positive TB cases was 66% (235/357, 95%CI 55–77). The incidence of all forms TB was 24.1/100 000 population during the same year with a case detection rate of 55% (364/663, 95%CI 45–64).

Conclusion and recommendations: This study demonstrates the potential utility of capture recapture analysis, which, together with improved surveillance, can provide estimates of disease occurrence and allow the monitoring of progress in the performance of TB surveillance and control over time. It is likely to be useful in countries where disease prevalence surveys are not cost-effective, provided sufficient data sources are available to fulfil methodological requirements.

PC-94421-06 Validating the results of Yemen tuberculin survey using interferon gamma assay

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Background: A nationwide tuberculin survey has been conducted in Yemen during 2007. The Interferon Gamma Release Assay (IGRA) was used to validate the tuberculin survey results.
Design/methods: All schoolchildren that showed a reaction to the tuberculin skin test (TST) were retested 3 months later with IGRA. Of the 477 children that showed TST induration, 352 (74%) were tested with IGRA. 50 newly diagnosed smear positive TB patients were also tested by IGRA to determine the sensitivity of the serological assay. The diagnostic performance of the TST was evaluated and the receiver operating characteristics (ROC) curve analysis was carried out.
Results: The sensitivity of the IGRA in active TB was 78.0%, slightly lower than that of TST (81%). The positive predictive value (PPV) of TST compared to IGRA as gold standard was 60.5% in healthy schoolchildren. ROC curve analysis showed that, in order to obtain high specificity (no FPR), a cut-off of 22 mm would be taken. The prevalence of infection reported by IGRA was 1.16%, which is 2.3 folds the prevalence reported by the mirror image and mixture methods (0.5%, each). These methods have used a mode of 20 mm obtained from the distribution of indurations in active TB patients to determine the prevalence and annual risk of TB infection. The mode of positive indurations with positive IGRA results was 15 mm in infected schoolchildren.
Conclusion: The IGRA test has shown that the 3 analytical methods for tuberculin survey significantly underestimate the prevalence of TB infection. The study reported the potential of using IGRA in deter-

mination of the true TB infection among children with positive induration in future tuberculin surveys.

PC-94451-06 Risk factors for mortality among children hospitalized with tuberculosis

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Background: Children in developing countries suffer high tuberculosis mortality. We examined factors associated with in-hospital death among children with tuberculosis.
Methods: This retrospective cohort comprised children age 0–14 years hospitalized with TB at a Peruvian referral hospital over the 25-year study period (1973–1997). Detailed chart abstraction captured clinical history including TB contacts, physical examination findings, diagnostic data, treatment regimen, and outcome of hospitalization. We used a Cox Proportional Hazards model to determine risk factors for mortality.
Results: Of 2392 children, two (0.1%) were known to be HIV positive; five children (0.2%) had documented multidrug-resistant TB. 266 (11%) children died. The median time to death was 16 days (interquartile range, 4–44 days). Reaction of less than 5mm induration on tuberculin skin testing (hazard ratio, 3.42; 95% confidence interval, 2.43–4.81; $P < 0.0001$) predicted death in a multivariable analysis. Age less than 5 years (HR 3.20; 95%CI 2.17–4.70; $P < 0.0001$), alteration of mental status (HR 3.42; 95%CI 2.03–3.67; $P < 0.0001$), respiratory distress (HR 1.47; 95%CI 1.12–1.92; $P = 0.005$), and peripheral edema (HR 1.53; 95%CI 1.10–2.12; $P = 0.01$) were also associated with mortality. Malnutrition (HR 1.12; 95%CI 0.80–1.57; $P = 0.51$), defined as admission weight less than 5th percentile for age, and history of BCG vaccination (HR 0.95; 95%CI 0.74–1.22; $P = 0.70$) did not predict in-hospital death. Treatment regimens containing rifampicin (HR 0.51; 95%CI 0.39–0.65; $P < 0.0001$) were associated with improved survival relative to regimens that did not include rifampicin.
Conclusion and recommendations: Negative reaction to TST is highly predictive of death among children with active tuberculosis. In children with clinical and radiographic findings suggestive of TB, a negative TST should not preclude or delay antituberculosis therapy.

PC-94472-06   A meta-analysis of tuberculosis as risk factor for mortality in HIV-positive individuals

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Background: An estimated one third of HIV positives are co-infected with tuberculosis (TB). TB is a leading cause of death in HIV positives. These deaths are assigned to HIV in the vital registration system. To assess the magnitude of TB as risk factor for mortality in HIV positives we have conducted a systematic literature review and meta-analysis.

Methods: To identify cohort studies assessing the effect of TB on mortality in HIV positives we systematically searched electronic databases (till Dec. 2008), performed manual searches of citations from relevant articles, and reviewed conference proceedings. Multivariate hazard ratios (HR) of mortality in HIV positives with and without TB, estimated in individual cohort studies, were pooled using random effect weighting according to 'Der Simonian Laird method' if the P-value of the heterogeneity test was <0.05.

Results: Pooled analysis of four studies estimating the effect of incident TB on all cause mortality in HIV positives showed a HR of 3.0 (95% confidence interval (CI): 1.8–5.0). When including six additional studies in which part of the cohort had TB at baseline the pooled HR was 2.3 (95%CI 1.6–3.1). The effect of TB on mortality tended to be smaller in HIV positives with baseline CD4 cell count $\leqslant$200 cells/μL and non-existing in HIV positives exposed to highly active antiretroviral treatment: HR 1.5; 95%CI 1.1–2.1) and HR 1.0 (95%CI 0.8–1.3), respectively. Sensitivity analyses based on study quality showed similar results.

Conclusion: HIV positives with TB face a more than two times higher risk of death from all causes compared to HIV positives without TB. This could be attributed to missed or delayed diagnosis of TB, to drug interactions and/or to an enhanced suppression of cellular immunity. The diminished effect of TB on mortality in individuals with more advanced HIV disease may indicate that these are at increased risk of dying from other HIV-related conditions.

PC-94536-06   Rifampicin mono-resistant TB disease: an increasing trend among children in Cape Town, South Africa

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Background: Rifampicin mono-resistant *M. tuberculosis* (RMR-TB) has serious implications for the duration, cost and outcome of TB treatment. A rising incidence of RMR-TB among adult, HIV-infected populations has been observed. Paediatric RMR-TB has not previously been described in an HIV− and TB-endemic region.

Methods: Children treated for culture-confirmed RMR-TB at two large referral hospitals managing complex and drug-resistant TB in South Africa were identified between March 2003 and February 2009. Hospital records were reviewed, and mutation analyses were performed on available specimens.

Results: Eighteen children with a mean age of 6.7 years (range 2 months–12.8 years) were identified; 3 (17%) in the first half and 15 (83%) in the latter half of the study period. Nine (50%) were HIV-infected and 4 (22%) were HIV-exposed, uninfected. Eleven (61%) had previous TB treatment or prophylaxis. Four children (22%) had extrapulmonary disease. Nine (50%) had cavitary disease, and of those 6 (67%) were HIV-infected. Twelve (67%) had known adult TB source cases; 5/12 (42%) adults had known RMR-TB. Primary transmission was suspected among these five children and an additional five without previous TB treatment. The remaining 8 (44%) failed previous adherent TB treatment or rifampicin-containing prophylaxis and may have acquired RMR-TB disease. Median delay to specific RMR-TB treatment was 70 [23–118] days. No mortality was observed. Twelve are currently completing treatment with a mean follow-up time of 327 days. A multidrug-resistant treatment regimen for 12–18 months was used. Gene mutations consistent with RMR-TB were confirmed in 4 cases.

Conclusion: More than 80% of the cases were identified in the latter half of the study period suggesting an increasing trend of RMR-TB, particularly in HIV-infected/exposed children. A >2-month median delay to appropriate therapy for RMR-TB and cavitary disease could serve as a source of RMR-TB transmission.

PC-94720-06   Successful implementation of isoniazid preventive therapy for childhood contacts in Rwanda

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Background: Rwanda has a high burden of tuberculosis (TB). The risk for developing TB disease is higher in children under 5 years and those HIV-infected. Isoniazid Preventive Therapy (IPT) is an effective approach to reduce development of active TB in children with a history of household contact with a smear-positive (smear+) index case. The Ministry of Health (MOH) recommends IPT but this intervention has not been systematically implemented. We describe the on-going efforts to expand Implementation of IPT in Rwanda.
Intervention: Through collaborative efforts between the TB Unit of the MOH and partners, the pediatric TB guidelines were revised in 2005. Contact tracing and a simple algorithm based on symptoms and physical examination were recommended to detect children with latent TB infection (LTBI) and initiate IPT for 6 months. Chest X-ray and Tuberculosis Skin Testing is only indicated to exclude active TB disease in symptomatic children. Children on IPT are offered HIV testing and those found to be infected are enrolled into HIV care. TB treatment cards and reporting tools were revised and a training curriculum was developed and implemented at the district level followed by supervision, monitoring and evaluation to ensure quality. Since 2006, IPT data is collected through routine quarterly reports from Detection and Treatment Centers (CDT) in all 30 districts nationwide.
Results: IPT has been successfully scaled up to all 187 CDT in Rwanda. IPT uptake increased nationwide from 815 children in 2006 to 1507 in 2007 and 1349 in 2008. In 2008, 38% (513/1349) of children on IPT were tested for HIV and 6% (32/513) of those tested were found to be infected.
Conclusion: The implementation of IPT for childhood contacts of adults with smear+ TB is feasible in Rwanda. Further efforts is required to determine the best methods to reach all eligible children, to ensure adherence and completion of IPT and to evaluate the impact on morbidity and mortality from childhood TB.

PC-94858-06   How is tuberculosis in prisons related to tuberculosis in the community?

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Background: Tuberculosis (TB) incidence among prisoners in Estonia is dramatically higher than in the rest of community (470 vs. 31.5/100 000 in 2008, respectively). Along with high proportion of multidrug-resistant tuberculosis (MDR-TB) (25.0% and 14.5% in 1998 and 2008, respectively), the number of HIV-infected persons increased from 52 in 1998 to 6909 in 2008, but interrelations between HIV and MDR-TB in prisons and outside have not been sufficiently addressed.
Aims: To retrospectively analyze the impact of TB incidence in the community on that in prisons and to study how prevalence of MDR-TB and TB-HIV co-infection in prisoners is related to that in the rest of community.
Methods: All patients registered as having TB, MDR-TB, or TB-HIV co-infection in Estonia in 1998–2008 were included. Pearson's chi-square test was applied to difference for cases of MDR-TB and TB-HIV co-infection between patients in prisons and outside.
Results: TB incidence decreased from 56.6 in 1998 to 31.5 in 2008. TB incidence in prisons was significantly correlated with that in the community ($\chi^2 = 0.62$, $P = 0.043$). The proportion of HIV-positive TB cases increased from 0.1% in 1998 to 9.4% in 2008. Prevalence of TB-HIV co-infection was significantly higher in prisons than outside ($P < 0.0001$). On the other hand, there was no difference between TB patients in prisons and in the rest of community for prevalence of MDR-TB ($P = 0.11$).
Conclusions: HIV-TB co-infected population in significantly concentrated to prisons, along with increasing number of HIV-infected people in the community. Fortunately, HIV-TB co-infection does not necessarily increase the prevalence of multidrug-resistance in prisoners with TB.

PC-95393-06   Pre-morbid nutritional status as a risk factor for progression to TB disease

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Background: The relationship between undernutrition and the development of TB in childhood has not been documented well.
Aim: To determine whether undernutrition increases the risk of progression to TB in children.
Methods: A retrospective cohort design was used to determine the incidence of TB in children aged 5 to 14 years who participated in a TST survey in 2005. Anthropometric data collected at the time of the TST survey were used to calculate the height-for-age, weight-for-age and BMI-for-age nutritional indices;

Z-scores for each of the indices (HAZ, WAZ and BMIZ) were determined. Children with z-scores less than −2SDs from the median (CDC 2000 Growth Standards) of each index were classified as undernourished. Those with z-scores of −2SDs and above were classified as non-undernourished.

Results: The cohort consisted of 3642 children. 12.7% ($n = 462$) of the children had a HAZ less than −2SDs; 12.9% ($n = 471$) had a WAZ less than −2SDs and 5.0% ($n = 183$) had a BMIZ less than −2SDs. Between 2005 and 2008, 17 children developed TB. Risk ratios are indicated in the table.

Conclusion: There is no evidence of any associations between pre-morbid nutritional status and TB incidence.

Table of risk ratios

	Risk		
	Under-nourished (R_U)	Non-under-nourished (R_N)	Risk ratio (R_U/R_N)
HAZ	0.00216	0.00503	0.430 (95% CI 0.0572 – 3.236)
WAZ	0.00212	0.00504	0.421 (95% CI 0.0559 – 3.165)
BMIZ	0.00546	0.00463	1.181 (95% CI 0.1575 – 8.858)

PC-95599-06 Study of the frequency of diabetes and of HIV among TB patients in a district of Dakar

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Aim: To compare the HIV and diabetes burden in TB patients in the district of Pikine; To describe the clinical characteristics of these associations TB/diabetes and TB-HIV.

Methods: During the year 2008, after a counseling pre and post checking, 250 TB patients have undergoes a screening for diabetes and HIV in the district. After counseling, patients who accepted testing of the diabetes and HIV were included. A capillary glycemia was practiced to the TB ones attending the district hospital and glucometer 'Type ACCU-CHEK' was used. The test glycemic was done with jeun.

Results: All the patients having had a glycemia of more than 120 mg/dl were oriented to the service in charge of diabetes. From sample selected 244 patients could be analyzed. They are distributed in the age bracket of 16 and 75 years. Positive smears represent 86% (210). According to the type of patients 85% are new cases, follows relapses 8% (20), defaulters 5% (14) and failures 1% (5). In the sample, 7 (3%) patients are HIV+, six of them are new positive cases and 1 relapse. The frequency of TB/diabetes association is more important than TB-HIV one, 31 (13%) cases of diabetes were identified. Most of cases (28)

were unknown before the investigation. For the 3 or remaining cases diabetes diagnoses preceded and of two of them were under treatment. The high values of glycemia lay between 120 and 532 mg/dl. Among the patients having a glycemia higher than 150 mg/dl (Nb 7), three recognize family antecedents. The characteristics of these diabetics 79% men, 81% (25) have less 50 ans, the new cases also account for 81% (H20, F5), the relapses 13% (H4, F0), defaulters 3% (H0, F1), the failures 3% (H1, F0).

Conclusion: Because of this Co-morbidity which seems frequent, the food mode of patients often directed towards sugars to the detriment of expensive animal proteins and the risks of MDR-TB which could result from it, routine diabetes testing of TB patients should be recommended.

POSTER DISPLAY SESSIONS

IMPLEMENTATION OF POLICY AND PRACTICE

PS-94038-06 The impact of national endorsement of standardized regimens on TB care

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Purpose: To better understand the anti-tuberculosis regimen and dosage prescribed to smear-positive tuberculosis (TB) patients, before and after the endorsement of standardized regimens for TB care at national level.

Materials and Methods: All patients newly diagnosed with smear-positive TB in Taiwan during April 1 to May 31, 2008 were enrolled. Patients were randomly sampled with a ratio of one to ten. TB case management cards and prescription from yellow booklet were reviewed by physicians. The result was compared with 108 cases sampled from April 1 to May 31, 2007 published previously.

Results: Of the 104 cases analyzed, 4.8% (5) did not received standardized regimen including isoniazid, rifampin, ethambutol, and pyrazinamide in intensive phase, 3.8% (4) were prescribed divided doses for once daily drugs, and 22.1% (23) were given non-standardized dosage of one of the anti-TB medications. The result was improved the most in decreasing proportion of non-standardized regimen in intensive phase compared with 14.8% (16/108) in 2007 ($P = 0.02$, Fisher's Exact). Although the proportion of

prescription of non-standardized dosage was decreased but not statistically significant ($P = 0.345$). Rifampin under-dosage, the leading dosage problem in 2007, found in 14.8% of 108 cases (16), were decreased dramatically to 5.8% of 104 cases ($P = 0.04$, Fisher's Exact). The leading dosage problem of 2008 was ethambutol under-dosage in 13 cases, which might be due to growing aging population in TB cases.

Conclusions: The evaluation of prescription to patients revealed that nearly one-third of regimens were not standardized from the initiation of treatment without specific reasons in 2007. The endorsement of standardized regimens for TB care at national level seemed to impact the standardized 4 combined regimen in intensive phase the most, and also decreased the under-dosage of rifampin, which was crucial for short-course standardized regimen.

PS-94115-06 Study on compliance with directly observed treatment conducted by family members of new smear-positive patients

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Objective: To explore effective methods to improve treatment compliance of new smear positive (NSP) tuberculosis patients and increase treatment and management quality.

Methods: The epidemiological, experimental study was utilized. From June 2006 to April 2007, NSP cases registered in Hanchan, Idu, Xianfeng, Zigui and Jianshi counties were randomly allocated to two groups using SAS software. Experimental group (Group 1) received DOTS conducted by family member and control group (Group 2) by village doctor. The treatment compliance and cure rate between 2 groups were evaluated. EpiData V3.02 software, EpiData Analysis V2.0.3.129 software and SAS 8.0 software were adopted for inputting data, compiling information and χ^2 analysis.

Results: Of total 532 TB cases, 270 were divided into group 1 and 262 into group 2. The sputum examination rate after 2, 5, 6 month treatment were 95.9%, 93.0% and 92.6% in group 1, and 95.8%, 89.7% and 88.9% in group 2. There was significant difference between 2 groups on sputum examination rate after 6 month treatment ($\chi^2 = 6.9350$, $P < 0.05$); 24 300 doses should be taken and 23 126 actually were taken in group 1. 23 580 doses should be taken and 22 045 actually were taken in group 2. The drug-taking compliance rate in group 1 (95.2%) was significantly higher than in group 2 $\chi^2 = 93.5\%$, $\chi^2 = 63.1636$, $P < 0.01$. The sputum negative conversion rate after 2 month and cure rate was 95.6%, 92.6% in groups 1 and 95.4%, 88.9% in group 2. There was

not significant difference between 2 groups on sputum negative conversion rate and cure rate.

Conclusion: It is possible to increase treatment compliance of new smear-positive TB patients, DOTS coverage rate and DOTS implement quality by encouraging educated, trained and responsible family member or volunteer as family supervisor in rural areas.

PS-94124-06 Investigating first-line TB regimen change in the 22 high-burden countries

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Background and challenges: Implementing a TB regimen change requires concerted decision-making and effort from multiple actors. As new TB drugs are being developed, past history can act as a guide for the introduction of future changes in TB regimens.

Method: Using background data and 165 in-country interviews, we investigated the past history of 35 first-line TB regimen changes in the 22 high burden countries. We determined the process, major players, and key procedural success factors for adoption, introduction and implementation of a new TB regimen in these countries. The challenges and considerations that will require more focused in-country preparatory work prior to launch were also defined.

Results and lessons learnt: Once a decision-making process was initiated, TB regimen changes required an average of 1.4 years for a decision plus 2.3 years for implementation. During decision-making, WHO recommendations and GDF grants were influential in shaping policy. Different arguments were seen as important, depending on who had significant input into the process. National TB Programs tended towards a public health perspective and concerns about cost and logistics; WHO and donors (for more donor-dependent countries) relied more on international policy evidence; and civil society (for countries with an active TB advocacy landscape) promoted patient concerns. Larger and more developed countries were more likely to conduct effectiveness studies as part of the decision-making, and to have staged roll-outs.

Conclusions and recommendations: Regimen changes may take many years. Faster implementation of improved regimens requires sufficient investment to generate evidence and a champion for change.

PS-94383-06 Programmatic management of MDR-TB in Dominican Republic, 2006–2007

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Background: The National Tuberculosis Program started the registration of Category IV patients in October 2005, registering 135 patients by the end of 2006. In this study we will review the data registered during 2007 second year of implementation of the program.
Aim: To gather information that will allow us to improve programmatic management of MDR.
Design and methods: Descriptive study. The Category IV register book was review, analyzing demographic, clinical and treatment variables. The obtained data was process and analyzed.
Results: 116 cases were registered, all pulmonary: 79 had confirmed MDR, 1 poly-resistant, 22 reminded as suspects and 14 were excluded. Of confirmed MDR, sex distribution was the same to 2006 (59% male and 41% female). The history of second line drug used reduced from 40% in 2006 to 9%.The distribution by previous treatment was: 40 (50.6%) failure to Category II, 22 (27.8%) failure to Category I, 7 (8.9%) new, 5 (6.3%) after relapse, 3 (3.8%) after default and 2 (2.5%) others. 58 patients have initiated treatment increasing from 50% of 2006 to 68% with a decrease in dying in waiting from 37% to 18%, 7 (8.9%) refused treatment. 2 patients are HIV positive.
Conclusion: Patients registered in 2006 reflected part of the prevalence of chronic cases that were not treated following the guidelines. There is a weakness in the diagnostic capacity showed in higher number of suspects. Most of the patients had history of failure to Category I or II regiments. More patients had access to treatment.

PS-94453-06 Cost and cost-effectiveness of laboratory capacity strengthening in high TB burden, low resource

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In Lesotho, the Foundation for Innovative New Diagnostics (FIND), the Partners in Health (PIH) along with Ministry of Health carried out an extensive evaluation of the national TB reference laboratory (NRL) and launched a project to rapidly establish a liquid culture and drug susceptibility testing (DST) facility to diagnose tuberculosis (TB) and multidrug-resistant TB (MDR-TB). Within a very short period of time, FIND and its partners successfully incorporated the NRL of Lesotho into a quality-assured TB culture facility with a capacity to streamline culture and DST. As a follow-up, molecular testing for MDR-TB employing line-probe assay (LPA) was established by FIND and a brand new molecular laboratory was inaugurated at the NRL complex in November of 2008. This capacity strengthening and laboratory upgradation project gave an excellent insight and would serve as a test case for other sub-Saharan countries with high TB (MDR and XDR-TB) burden where quality-assured, safe laboratory infrastructure for culture and DST is desperately needed. In addition, it provided valuable lessons on areas that are essential for sustainability of the enhanced operation and improved capacity. Our costing study aims to address and document the following: 1) all costs (financial and economic) associated with the laboratory upgrade, 2) changes in operational costs relating to pre and post laboratory upgrade, and 3) provide specific lessons learnt in regards to implementation and management issues that are associated with rapid integration and introduction of new technologies and capacity improvements. This study is currently on-going and the data is being analyzed.

PS-94458-06 Eastern Mediterranean Partnership to Stop TB: multi-sectoral response to Stop TB in EMRO

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Aim: The Eastern Mediterranean Partnership to Stop TB was launched in May 2008 with the objective to respond to the gaps in tuberculosis care in the countries of the WHO Eastern Mediterranean Region. We assessed the rationale behind establishing the Partnership and examined its activities and outcomes.
Methods: Descriptive review on the Partnership activities through its documents, workplans, and other materials, and also through comparison with the existing other partnerships in public health.
Results: We found the Eastern Mediterranean Partnership has been instrumental in increasing broader society support to TB patients. This includes; generating the support to marginalized TB patients like MDR-TB patients and those in countries under complex emergency; enhancing the national commitment through forging national partnerships; and engaging community particularly youth in the fight against TB. The Partnership however has not been effective, yet, in generating large amount of financial support from the countries of the Region.
Conclusions: Tuberculosis control is indeed not just a public health issue and has significant socio economic

implications. The initiative of the Eastern Mediterranean Partnership to Stop TB has provided a well thought and coordinated multi sectoral response and needs to be strengthened and replicated at national levels. The Partnership however is still at the infancy and needs more institutionalization in the Region.

PS-94741-06 Research of directly observed treatment conducted by family member for new smear-positive pulmonary tuberculosis patients

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Objective: To evaluate the effectiveness of two different management models and assess the feasibility of using patient's family members to implement directly observed treatment (DOT) instead of village doctors in remote areas.
Methods: Experimental study was performed in this project. 532 new smear positive pulmonary tuberculosis cases detected in five mountainous counties from June 2006 to April 2007 were randomly allocated using SAS software to two groups. One was family member DOT group 270 (experimental group), the other was village doctor DOT group 262 (control group). Patients' family members were selected and trained as observers to supervise medication in take of patients every time until treatment completion, and to supervise rechecking of sputum and chest film. Data about drug taking, sputum rechecking, and costs and time for patients and village doctors were collected and analyzed using EpiData V3.02 software, and SAS software.
Result: Cohort analysis at the end of treatment showed 250 conversed, 1 completed, 5 died due to other diseases, 2 missed, 6 transferred, 6 interrupted because of adverse drug reaction in experimental group 270, and 233 conversed, 1 died, 6 missed, 6 transferred, 15 interrupted because of adverse drug reaction, 1 refused in control group 262. Cure rates of experimental group and control group were 92.6% and 88.9% respectively ($\chi^2 = 2.1316$, $P > 0.05$). The medians of time spent by patients during drug taking every time were 7.5 minutes in experimental group and 54.4 minutes in control group respectively. The assessment of satisfaction degrees of management models by patients showed special satisfaction 39.8%, satisfaction 59.4% in experimental group, special satisfaction 21.0%, and satisfaction 76.4% in control group.
Conclusion: It is feasible for family members to implement DOT in remote areas, especially in mountainous areas where the economy was undeveloped, and the traffic was inconvenient.

PS-94798-06 The outcome of tuberculosis and treatment adherence among prisoners compared with civilians group

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Tuberculosis is a major health problem in many country, especially in marginalized people who are living in overcrowded and precarious conditions. We try to evaluate retrospectively the outcome of tuberculosis and treatment adherence among two different group, prisoners and civilians. 100 patients were hospitalized in Pneumology Sanatorium Aiud, and 31 were in Penitentiary Center of Aiud. We analyzed clinical and social profile of prisoners compared with civilians like: gender distribution (male prisoners 97% comparative with 74% patients), mean age (33.2 y for prisoners, and 53.4 y patients), repartition on age (21–30 y 55% for prisoners and over 51y for civilians 46%), occupation (unemployed without medical insurance 90% for prisoners, and for civilians 80% unemployed out of 30% without any income, retired 4%), the environment (urban area 55% for penitentiary, and 59% for Sanatorium), living conditions (homeless prisoners 19%, civilians 16%, and with precarious conditions 36% for prisoners, 42% for civilians), smoking habitat (77% prisoners, 80% patients), alcohol abuse (61% prisoners and 45% patients), The civilians were more likely to be symptomatic (60% comparative with prisoners 23%), and have advanced disease (52% with cavity and 20% extensive tuberculosis from civilian and for prisoners 45% were cavity and extensive 26%) Smear situation for civilians were M+C+ 66%, M−C+ 22% and for prisoners M+C+ 55%, M−C+ 29%. Patients' adherence was classified as follows: completed, defaulted, dead or transferred out. In Penitentiary 84% made completed treatment and only 16% defaulted and transferred out, and in Sanatorium 52% had noncompliance at treatment. The outcome of TB were with negative smear 97% for prisoners, and 87% for the civilian patients. TB control programmes should initially focus early diagnosis and standardized treatment (DOTS) associated with medical education with a better motivation of these patients.

PS-94884-06 Analysis of status of new rural cooperative medical scheme on tuberculosis control in rural areas

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Background: The pilot New Rural Cooperative Medical Scheme (NCMS) was implemented in Henan province in 2003. TB was integrated into this scheme in 2005. Only in designated TB dispensaries can the

charge for TB service get reimbursement from NCMS. This paper is to describe the reimbursement mechanism under NCMS and its influence on TB care service.

Methods: A literature review was conducted. 122 TB patients, who have got reimbursement, were inquired by questionnaires from three counties classified by population, economy and geography. Total 12 stakeholders in policy-making and management of NCMS were interviewed.

Results: 92% patients got diagnosed as TB in designated dispensaries. The frequency of doctor visits before diagnosis decreased from 4–6 times in 2004 to present 0.6 times. 69% patients in one county knew TB through NCMS certificate with printed TB knowledge, which was much higher but less cost than that through traditional media. 36% patients were hospitalized. The total cost for completing a regular treatment was nearly US$512 ($84 for out-patients and $624 for in-patients). The average reimbursement from NCMS was US$238 ($45 for out-patients and $291 for in-patients). The income of designated dispensaries showed a yearly average increase of 25% from 2004 to 2007.

Conclusion: NCMS is a new approach to ensure rural TB patients get a regular and high-quality TB service. And the centralized management for TB patients was strengthened through reimbursement mechanism. But the standard of admission to hospital and discharge should be clearly defined to avoid supplier-induced demand and reduce patients' economic burden.

PS-95015-06   Delay in patient diagnosis of pulmonary tuberculosis at a primary health level, Vitoria, ES, Brazil

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Setting: Tuberculosis (TB) patients reported in Vitoria TB Program, Espirito Santo, Brazil from January 1, 2003 to December 30, 2007.

Objective: This study was design to identify risk factors associate to patient's delay at a primary care level.

Methods: We conducted a cross-sectional study. A questionnaire ascertained the date and of onset, duration of TB symptoms and the date of confirmatory TB diagnosis. Covariates were divided into three subgroups: demographics, clinical and diagnostic factors. The Mann-Whitney test was used to compare between-group distribution of delays.

Results: Out of 304 patients, 296 (97%) reported at least one TB symptom. 244 (80.3%) reported cough greater than 3 weeks and the overall median of cough duration was 76 days. A multivariate analysis revealed cough (ORadj 7.35; 95% confidence interval [CI] 2.40–22.5) and initial weighed less than 60 kg (ORadj 5.92; 95%CI 1.83–19.1) were associated with patient delay of ≥30 days. In a multivariate model with ≥90 days defining patient delay, age ≥30 years old (ORadj 1.93; 95%CI 1.09–3.43). chest pain (ORadj 2.42; 95%CI 1.29–4.53) were associated with increased risk of patient delay.

Conclusion: Improve population education about TB symptoms and improve activity case finding will reduce delays and may reduce TB transmission at community level.

PS-95047-06   Medical students at risk for nosocomial tuberculosis infection in Rio de Janeiro, Brazil

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Introduction: Nosocomial transmission of tuberculosis (TB) is considered an occupational risk for healthcare workers (HCWs), especially in high burden countries. The risk among healthcare students, however, has been neglected.

Methods: We evaluated the incidence of latent TB infection (LTBI) and its associated factors in five medical schools in three cities with different TB incidence rates in Rio de Janeiro State, Brazil. A longitudinal survey was conducted among undergraduate medical students using tuberculin skin test (TST) conversion as a marker of LTBI incidence. Conversion was defined as an induration ≥10 mm in the third TST (TST3), with an increase of at least 10 mm over a negative two-step baseline TST (TST1 and TST2).

Results: Among 458 participants, mean age was 21.8 (± 2.4) years. The overall LTBI prevalence at baseline was 6.9% (95%CI = 5.4%–8.6%), the booster phenomenon was present in a further 8.4% (95%CI = 6.5%–10.6%). The TB annual risk of infection was 3.1% (1.8%–5.2%), and it was only associated with nosocomial TB exposure [Hazard Ratio = 9.3 (2.0–42.9)] on multivariate analysis. Unlike TST1 small reactions (1–9 mm) and TST2 boosting, which were both associated with BCG vaccination after infancy, nosocomial TB exposure was the only factor associated with TST conversion (Table).

Conclusions: We conclude that medical students are at risk for TB transmission in Rio de Janeiro, and possibly in other high burden countries. We suggest that medical students in high burden countries should be regarded as HCWs and submitted to the same policies, as recommended by developed countries' guidelines.

Table Tuberculin skin test conversion among 458 medical students, Brazil, Rio de Janeiro, 2002–2004

Characteristics	Conversion (n = 13)	No conversion (n = 445)	HR (95%CI)*	P value*
Age, years,				
mean ± SD	22.0 (2.8)	21.7 (2.4)	—	0.666
Sex				
Female	10 (3.9%)	249 (96.1%)	1	
Male	3 (1.5%)	196 (98.5%)	0.4 (0.1–1.5)	0.172
Socio-economic status (mean monthly family income)				
A1 (US$ 2715)	2 (2.2%)	88 (97.8%)	1	
A2 (US$ 1619)	6 (3.1%)	187 (96.9%)	1.4 (0.3–7.1)	0.665
B1 (US$ 977)	3 (3.3%)	87 (96.7%)	1.5 (0.3–8.8)	0.671
B2 (US$ 581)	1 (1.9%)	52 (98.1%)	0.7 (0.1–8.0)	0.796
C (US$ 322)	1 (4.3%)	22 (95.7%)	1.8 (0.2–19.3)	0.648
D (US$ 147)	0 (0.0%)	3 (100.0%)	—	—
E (US$ 72)	—	—	—	—
Missing	0 (0.0%)	6 (100.0%)	—	—
Clinical years				
Pre-clinical	6 (3.8%)	150 (96.2%)	1	
Early clinical	3 (1.6%)	187 (98.4%)	0.8 (0.2–3.5)	
Late clinical	4 (3.6%)	108 (96.4%)	8.3 (1.7–40.5)	**0.009**
TB incidence in the city				
Low	1 (1.8%)	54 (98.2%)	1	
Intermediate	5 (2.9%)	165 (97.1%)	4.8 (0.5–42.6)	0.164
High	7 (3.0%)	226 (97.0%)	0.4 (0.1–1.2)	0.088
BCG vaccination scar				
No	1 (2.5%)	39 (97.5%)	1	
Yes	12 (2.9%)	401 (97.1%)	1.3 (0.2–9.8)	0.819
Missing	0 (0%)	5 (100.0%)	—	—
Age of last BCG vaccination				
None				
Infancy				
(≤2 years old)	1 (2.5%)	39 (97.5%)	1	
Later	0 (0%)	93 (100%)	—	
(>2 years old)	6 (6.0%)	87 (93.5%)	2.4 (0.3–20.3)	0.409
Missing	6 (2.6%)	226 (97.4%)		
TST1 size (induration)				
0 (no induration)	10 (2.5%)	392 (97.5%)	1	
1–4 mm	2 (5.9%)	32 (94.1%)	2.5 (0.5–11.3)	0.241
5–9 mm	1 (4.5%)	21 (95.5%)	1.9 (0.3–15.6)	0.515
Booster size (induration)				
0 (no induration)	11 (3.7%)	287 (96.3%)	1	
1–4 mm	1 (1.8%)	55 (98.2%)	0.5 (0.1–4.3)	
5–9 mm	1 (1.1%)	93 (98.9%)	0.3 (0.03–1.9)	0.563
Non applicable	0 (0%)	10 (100.0%)	—	0.184
Nosocomial TB exposure				
No	3 (1.2%)	245 (98.8%)	1	
Yes	8 (5.6%)	136 (94.4%)	9.3 (2.0–42.9)	**0.004**
Unknown	1 (1.9%)	51 (98.1%)	—	
Missing	1 (7.1%)	13 (92.9%)	—	

*P from Cox regression analysis.
HR = hazard ratio; CI = confidence interval; TST1 = first tuberculin skin test.

PS-95049-06 Dramatic increase in case detection rate because of intensive counselling

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Challenges: Lack of information about TB, and terrible social stigma, results in deep rooted reluctance to get sputum testing done. Many are not aware of the symptoms of TB. Fear of losing jobs and ostracism by society are key issues that need to be addressed.
Methods: Involvement of the community crucial in imparting intensive education. This is being done in 2 ways.
1 Full time counsellers provide counseling to patients, family members and those living or working in proximity, and encourage them to come for testing.
2 We organize large community meetings for raising awareness about TB. Municipal councilors and legislators are invited. Their presence has a great impact. Our staff belongs to the same socio-ethnic and religious/economic groups as the communities they serve, which makes their message acceptable.
Results: In a TB treatment unit in South Delhi, Operation ASHA covers half the total population and patients. Here, between 2006 and 2008, the detection rate went up by 39%. Within our area, the detection rate must have gone up by 78%.
Conclusion: Detection rate can be substantially improved by a robust awareness program. What worked in our favor was the fact that we have hired local persons, and involved local political leaders. Other programs will benefit from similar activities. Awareness programs should be a key recommendation for all organizations with the same focus.

PS-95183-06 Increased tuberculosis case notification in private hospitals in Thailand

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Background: Of 1334 hospitals in Thailand, 354 hospitals are from private sector. However, only 150 private hospitals regularly submit TB surveillance reports to National TB Program (NTP).
Purpose: To describe characteristics of TB patients being reported from private hospitals.
Method: Formal agreement between NTP and Private Hospital Association (PHA) as well as between PHA and each private hospital have been developed. PHA negotiates with administrators of private hospitals to organize the TB services including setting up TB clinic, assigning a dedicated TB coordinator, registering all TB patients through electronic software, notifying all cases to provincial health offices (PHO) to public health activities (Directly Observed Treatment, contact investigation, defaulter tracing system), and submitting all quarterly TB reports to PHO. NTP provides training, supervisions, meetings, quality assurance for smear microscopy, health education materials to pri-

Figure 1 Summary number of all cases TB patients registered in 20 private hospitals from January–September 2008, Thailand.

No.	Private Hospitals	New Smear-Positive Cases	New Smear-Negative Cases	Relapse Cases	Extra-Pulmonary Cases	Treatment after Failure Cases	Treatment after Default Cases	Others (Smear-Positive) Cases	Others Cases	All types registered Cases	HIV Counseling Cases	HIV Testing Cases	HIV Infection Cases	Co-tri Cases	CD4 Testing Cases	CD4 <250 Cases	ARV Cases
1	Aikchol 1	32	77	1	18	0	0	0	2	130	46	38	11	4	9	8	6
2	Aikchol 2	5	6	0	7	0	0	0	3	21	14	14	0	0	0	0	0
3	Phayathai Sriracha	20	1	0	2	2	2	1	2	30	15	15	2	0	2	2	0
4	Laemchabung International	16	7	1	1	0	0	0	4	29	7	7	3	0	0	0	0
5	Mongkhut Rayong	10	2	1	4	0	0	0	2	19	18	19	4	0	3	1	1
6	Ruamphaet Rayong	2	2	0	2	0	0	0	0	6	0	0	0	0	0	0	0
7	Sotharavej	10	4	0	5	0	0	1	1	21	10	10	3	0	3	1	1
8	Jularat Bangpakongpiyavej	12	14	1	5	0	1	0	12	45	45	41	12	4	0	0	0
9	Mahachai 1	26	15	0	21	0	0	0	14	76	41	41	3	0	5	5	3
10	Mahachai 2	18	22	0	0	0	0	0	18	58	3	3	0	0	0	0	0
11	Srivichai 3	17	22	1	7	0	0	0	5	52	29	26	4	0	3	3	2
12	Ekachai	10	9	0	6	0	0	0	1	26	11	8	3	0	0	0	0
13	Mae-klong 2	3	2	0	1	0	0	0	2	8	4	3	3	0	3	2	0
14	Phetcharat	4	2	0	1	0	0	0	0	7	4	4	0	0	0	0	0
15	Muangphet-Thonburi	2	6	0	0	0	0	0	1	9	0	0	0	0	0	0	0
16	Sancamillo	2	5	0	2	0	0	0	0	9	2	2	0	0	0	0	0
17	Vejprasit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Phisaivej	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Nongkhai-Wattana	2	2	0	0	0	0	0	0	4	4	4	0	0	0	0	0
20	Mission-Phuket	27	20	3	5	0	1	0	5	61	40	24	8	5	3	3	3
	Total	**218**	**218**	**8**	**87**	**2**	**4**	**2**	**72**	**611**	**293**	**230**	**54**	**13**	**31**	**25**	**16**

Figure 2 Number of new smear-positive TB patients divided by gender and age.

No.	Private Hospital	0-14 M	0-14 F	15-24 M	15-24 F	25-34 M	25-34 F	35-44 M	35-44 F	45-54 M	45-54 F	55-64 M	55-64 F	>65 M	>65 F	Total M	Total F	Grand Total
1	Aikchol 1	0	0	4	3	4	2	4	2	4	1	3	1	3	1	22	10	32
2	Aikchol 2	0	0	0	1	1	1	0	2	2	0	0	0	0	0	3	2	5
3	Phayathai Sriracha	0	0	2	1	8	3	4	0	1	0	0	0	1	0	16	4	20
4	Laemchabung International	0	0	1	1	4	2	4	0	2	0	1	0	1	0	13	3	16
5	Mongkhut Rayong	1	1	0	0	2	0	2	0	5	0	1	0	0	0	9	1	10
6	Ruamphaet Rayong	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2
7	Sotharavej	0	0	0	0	4	3	5	0	0	0	0	0	0	0	9	1	10
8	Jularat Bangpakongpiyavej	0	0	1	1	4	3	2	3	0	0	0	0	0	0	7	5	12
9	Mahachai 1	0	1	5	1	8	3	4	1	6	0	1	1	1	0	18	8	26
10	Mahachai 2	0	0	2	0	3	1	1	1	5	0	1	0	0	0	16	2	18
11	Srivichai 3	0	1	3	2	3	1	2	1	5	1	0	0	0	0	9	8	17
12	Ekachai	0	0	1	1	1	1	1	1	0	0	0	0	0	0	6	4	10
13	Mae-klong 2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	3	3
14	Phetcharat	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	4	4
15	Muangphet-Thonburi	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	3	2
16	Sancamillo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
17	Vejprasit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Phisaivej	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Nongkhai-Wattana	0	0	0	1	0	0	0	1	1	0	0	0	0	0	1	1	2
20	Mission-Phuket	4	2	7	3	6	0	4	0	0	0	5	2	0	0	21	6	27
	Total	**5**	**3**	**25**	**17**	**49**	**23**	**36**	**13**	**30**	**3**	**5**	**2**	**6**	**1**	**156**	**62**	**218**

vate hospitals. TB registration of individual patients registered during Jan–Sep 08 has been reviewed.

Results: A total of 611 TB patients from 20 private hospitals were enrolled. These patients are new smear-positive (SM+) for 218, new smear-negative for 218, relapse for 8, extra-pulmonary TB for 87, and other for 80. Most are insured under the Social Security Scheme (74%). For SM+ TB patients, the majority are age between 25 and 34 years (33%), and male (72%). Out of total 611 patients, 230 accepted HIV testing. Among 54 TB patients with HIV infection, 31 had CD4 testing, 13 received co-trimoxazole, and 16 were on anti-retroviral therapy.

Conclusions: Collaboration with private hospitals increased TB case notification in Thailand. Successful implementing TB care in private hospitals required formal agreement among all partners and continuous support from local TB program. Correct and complete TB registration as well as collaborative TB-HIV activities are major challenging issues in private hospitals.

PS-95194-06   Prevalence of tuberculosis among patients attending national hospitals, Kabul, Afghanistan

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Background: Tuberculosis (TB) is still a major public health problem. TB control program has made significant achievement nationwide, but little progress in Kabul city, which has huge and vulnerable population (Case notification; Country wide 53/100 000, Kabul 28/100 000). Majority of public health facilities for primary health care service have been involved into TB control program but among 16 national hospitals only one hospital provides TB control and it is crucial to involve those hospitals in TB control program. However, there is no data about the TB patients in those hospitals.

Objective:
- To determine the prevalence of sputum smear positive pulmonary TB among patients attending public national hospitals.
- To provide information to make strategic plan to increase case notification.

Method: A hospital-based survey was conducted at five public national hospitals, we interviewed all adult patients who attended during 10 to 30 days in each hospital about the presence of symptoms of TB (cough more than two weeks, sputum, fever) and then symptomatic patients went under three sputum samples microscopy.

Result: A total number of 2779 adults were interviewed. Of these participants 147 (5.3%) were identified as TB suspects and 5 (4 female, 1 male) were diagnosed to have sputum smear positive pulmonary TB. The positive rate among suspects was 3.4%. Among these 5, 4 were identified in the hospital for chest disease and remaining one in the general hospital.

Conclusion: This study revealed significant prevalence of TB in certain hospitals, indicating the need of adopting TB control in those hospitals.

Table   Summary of analyzed data

Name of hospital	Total patients inter-viewed	% of TB suspect with muco-purulent sputum samples	3 sputum collection rate	% of TB suspects	Prevalence of sputum smear positive TB/100 000 patients
Esteqlal	412	64	72%	6	242
Ibn-sina chest hospital	850	55	60%	8.9	470
Malalai	734	17	17%	4.5	0
Rabia Balkhi	217	100	100%	0.4	0
200 beds of Khair Khana	566	63	81%	1.9	0
Total	2779	40	52%	5.2	179

PS-95241-06   Incidence and risk factors for tuberculosis among the people living in remote areas in Albania

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Background: Poverty in Albania has marked spatial and regional dimensions, with rural areas in the Mountain region being consistently poorer than the rest of the country. Poverty in remote areas is 66 percent higher than in others areas. Average consumption in the mountainous region is two-thirds of consumption levels than the rest of the country.

Objective: This study aimed to evaluate the epidemiological status of Tuberculosis regarding to the socioeconomic characteristics of regions in Albania.

Methods: Information related to socioeconomic inequalities of TB in Albania was reviewed, including study of TB incidence, regional disparities of disease of TB with a view to establish a link between TB and poverty, in terms of income, education and standard of living.

Results: There were 430 TB cases in Albania for 2008. In remote areas there 159 cases (37%) and in the rest of the country 271 cases (63%). Remote areas constitute 19% of the population of the country and represent 37% of the all TB cases. The incidence in remote areas ranged from five to tenfold higher than the other areas. Among TB cases, 204 people were unemployed, 97 employed and the rest were children, students or retired people. 80% of the adult in remote areas were smoker compare to 50% of the country and 68% were alcohol consumer compare to 44% of the country. Also, illiteracy was higher 18% in remote area, compare to 12% in the country. The housing in Albania was improved remarkably, last decade, except in remote areas. In addition, health services are more distant; level of training of health staff is lower; time needed/difficulties to find the medicaments are greater; and the cost of using the service is higher.

Conclusion: Government projects for poverty reduction and economic development are crucial for TB diminution in remote areas.

PS-95391-06   Egypt achieved the global targets after re-estimation of tuberculosis incidence

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Egypt has an intermediate incidence of Tuberculosis (TB); it is an important public health problem, as 83% of the cases occur in the productive age groups (between 15 and 54 years). In the last quarter of 2007, study registers were introduced in a national representative sample of private and public non-NTP health facilities, in which TB cases were listed. The list of

patients in the study registers was then compared with the list of notified cases from the same period of the year. Using capture-recapture models, the number of cases that were missed by all of these sources could be estimated by comparing the number of cases that were observed in each source of data independently and the number of cases that were common among them, the re-estimation of TB incidence approved that the new incidence of all new TB cases is 21/100k of population and for new Smear positive TB cases is 9/100k of population. Finally, Egypt successes to occupy a place in the target zone in achieving the global targets in the fight against TB as the detection rate of positive cases 2008 is 78%, and the rate of successful treatment 2007 is 88%.

PS-95418-06 The application of Global Fund TB program software in program management

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Aim: Provide a open, unified online platform for all Global Fund TB program implement units to report the fund utilization and program progress to got more effective management.

Methods: All program units report the program budget, work plan fund utilization and the finished activities as well as inquire corresponding data in the online software.

Results: According to applying software in all provincial, prefecture and counties program units for 2 years, all the program progress can be seen immediately on the internet. The program worker can understand the program easier and the program managers can know the program more timelier, it is possible to manage the Global Fund program on the internet.

Conclusion: The application of Global Fund TB program Software strengthened the program workers understanding the program and improved program management efficiency.

PS-95421-06 Impacto de la busqueda de casos de tuberculosis pulmonar en las prisiones de Mexico

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Objetivo : Demostrar que los pacientes con tuberculosis pulmonar que se diagnostican y se tratan en prisiones curan.

Método : Se convocó a las 32 entidades de México para realizar búsqueda de casos de tuberculosis pulmonar (TBP) en prisiones. Se efectuó coordinación con las autoridades de la Secretaría de Salud, prisiones y el personal médico que atiende a los pacientes con tuberculosis pulmonar para dirigir la búsqueda de sintomáticos respiratorios a su ingreso, se capacitó al personal

de salud de estos centros para realizar el diagnóstico, seguimiento, administración del tratamiento estrictamente supervisado hasta el egreso del paciente.

Resultados : Se realizó búsqueda de sintomáticos respiratorios en 230 prisiones de enero a junio del 2008, se estudiaron 8198 sintomáticos respiratorios, se identificaron 193 casos de tuberculosis pulmonar, 160 curaron (85%) 1 fracaso (0.5%), 4 defunciones (2%), 7 abandonos (3.6%), 3 traslados (1.5%).

Conclusiones : El éxito que se obtiene trabajando en grupos vulnerables como son las prisiones es la participación coordinada de los diferentes grupos responsables de estas actividades hasta llevar al paciente a su curación, lo cual permite controlar la transmisión de la enfermedad.

PS-95516-06 Reasons for initial loss of patients with pulmonary tuberculosis disease in health centres in La Paz

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Introduction: Pulmonary tuberculosis in Bolivia is an important public health problem. La Paz is one of nine departments, the incidence is 70.5/100 000 population, 1006 patients with smear positive pulmonary tuberculosis. The detection rate is now decreasing, but the information of the laboratory network, including 110 laboratories, is different than the notification case rate. The National Reference Laboratory performed a study of the laboratory records in health centers in La Paz, and patient interviews.

Objective: To know the reasons for initial loss in patients with direct smear examination positive, in hospital and health centers of La Paz, city.

Methods: The information of data register in laboratories were compared with the new cases reported in the Tuberculosis Control Program, and to perform the interview in the patient who have positive direct smear examination, and they are not in the new cases reporter.

Results: In 256 patients of the five laboratories in La Paz, city, all of them have result of direct smear examinations. 85 patients have positive results and 17 (20%) received anti-tuberculosis treatment. 68 (80%) patients with positive direct smear examination did not start specific treatment. Among 48 (56%) patients, the reasons for not going to the health center were as follows:

1 I don't have money to pay the bus from my house to health center (87%)
2 It is very difficult to pay for the care in the hospital (90%)
3 The timetable of the health center is different than my activities, usually I am working all the day, and it is impossible to return (65%)
4 I don't know why the medical doctor asked about my sputum (45%)

5 I went one time, but the personnel were busy, and I don't have free time (35%)

Conclusion: The tuberculosis control program needs to implement strategies to go with the patient, to be able to start treatment in all patients.

PS-95531-06   Prevalencia del binomio diabetes tipo 2-tuberculosis en dos jurisdicciones de Jalisco, Mexico

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Introducción : Recientemente se ha encontrado que el binomio DM2-TBP (18%) es el más importante para TBP en México, aun comparado en el de TBP-VIH; también en Jalisco (21%), donde está en aumento. Aunque el control de la glicemia en pacientes DM2 es importante para prevenir infección y recaída por TBP, la detección precoz de TBP en pacientes diabéticos, que es más costo-benéfica, ha sido poco estudiada.

Método : Estudio observacional, comparativo, transversal; Se realizaron a 345 casos de DM2 en control, 3 baciloscopias para detección de TBP y determinación de Hemoglobina glicosilada para control de DM2. Se estudiaron también datos personales, evolución de DM2, estado nutricional, y síntomas respiratorios. Se hizo búsqueda intencionada de TBP en personas

asintomáticas con DM2, y se concientizó al personal de salud para búsqueda de casos de TBP en este grupo.

Resultados : La prevalencia de DM2-TBP fue 1.7% (6) casos, que pudieron no haberse detectado, pues la mitad no eran sintomáticos respiratorios (y pudieron haber infectado a 90 contactos). De ellos, 100% se ubicaron en mal control de DM2. Las variables relacionadas a la posibilidad de padecer TBP fueron : sobrepeso (χ^2 de Pearson = 8.65, P = 0.0032), Sintomatología respiratoria (χ^2 de Pearson = 4, $P < 0.05$), Mal control de la DM2 OR 1.026 IC95%1.005–1.047. Se recomienda búsqueda intencionada de TBP, y control de peso en pacientes con DM2, considerada la obesidad como una malnutrición que incrementa vulnerabilidad a TBP.

PS-95631-06   Evaluation of the relationship between laboratories in the various hierarchical levels

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Setting: The laboratorial activities of the National Tuberculosis Control Program are based on the National System of Public Health Laboratories (SISLAB). The SISLAB is a network joining the national laboratories and organized into sub-networks. Specific tuberculosis (TB) activities are one of these sub-networks. The TB sub-networks is composed of organized laboratorial units which are involved in National Epidemiological Surveillance.

Objective: Evaluation, from the perspective of managers, of relationship between laboratories in the Brazilian TB laboratorial network on different hierarchical levels.

Methods: Was used the quali-quantitative methodology through the technique of the 'Collective Subject Discourse (DSC)' and using the software Qualiquantisoft®. The DSC is a methodological strategy that collects the data from the social representations. The sample is composed of the lab managers from the federal, state, municipal and local levels..

Results: From the 54 interviewed managers about 33.3% responded relate harmoniously between the network with agility, following the rules and the flow; 31.5% said there is quality control, supervision, training and technical support; only 5.6% said that the decentralization process not broke the equilibrium on the network; 25.9% say that relationship is harmonious, not lack information, communication, knowledge of standards and technical and political
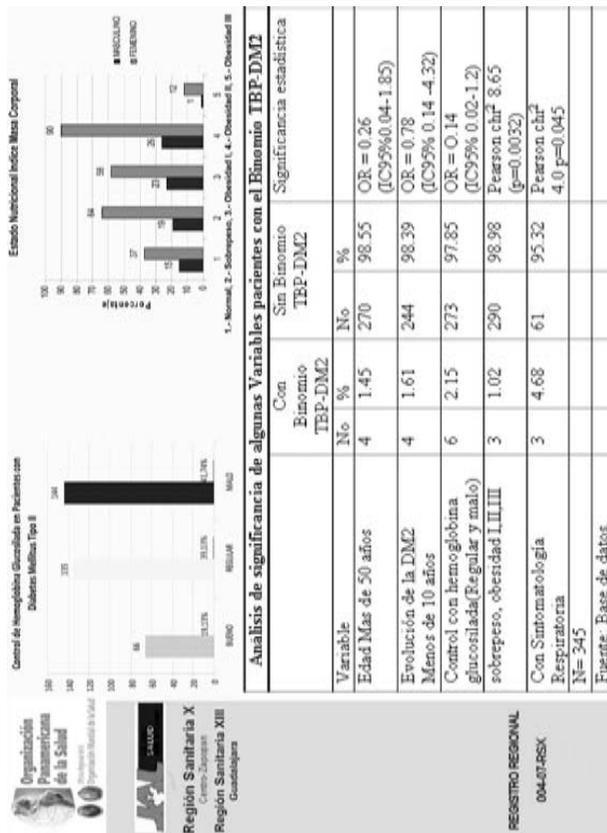
commitment; 25.9% no lack of training, supervision and/or quality control; 12.9% no lack on laboratorial integration and reference, 7.4% the GF and technical visits had positive impact on the flow of information; 7.4% data and reports are monitoring is done; trainment on quality control processes is necessary on the network.

Conclusion: The evaluation of the national network of laboratories contribute to the planning of actions for the epidemiological surveillance, to establish a system to reference tests and information.

POVERTY AND TUBERCULOSIS

PS-94008-06   Distribution of estimated MDR-TB cases by country economic groupings

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Aim: Multidrug-resistant tuberculosis (MDR-TB) is a threat to TB control. Information on the global distribution of MDR-TB cases by country economic grouping is useful to inform the discussion on funding for TB control.
Methods: World Bank estimates on gross national income (GNI) per capita were used to rank countries on a scale of relative wealth [Low income (LI, <$936); Lower middle (LMI, $936–$3705); Upper middle (UMI, $3706–$11 455); High (HI, >$11 455)]. The latest MDR-TB incidence estimates published by WHO in 2009 were used to describe the burden, using national data or statistical modeling from 181 countries.
Results: In 2007, 510 545 incident MDR-TB cases were estimated to occur in the world. The distribution of cases was: 60% in LMI countries (53 countries), 24% in LI (45), 15% in UMI (35) and 1% in HI (48). Fifty-six percent of cases occurred in China and India (LMI), and the Russian Federation (UMI) alone, three large populous countries running extensive TB control programmes. The mean frequency of MDR-TB among TB cases was significantly higher in middle income countries—7% in UMI (country range: 0–32%) and 6% in LMI (0–36%)—than in LI 3.3% (0–24%) and HI 2.6% (0–20%). This was influenced by a much higher frequency of drug resistance among TB cases in the 15 countries of the former Soviet Union, 10 of which belong to the middle income group.
Conclusion: Most MDR-TB cases in the world today occur in middle income countries with a fairly well developed infrastructure and which have been running TB control programmes for a long time. The allocation of resources to combat drug-resistant TB by countries having a large caseload or a high frequency of MDR among their TB cases would be expected to

have a faster return given that the local infrastructure and capacity are well advanced.

PS-94076-06   Vulnerability factors among tuberculous patients of Oran town

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Context: Tuberculosis is a great problem of public health in the world. Several factors explain its persistence, notably, quality of interventions for tuberculosis control, socioeconomic environment and demographic changes. In Algeria, in spite of national tuberculosis programme contribution, we registered an increase of tuberculosis cases since 2000 year. Incidence rates of tuberculosis in our town Oran were higher than national incidence of tuberculosis (90.88, 2007).
Objective: To explain the increase of tuberculosis incidence in our town taking into account quality of tuberculosis control measures in the field and socioeconomic environment.
Methods: We realised an audit concerning structural and organisational aspect of tuberculosis control in our town. We analysed in the field attitude of the different actors responsible of tuberculosis control. Socioeconomic environment data derived from national office of statistics.
Results: We noticed that tuberculosis control public health structures were inadequate and patients accede with difficulties into primary health care in certain municipalities. Resistances of tuberculosis control were observed among health workers and political responsibles of our town appear insensible of tuberculosis problem. The rapid and uncontrolled extension of our town around its periphery and slowness of socioeconomic development have led the emergence of tuberculosis cases.
Conclusion: The necessity to strengthen tuberculosis control in our town and to involve the different actors responsible of tuberculosis control. To influence politicians, public and private organisations whose policies affect community health.

PS-94120-06   TB stigma amongst high-risk groups in Hackney, London

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Introduction: The London borough of Hackney exhibits some of the highest rates of TB in the UK.[1] Most TB presents in individuals who originate in areas of high TB prevalence, such as sub-Saharan Africa, however, there is also a high burden of complex cases in Hackney, for example, street sex-workers.

TB is a stigmatising disease and this has previously been demonstrated in Hackney amongst African TB patients.[2] We sought to explore whether TB stigma was still apparent in the Hackney community and whether stigma experienced was specific to TB.

Methods: We recruited from two community groups in Hackney due to the higher incidence of TB observed within them: Street sex-workers (SSW) and Hackney African residents (HAR). We used mixed methodology to explore TB-related stigma: Focus groups exploring stigma themes discretely and overtly; process mapping exercise; stigma questionnaire; preferences of care using conjoint analysis. We report here on the focus group results which allow a comparison between the two groups.

Results: Ten SSW and 21 HAR were recruited: the HAF group was divided into English and French-speaking participants. The Table summarises some of the focus group results by theme.

Table   Examples of stigma categorised by emergent themes and group

TB stigma theme	HAR	SSW
TB as a contagion	'If someone has got TB in the family, people think the whole family has got TB. And then they have a kind of label—that family is TB bad . . . the 'TB family''	'I was worried I would get TB from other girls on the street' 'I knew someone with TB. I never sat next to her. I didn't share my cup, cutlery or drink with her'
Origins of TB as a contagion	'In Africa we say, [people] that have TB, don't touch their cups, don't eat there, don't mix up with them, that's how we think'	'I had TB and my mum avoided me. When she did see me she did not have the same level of bodily contact as before'
TB and HIV	'When you have TB it is thought you have HIV unless proven not guilty'	
Differences between TB and HIV stigma	HIV—someone may be affected in your family or your community but you're not going to be victimised as a friend or member of family. TB, however, if my mum or my brother was affected, not just he or she would suffer social stigma, I would also suffer the social stigma—that's the difference.	
Origins of TB and HIV stigma	'If you have TB and you are African the hospital automatically tests you for HIV'	
TB stigma in healthcare	'When I was in hospital with TB . . . the cleaner would not clean near my bed . . . she was afraid' 'I think the problem here in the UK is that the problem starts in the prejudice of the HCPs. When prejudice and stigma starts from up there-where you are supposed to go for help it is difficult'	

Conclusion: Greater participation by HAF likely resulted in more explanation of TB-related stigma. However, similar themes between the two groups were evident. For example, TB-related stigma was differentiated from other disease stigma related to the communicable nature of TB. Stigma reported in the current study has previously been observed amongst TB patients in a similar group in Hackney.

Stigma continues to exist in communities where TB is most prevalent. A strategy to combat TB-related stigma has been introduced in Hackney with particular focus on higher risk community groups.

1 Health Protection Agency. www.hpa.org.uk
2 Nnoaham KE et al. Int J Tuberc Lung Dis 2006; 10: 1013-1017.

PS-94198-06   TB control strategy in smooth information platform and coping with poverty

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Tuberculosis (TB) is an important infectious disease that can make agricultural population poor. Ten years ago due to a slack information platform TB control doctors could not contact TB patients in time and communicate with them effectively. It made TB patients uncomplying to doctors in dose or counter-check and difficult to recover, which made their family be in necessity, or infected others and make other families became poor too. Meanwhile TB control dispensaries had to pay much money to trace TB patients. Other institutions related to TB control also needed to pay out more costs to communicate with TB control dispensaries. So the slack information platform will do harm to the economy of the whole society (TB patients, TB control dispensaries, and other institutions related to TB control). Now a smooth information platform for TB control strategy has been set up. Many TB control software based on network, professional web sites or forums, E-mails, QQ groups or MSN groups and mobile telephone notes have been put into service. In this platform for TB control, we can work more effectively, manage job more elaborately and help to execute science research. At the meantime now TB control doctors can contact TB patients in time and communicate with them effectively, which cure them in early period, make them restart to work more quickly and get rich earlier. Simultaneously we can reduce tracing cost of TB control dispensaries and communication cost of other institutions related to TB control. So this smooth information platform is benefit to the whole society, and can help to relieve poverty. Now we can conclude that current TB control strategy in smooth information platform is better than that one in slack information platform. But at present we still need to strengthen supervision for TB control, keep in touch with all institutions related to TB control, and pay attention to science research for TB control.

PS-94209-06   Socio-economic status of TB inpatients in Iran (new MDR cases)

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Introduction: One of the most important factors in diagnosis, treatment and follow up the TB patients, especially MDR-TB, is their level of knowledge and revenue. This study investigates the pattern of socio-economic status of TB inpatients.
Aim: To determine the pattern of socio-economic status of TB inpatients and compare between MDR-TB and New-case TB inpatients in NRITLD (referral center for MDR inpatients in Iran).
Materials and methods: This study was an applied retrospective cross-sectional study conducted in the 2008 year in National Research Institute of Tuberculosis and lung disease (Referral center for MDR-TB in Iran). A questionnaire has been designed to collect the data.
Results: This study revealed these main results: 1) Average income in MDR-TB inpatients (9.3%) was 77$ and in new-case was 105$; 2) 10.1% of MDR-TB inpatients and 16.5% of New-case were unemployment; 3) The higher frequency of family number was 16.4% in 4 people in a house; 4) The percentage of education in MDR-TB was 60% illiterate and in New case TB is 59.6%; 5) The high rate of inpatients (27.6%) didn't have any insurance support.
Discussion: The strengthened and enhanced financial support in TB patients has got the essential role to help these patients to treat and follow up their problems. Nearly more than half of TB inpatients are illiterate so socio-economic factors being important correlates in TB patients. The findings can be used to advance the argument in support for financial and insurance among TB patients in Iran.

PS-94392-06   The performance assessment of World Bank loan TB control programme

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Objective: To assess the performance of World Bank load TB control program in poor area in Guangxi Zhuang Autonomous Region in China.
Methods: Collect the information on controlling TB from 2003 to 2008, and evaluate the accessibility, equity, effectiveness and utility, benefit and efficiency of the program.
Results: With the input of USD 9 m, the network of TB controlling program from the provincial, city, county, township to village level their capacity became more perfect, and give a better service to the poor. During the period of program, there were 45 479 TB patients were treated and avoid 52 975 persons in-

fected, which due to direct economy USD 70.38m saved and avoid indirect lost of USD 528.63m.
Conclusion: The program had reached the expected aim and made great social and economic benefit. It provides a good experience for TB control in southwest of China.

PS-94486-06   Poverty reduction and health improvement in China

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China is facing disparities and a critical health challenge related to inequality in health outcomes.
1 Poverty disparities
    1.1 Rural-urban disparities:
    1.2 Regional disparities:
2 Leading cause of disease
Global Burden of Disease estimates produced by WHO indicate that China's overall disease profile now resembles that of a developed country, with 80% of deaths due to NCD and injuries. Among the remaining infectious diseases, TB, lower respiratory infections, and Hepatitis B virus infections still account for significant mortality and lost DALYs.
The role of government: The COG has been playing a leadership role of in poverty alleviation and disease control and prevention since health reform in 1996 and special in the aftermath of SARS epidemic, two important documents have been publicized from the Centre:
    Nation policy and health policy have been reorganized to invest into health improvement of health facilities, professionals, communicable disease and non-communicable disease control and prevention.
    China also made an important commitment to better health by signing the Framework Convention on Tobacco Control in November 2003. The convention was ratified by China's National People's Congress in August 2005, become effective in January 2006. Since this momentous pledge, China's MOH had taken step by step including MPOWER to improve public awareness of the health risks related to smoke and inhaling second hand smoke, try to 100% smoke free environment.

PS-94834-06   Perception and management of cough in poor settings in Cameroon

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Setting: This research was to understand perception and cure of coughs. 300 households participated to this study in 6 poor settings health areas in the health district of Cité Verte in Yaoundé, Cameroon.

Results: Causes of coughs enumerated are: cold temperature, fresh and humid air, dust and smokes from burned substances. 70% participants stated that normal coughs are those associated with expectoration, and that complicated coughs are dry cough or cough with elimination of blood, or that causes chest pain. Main therapy approaches applied to cough are: bandage of the chest after application of menthe derived ointment essentially for children (55% of participants), consumption of menthe or ginger based sweets by adults, hot clothes (60%). To cure serious cough, main antibiotics used are Cotrimoxazole (70%) or Amoxicillin (40%) indifferently for adults or children. Some participants prepare themselves medicine to cure serious coughs (30%). These products are essentially onion, lime, garlic, menthe or honey based products. 20% of participants are able to enumerate at least one type of expectorant product. Knowledge of pharmaceutical product to cure cough are got from family members (40%), friends or colleagues (42%) health facilities and pharmacies (35%), drug hawkers (70%). 82% of participants know at least one symptom of tuberculosis. Main TB symptom evoked is blood in spit. 32% of participants declared have been or have sent someone to a health facility because of cough attack. Duration cough that may be suspected as TB is known only by 20% of participants. Those able to distinguish asthma symptom from other types of lung disease are those who know a person suffering from asthma. The majority (95%) know at least one person who died/is suffering or have suffered from TB.

Conclusion: Management of cough in underprivileledged settings is still poor in term of quality of treatment and information. More is still to be done to inform inhabitants of about cough TB and asthma.

PS-94870-06   The impact of poverty and illiteracy on asthma treatment in Syria

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Background: Poverty and illiteracy often coexist in poor and developing communities. Patients with chronic incurable diseases, like asthma, may misunderstand the numerous medical instructions, and hence, may not adhere to instructions.

Objectives: To explore and analyze the effect of both, poverty and illiteracy in asthma development and therapy outcome.

Methods: We conducted a retrospective observational study of one thousand asthmatic out-patients of the asthma clinic in the public hospital of Homs city. We referred to their files, and reevaluated the degree of asthma control during the last three years of follow up. All patients have had mild, moderate or moderate severe persistent asthma. Patients were divided into poor or not poor. And to illiterate, half educated (not completing secondary school) or educated. Evaluation of control was based on: clinical improvement, lung function tests (LFT) and how many visits to emergency department (E.D.).

Results: Most findings affirmed the adverse effects of illiteracy and poverty on the efficacy of the long-term strategy of asthma therapy, especially drug unaffordability or interruption, ambient air polluted with smoking and allergenic materials, and misinterpretation of the chronicity concept of the illness. Few controversial findings were obtained, where some half educated and rich patients have enough vanity to disobey therapy instruction.

Conclusion: In out-patient asthma clinics, physicians are confronted by several drawbacks, related to poor social, economic and educational conditions. Chest physicians have to intensify and organize efforts to educate and convince patients to comply well, and discard many common wrong thoughts and habits.

PS-94952-06   Research for improving access to TB services for the poor

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Background: China is one of the 22 high TB burden countries in the world and accounts for 17% of the global TB burden. Although the case detection rate has been increasing sharply, literature and research show that China currently still faces some important problems regarding the effectiveness of TB control. These problems are found to disproportionately affect the poor.

Methodology: This policy paper involved a literature search of all EQUI-TB supported research in China. This search was then expanded using the MEDLINE database to provide context and comparison to the EQUI-TB research findings. The terms used for the search were 'tuberculosis and control', and the type of article is 'review' or 'systematic review'. The languages involved were English and Chinese. The National TB control programme of China played an important role in requesting and acquiring the information needed to evaluate the actual situation and refining the measures indicated in this paper.

Conclusions: Economic barriers, geographic barriers, social and cultural barriers, health system barriers and migrant's barriers affect the poor and vulnerable population to seek health care for TB. High levels of economic burden among poor and vulnerable population resulted in people not seeking care at all for tuberculosis and they experienced delays before seeking effective care. The distance from health facilities for the remote population was also a barrier to prompt access to health care. Gender related fac-

tors, lack of awareness of TB knowledge, social stigma and aged population all were the barriers of care seeking delay. That the tuberculosis patients in migrant population haven't been involved in DOTS program is a big problem for TB control in China.

Policy implications:
1 Strengthening the health care system capacity building.
2 Shorten the pathway to diagnosis and treatment.
3 Reduce irrational health charges.
4 Control TB patients in migrant population.

PS-95093-06   TB and poverty alleviation: BRAC experience

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Introduction: BRAC, an NGO established in 1972, working for poverty alleviation and empowering the poor in Bangladesh since beginning. BRAC's community based TB control program was initiated in 1984 as a component of its health program to complement and supplement national program.

Objective: To increase access to TB diagnostic and treatment services with special focus to the poor.

Method: Since 2002, BRAC initiated a comprehensive economic and social development program for specially targeted ultra poor (STUP) people. The beneficiaries are identified with certain criteria. The program has a two-year cycle and at the end members are expected to graduate into mainstream development program and receive micro-credit. BRAC designed a special health program including TB services for these people. BRAC health workers ensure essential health care and if any one has cough for more than three weeks, refer them for testing. Diagnosed TB patients are given treatment under supervision of health volunteers. The patients of this programme do not require depositing 200 taka (US$3) as bond for treatment compliance program.

Result: In 2008, a total of 85 000 households were covered under this program. Total 293 TB patients were identified and brought under treatment in STUP areas in 2008. In 2008, out of 90 259 TB patients diagnosed in BRAC supported areas, 7862 TB patients received micro-credit support for their livelihoods.

Conclusion: BRAC's holistic approach to poverty alleviation increases access to TB care particularly to the poor. Targeted interventions are needed to reach special groups.

PS-95124-06   Participación de la RED TAES de enfermería en una estrategía de Movilización Social en Tuberculosis

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Objetivo : Involucrar oficialmente al Sector Salud y medios de comunicación y Organizaciones No Gubernamentales para que participen con la donación de productos no perecederos, además de promoción y difusión del TBTON : evento de movilización social en Tuberculosis.

Metodología : Los medios participaron difundiendo el evento en cadena estatal e invitando a la población a la donación de productos no perecederos, así como aportaciones en efectivo con botes recolectores (boteo). La técnica de 'boteo' se aplicó en : tiendas de autoservicios, empresas privadas, autoridades de salud, escuelas de enfermería, población en general y cruceros más importantes de la vía publica en las 8 jurisdicciones sanitarias.

Resultados : Se conforman 330 despensas con productos básicos y se entregan en una ceremonia donde asisten enfermos con TB durante un desayuno en cada una de las 8 jurisdicciones.

Conclusiones : La estrategia TBTON es un éxito de movilización social de las instituciones del sector salud en la recaudación de insumos, efectivo, integración de despensas para el mejoramiento nutricional y satisfacción para los enfermos y prestadores de servicios de salud de Tamaulipas.

PS-95151-06   The impact of poverty on experience of tuberculosis in KwaZulu-Natal, South Africa

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Aim: 1) To determine the household financial status of patients with TB in KwaZulu-Natal, South Africa, and the impact of this on their experience of TB and their ability to complete treatment. 2) To determine patients' responses to the different types of material support offered by clinics in the province.

Methods: Structured questionnaires were administered to 487 patients with TB at randomly selected clinics in two districts of KwaZulu-Natal. Issues of employment, household financial status, and material support from families and the clinics were explored, in the context of patients' TB infection.

Results: Over 50% of patients classified their household financial status as poor or extremely poor, and a similar percentage said that TB had made their financial situation worse, because of inability to continue working (65% were too sick to work, and 11% were retrenched), or because of the costs incurred with obtaining treatment (63% of patients said it was 'very expensive' for them to get to the clinic). Patients received material support from the clinics in the form of disability grants (for which they needed to qualify), food parcels and vegetables from the clinic gardens. 73% of patients rated the disability grant as 'very

important, we need it to survive' (although this grant was only received by approximately one quarter of all patients). 76% of patients described the parcels as 'very helpful, we are very short of food at home' but 58% said that the quantity of food was too small. Less than 10% of patients participated in clinic gardening projects.

Conclusions: Patients with TB in KwaZulu-Natal come from poor households and TB frequently exacerbates their poverty. Programmes of material support should be extended to assist patients more.

PS-95157-06   Social impact of tuberculosis among patients registered in an urban government DOTS program

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Setting: Tuberculosis patients registered in government clinics under an urban DOTS program in Chennai city catering to more than 5 million population.
Objectives: To assess the social impact of TB on patients and their families due to illness and correlate it to social determinants.
Methodology: A cross sectional survey among 300 new TB patients, who had completed at least 2 months of anti-tuberculosis treatment was done using a pre-coded semi-quantitative questionnaire between March and June 2007.
Results: Social impact was perceived by 69% of the TB patients in terms of fear of rejection (37.7%), fear of discrimination (30.7%), dependency on others (19.7%), non-disclosure about TB illness to family members (14%) and to spouse (3.3%), discontinuation from job (6%), mental anguish (5.4%), rejection from home/by employers (1.4%), guilt (1%), change of job and discontinuation from school due to TB (<1%). Social impact was perceived by more female patients as compared to males (80.7% vs 62%, $P < 0.001$). More patients having monthly per capita income of more than 50 US dollars (Rs.2250, 1 US dollar = Rs.45), an education of more than 12 years of schooling, unemployment status, belonging to nuclear family and with extra-pulmonary TB perceived social impact.
Conclusion: The social consequences of tuberculosis are far reaching, especially among women patients and needs to addressed in a comprehensive way in order to strengthen the National TB Control Program.

PS-95158-06   Economic impact of tuberculosis among patients registered in an urban government DOTS program

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Setting: Tuberculosis patients registered in the government clinics under the DOTS (Direct Observed Treatment, Short course) program in Chennai city catering to more than 5 million population.
Objectives: To assess the economic impact of TB on patients and their families due to illness and correlate it to social determinants.
Methodology: A cross sectional survey among 300 new TB patients, who had completed at least 2 months of anti-tuberculosis treatment, was done using a pre-coded semi-quantitative questionnaire between March and June 2007.
Results: Economic impact was perceived by 30.3% of the TB patients. Of the 300 patients, 24.3% had their savings reduced, 7.3% got indebted, 2% had to mortgage their property. Of the 25 patients who took loan/mortgage either before or during treatment, the mean was Rs.3680 (US dollar 81.8), median Rs.3000 (US dollar 66.7), (1 US dollar = Rs.45). More patients with extra-pulmonary disease (44.4%) and belonging to families other than nuclear families (40.7%) perceived economic impact ($P < 0.05$). Higher number of patients having an education of more than 12 years of schooling, female gender, unemployment status, with monthly per capita income of less than US dollar 24.4 (Rs.1100) perceived economic impact.
Conclusion: The economic impact of tuberculosis is considerable, especially among extra-pulmonary TB patients, considering that the entire treatment is free of cost in DOTS program.

PS-95169-06   TB control and treatment outcomes in big provinces and urban poor areas in Thailand

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As far as TB control in urban is very concerned, to control TB in urban/big cities/large provinces is very complex. Default rate is high because of many factors such as in-out urban migration, mobile populations, expansion of dense slums and congested communities, poor living standard/lifestyles and poor compliances. This project aims to implement TB control program in 57 large provinces and urban poor areas in implementing DOTS services, DOT corner and TB

Clinic in municipalities with: 1) Strengthening WHO standard of TB services with International Standards for TB Care; 2) Supporting access to early diagnosis and treatment-fast track services; 3) Providing training and capacity building for health personnel-TB clinic nurses, outreach workers, volunteers; 4) Coordinating with NGOs and Private Partnerships; 5) Monitoring, supervision and evaluation. As the results of the treatment outcomes of the cohort 1–4/2007, out of 18 500 TB cases, 77.10% was successful treatment. The death rate was 8.54%. The default, failure, and transfer out rates were 8.54, 2.64, and 3.18% respectively. To be able to improve DOTS program and treatment outcomes is to strengthen access to care and treatment particular in alleviating non-compliance and death and default rates in these urban poor communities.

PS-95424-06   Successful strategies to fight TB, poverty in urban slums

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Background: Bainganwadi is an urban slum, having population of 162000 within a Megacity Mumbai, India. People earn their livelihood by picking up rags and selling material found in the garbage dump which is breeding ground for communicable diseases.
The challenges:
— 85% of the people live below rgz poverty line and have limited access and knowledge to health care
— Health facilities are inadequate, far away and for some not available
— Unhealthy surroundings, unsafe water, Poverty and TB is a major problem to the slum inhabitants
— Low case detection of TB show many undetected cases. Many avail services of quacks which could result in DR-TB
— Uneducated stray children and adults
Methodology to tackle the problems:
— Fairmed-Switzerland with Local NGO initiated a Community Development Project with focus on TB and Poverty reduction
— 7 Self Help Group's having 12 members each were trained and assigned responsibility to carry out DOTS from their homes, provide assistance in DOTS and General clinics, teach sanitation and hygiene practices to other community individuals, practice and teach income generation activities, conduct IEC campaign
— New 3 DOTS, 3 sputum collection centers and General clinics to improve accessibility to DOTS and other health issues
— Training of General Practitioners and quacks
Results:
— Case detection increased by 20%

— Defaulter rate Reduced from 31%–7%
— Treatment Success rate increased from 60%–87%
— Clean surroundings and safe Drinking water
— Daily Income for many increased from below 1$ to 1–2$ per day
— Education availed by most children
Conclusion: The project hopes to achieve all its objectives by the end of 2011 thereby reducing TB and poverty and will near to its target of reaching MDG's and fulfill the Ottawa charter.
Recommendations: To tackle the challenges of TB in marginalized and unstable environments like urban slums its necessary to have a Holistic approach addressing people's needs along with the programme needs.

PS-95520-06   Incentives and enablers in a slum area of Istanbul for better tuberculosis control

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Aim: Umraniye is one of the most populated parts of Istanbul with a trend of fast growth due to migration. This study is planned to determine the incentives and profiles of TB patients treated in Umraniye TB dispensary, located in a district with both poor and rich inhabitants.
Method: We searched for the details of incentives given to TB patients treated in 2007, by looking in the files of patients and TB dispensary financial records.
Results: In 2007, 418 patients had been treated in our dispensary, 41% (171) of them were female and 23% (96) of the have no health insurance and 12.2% (51) were uneducated. Mean age was 34% ± 16.7. 38.965 dollars had been spent out for the incentives and enablers in 2007. From this amount 42.5% (16.510 dollars) was spent for food, 33.5% (13.137 dollars) for transportation, 10% (3607 dollars) for rent of patients, 6% (2367 dollars) for clothing, 5% (2035 dollars) for drugs and the rest for utility expenses such as water, electricity etc. In one year we bought 800 food packages for 135 patients, we covered for 94 patients transportation fees to and from the dispensary, for children of 20 families we bought clothes, we paid the house rents of 4 patients. Needs for some immediate laboratory examination (liver function tests whenever necessary) fees, drugs for treating the side effects of TB treatment and drugs patients could not effort to buy were paid by us without questioning. Treatment outcome of 316 new TB patients were as follows: 87.5% (316) treatment success, 8.6% (31) transferred out, 0.6% (2) defaulted, 0.8% (3) treatment failed, 2.5% (9) died.
Conclusion: Providing incentives and enablers are essential to tuberculosis patients to improve tuberculosis control in a problematic slum area of Istanbul.

PS-95521-06   Poverty fuels spread of TB

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Introduction: Orissa, situated in eastern part of India contributes about 50 000 cases per year. Highest percentages of smear positive cases are being reported from southern Orissa. LEPRA Society started its intervention in TB in 1996 with DFID support in Koraput. Its OPD with laboratory at Jeypore recognised as a DMC under RNTCP since 2001 covering a population of about 40 000. The aim of this paper is to co-relate TB with socio-economic conditions and vice-versa.

Methodology: The study analyses socio-economic condition of 95 cases registered in this DMC during 2008. Out of them, 71 are male and 24 are female. 77 among them are from the productive age group, of 15 to 54. 95 cases surveyed through a simple questionnaire focusing on socio economic indicators. 61 (64%) respondents are illiterate. The analysis was made on the socio-economic condition of people and how it relates to the disease.

Results: 86% cases are sputum positive. 89% cases reported voluntarily which indicates that people are aware about the disease in the urban locality. 57% cases are from within 5 km of the DMC and 43% from a distance beyond 5 km. 60% reported to the DMC within 2 months of the symptoms perceived. In 18% cases contact history was found. 77% cases are below poverty line (BPL), among which 74% are male and 26% are female. In terms of livelihood 61% depend on daily labour for their livelihood, 10% on petty business and 10% on cultivation. The average family size is 4.5. 88% are having income of less than 1$ per day. 38% cases are the only earning member of the family and equal numbers are haveing 2 earning members. 72% live in a two room house mainly hut and 75% of the houses do not have ventilation facility.

Conclusion: TB mainly affects the productive age group and poor people. The down ward economy of the family due to TB increases poverty. Poverty fuels TB and Cure TB also reduces acute poverty. Overall development can reduces incidences of TB.

PS-95647-06   Mejora en la toma y preparacion de muestras para tuberculosis en un area indigena de Chihuahua

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Introducción : En la sierra tarahumara, se reúnen las condiciones idóneas para la transmisión de la Tuberculosis. Hay 45% de baciloscopías inadecuadas por mala identificación del sospechoso, y deficiente toma y procesamiento de muestras, visitas espaciadas de las Unidades de Salud Móviles.

Intervención : Se realizó un estudio observacional, prospectivo, cuasi-experimental, comparativo de intervención operativa en tuberculosis, con variedad de un solo grupo. Se capacito a 150 Auxiliares de Salud Comunitaria (ASC) de áreas focalizadas con casos de TBP en los últimos 3 años en los municipios indígenas de Guachochi y Batopilas, dentro de los 10 más pobres del país, se recapacito, de acuerdo a resultados, evaluándose el aprovechamiento y desempeño pre y post cursos-talleres.

Resultados : El conocimiento post-intervención, las detecciones (42,4%), la calidad de toma (10%) y la fijación (31%, llegando al 100%) mejoraron significativamente versus la situación previa ; Se diagnosticaron 5 casos de tuberculosis pulmonar (TBP), permitiéndoles ingresar oportunamente a tratamiento y previniendo la infección de 75 personas.

Conclusión : Capacitar a las Auxiliares de Salud Comunitaria en áreas indígenas, mejora la toma y procesamiento de la muestra, la identificación de caso sospechosos y el diagnostico de casos nuevos de TBP El proceso requiere de planificación permanente, supervisión del quehacer de los ASC en campo y de la coordinación interinstitucional para los apoyos convenientes que contribuyan a mejorar las condiciones de vida de la población.

Fuente: Registro de laboratorio de la Subsede Guachochi Chihuahua.
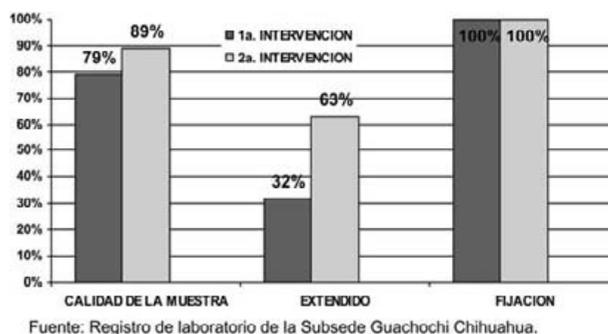
Figura Muestras adecuadas post-primera intervencion vs segunda intervencion de capacitacion a ASC.

PS-95585-06   Tuberculosis elimination plan for the United States: a call to action by Stop TB, USA

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Background and challenges: The release of the tuberculosis (TB) elimination plan for the United States (TEP) in 1989, by the Advisory Council for the Elimination of Tuberculosis, was followed by a national TB resurgence. In 2000, the Institute of Medicine (IOM) predicted a failure to reach the previous 2010 goal for TB elimination (one case per million/year) and proposed a 2035 goal. TB control funding eroded by 40% limiting implementation of key IOM recommendations. With TB rates declining only 3.8% annually since 2003, achieving TB elimination in the U.S. would require 96 years. To address this failing approach, Stop TB USA was challenged in August 2007 to update the TEP.

Response: The TEP Update Committee included 19 individuals from 11 local/state TB programs, and 8 national and international partners. Input from 29 individuals representing 17 partners and/or stakeholders, was obtained during consultations by email and teleconference. The American Thoracic Society and National TB Controllers Association provided limited funding. Federal officials served as consultants to the process.

Results and lessons learned: The Committee concluded that TB elimination for the U.S. will require implementing 1) previous recommendations to increase resources in order to develop and implement new tools for diagnosis and treatment of TB and latent TB infection plus vaccination; 2) approaches to reach foreign-born U.S. residents and difficult-to-reach U.S.-born populations; and 3) strategies for low-TB-incidence areas. Expanded treatment of latent TB infection will be required. Recommendations to educate policy makers and engage advocacy partners are also included.

Conclusions and key recommendations: The lack of government funding for this update limited resources but permitted a more open advocacy process. The Committee updated the TEP as a call to action and identified new partners for TB Elimination advocacy.

PS-95587-06 Encuesta de conocimientos, actitudes y practicas en pacientes con tuberculosis Bajo DOTS en Ecuador

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Introducción : En el Ecuador el Programa de Control de la Tuberculosis, requiere de información relacionada con el nivel de conocimientos, actitudes y prácticas de las personas que enferman de tuberculosis, para elaborar estrategias que mejoren el control de la enfermedad, basadas en los pacientes y su entorno familiar, la comunidad y los servicios a los que acuden.

Objetivos :
— Establecer un perfil cualitativo y cuantitativo de las condiciones sociodemográficas, características culturales relevantes.
— Establecer el nivel y tipo de conocimientos que los pacientes con tuberculosis tienen sobre su enfermedad.
— Caracterizar las actitudes de los pacientes con tuberculosis, respecto de la enfermedad.
— Caracterizar las prácticas que los pacientes con tuberculosis, realizan.

Diseño/métodos : Se aplicó una encuesta al 95% de confianza, con una entrevista estructurada, a una muestra nacional aleatoria de 260 pacientes ambulatorios TBBk+ y a 266 pacientes internados en servicios de salud del Ministerio de Salud Pública y de otras organizaciones, con tuberculosis sensible y, que se encontraban en un tiempo menor a seis meses bajo tratamiento DOTS.

Resultados : El 65% está en el grupo de 15 a 44 años y el 19% en el de 45 a 64 años, 78% tienen menos de 12 años de estudio, 55% debutan con tos, 18% con fiebre, 4% con esputo, 21% sabe que se transmite de persona a persona, 20% no considera grave, 84% presenta angustia, 7% tiene tendencia a rechazar el DOTS, 24% creen van a recidivar, el 100% pertenece a familias con más de un caso de tuberculosis en los últimos 15 años.

Conclusión y recomendaciones : Mejorar los niveles de educación en tuberculosis a los pacientes y familiares en los servicios de salud. **Reconocer al núcleo** familiar como el centro del foco tuberculoso. **Aplicar** Health Impact Assessment para la toma de decisiones por niveles de atención. Validar nuevas formas de DOTS aparte del institucional del Ministerio de Salud.

Tabla Molestias que obligaron a los pacientes tuberculosos a buscar atención médica, antes de ser diagnosticados de tuberculosis, **Ecuador, 2007–2008**

	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos				
Tos	214	40,7	41,0	41,0
Esputo C/S sangre	86	16,3	16,5	57,5
Fiebre	78	14,8	14,9	72,4
Dolor torácico	49	9,3	9,4	81,8
Cansancio	33	6,3	6,3	88,1
Disnea	13	2,5	2,5	90,6
Dolor abdominal	3	0,6	0,6	91,2
Perdida de peso	10	1,9	1,9	93,1
Impotencia	28	5,3	5,4	98,5
Signos y síntomas mal definidos	8	1,5	1,5	100,0
Total	522	99,2	100,0	
Perdidos				
Sistema	4	0,8		
Total	526	100,0		

Fuente: estudio ppm_cap-cemoplaf, 2007–2008.
Elaboración: j proano, s proano.

COMMUNITY MOBILISATION FOR TB CONTROL

PS-94024-06   Community advocacy for qualified drugs on national level in Ukraine

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Treatment of people in Ukraine must be safety. Quality control of medicines is a priority during state customs. Ukraine should follow the international medicines quality standards which mean WHO re-qualification. Procedure of WHO re-qualification is free of charge and open for every pharmacological medication.

As for today.

This event was action of the civil disobedience in the best traditions of HIV-activism. Under the walls of Ministry of Health was organized 'die-in' action called «Corruption = DEATH». It was conventionalized under the funeral ceremony with all the attributes for it: grave, boxes full of medications of doubting quality, requiem and headstone with 'Died because of the corruption' written on it. At the end of the ceremony funeral participants throw into the grave coins instead of earth, as a symbol of corrupted procedures of state customs.

By means of this practice Tender committee stayed aside of purchasing unknown quality medications, against which the participants of the action «Corruption = DEATH» were protesting.

Action was widely lighted by the national and regional mass media and even caused prompt reaction from the Ministry of Health. Ministry employees headed by minister deputy had invited journalists and participants to visit the briefing in the conference hall in the Ministry of Health.

Another result of this event is involving of the professionals and publicity to the discussion of the problem of nontransparent tender customs and corruption in the sphere of purchasing medications.

Media partners have always being mild stone of the successful advocacy strategy. Especially important for as was media role on the stage of broadening the discussion regarding quality of the medications and taking them away from HIV/AIDS sphere to a general list of health protection.

Preparing this action it was important to plan and split participants roles.

Also it is very important moment to involve partnership organisations in such events.

PS-94026-06   Global indigenous initiative to Stop TB

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Background: There are 370 million indigenous peoples in over 70 countries globally. Although they make up only 5% of the world's population, it is estimated that they make up 30% of the world's extreme poor in rural areas. In most countries they are the most marginalized groups and, when it comes to health, host higher burdens of disease than the non-indigenous peoples in the same country. Where data is available, as in Canada, rates of tuberculosis, for example, are 29 times higher in First Nations and a staggering 90 times higher in Inuit compared to Canadian born non-Aboriginals. The Assembly of First Nations (AFN) and the Inuit Tapiriit Kanutami (ITK) together with the STOP TB Partnership and the United Nations Permanent Forum on Indigenous Issues (UNPFII) members have begun an endeavour to reduce the burden of tuberculosis in indigenous communities globally.
Methodology: The AFN and ITK, with funding from the Canadian Government and the Global STOP TB Partnership, co-hosted a meeting of 130 global TB experts and Indigenous leaders from every Region of the globe. The purpose of the meeting was to bring together experts that would jointly develop a unique strategy to ensure global inclusion of indigenous in the Partnership to STOP TB.
Results: Two main outcomes emerged from the meeting: (1) a strategic plan was developed based on the outcomes of the meeting. This strategic plan is being used as a key tool for securing funding support from donor agencies and will be presented at the Global STOP TB Partnership meeting in Brazil, March 2009. (2) The role and formation of an indigenous people's secretariat was proposed that will champion the strategic plan. This secretariat will become a new 'partner' within the Global Stop TB Partnership and will maintain a link with the UNPFII.
Conclusion: The Global Indigenous Stop TB initiativeTB is the first of its kind and has instigated a number of new opportunities to draw attention to the burden of TB.

PS-94205-06   Améliorer le suivi des patients tuberculeux pour réduire les taux d'abandon et de perdus de vue

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Cadre : Le Programme de lutte antituberculeux du Congo Démocratique est bien structuré et doté de normes et directives adéquates. Mais l'application de ces prescrits par de nombreux prestataires laisse à désirer.

Objectif : Déterminer l'impact de la stricte observance des normes et directives en matière de prise en charge médicale sur le contrôle de la tuberculose.

Méthodologie : Une enquête longitudinale de la courbe des tendances quant à la maîtrise de la tuberculose en R.D. Congo, de 2005 à 2008, a été réalisée. Les 120 Zones de santé sur les 515, soumises à une observation directe, sont celles où une forte action de communication pour le changement de comportement et de mobilisation sociale a été menée. Dans l'ensemble, les taux médians de dépistage sont supérieurs à 40% grâce à la sensibilisation communautaire, mais curieusement les taux d'abandon et de perdus de vue stagnent.

Conclusion : Le Programme se fait fort de taux de dépistage améliorés, mais les taux médians d'abandon et de perdus de vue sont difficiles à infléchir, ce qui traduit des faiblesses dans le suivi des patients sous traitement. Compter sur des miracles des campagnes de communication est illusoire. Il convient toujours d'améliorer la qualité des prestations médicales.

PS-94265-06   TB-HIV active case finding and community DOTS with people centered approach in Lusaka, Zambia

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Background: Research Institute of Tuberculosis (RIT)/ Japan-Anti Tuberculosis Association (JATA) together with Zambia Tuberculosis Leprosy Trust (ZATULET) as a local implementing partner, designed and launched the pilot activities since December 2007 under the programme of TB-HIV Active Case Finding and Community DOTS in Lusaka, Zambia. As of year 2007, 183 Pulmonary Tuberculosis (PTB) among which 68% were diagnosed as sputum smear negative PTB cases were notified at government health centers covering 65 000 target population in 'Bauleni' compound. The programme aims to reduce the burden of TB in the HIV prevalent areas in resource-limited settings.

Intervention: The TB-HIV comprehensive programme approach was adopted within a small scale to target TB suspects from 65 000 people living in Bauleni, an urban compound of Lusaka. There are four components: 1) set up of TB-HIV Active Case Finding Management (ACFM) diagnostic centre for smear and culture tests and also equipped with a X-ray machine to increase early and sensitive detection of PTB and to promote Diagnostic Counseling and Testing (DCT) for TB positive patients in collaboration with the TB reference laboratory for Lusaka province; 2) capacity building of TB treatment supporters (TS) in the community through the holistic

training programme on TB-HIV, Home Based Care (HBC), community mobilization, participatory monitoring and evaluation; 3) DOTS supervision and HBC including provision of High Energy Protein Supplements (HEPS) in collaboration with TB corners at government health centres; and 4) improved livelihoods of TB treatment supporters through income generation activities.

Impact assessment: Baseline and post-intervention cross-sectional surveys are designed and being conducted to assess the impact of the programme. It aims to measure the extent to which patient and health system delays affect accessing TB diagnosis and treatment.

PS-94489-06   Partnering with grandmothers and healers to eliminate the 'Disease of Dust' in Senegal: a case study

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While tuberculosis continues to pose a major threat as a re-emerging disease and the burden of disease continues to grow and generate the need for community participation, evidence on community-based tuberculosis programming remains limited. There is little information regarding effective community-based programming to support and compliment the institutional approach to addressing tuberculosis through facility-based DOTS. In 2003, Christian Children's Fund initiated community-based tuberculosis services in project sites in Senegal. This case study is a qualitative documentation of that effort. Findings suggest that community health staff and volunteers, with relatively short training, can successfully increase patient screening and can also play a critical role in treatment adherence. This success relies on clarity of health workers' and volunteers' knowledge of their roles, including when to refer to the health center, and on routine knowledge assessment and supportive supervision. Secondly, community participation proved indispensable in overcoming powerful stigma, which was a major problem in this study. The project was able to address stigma through culturally appropriate mechanisms and carefully designed key messages that were implemented by CCF staff and community volunteers. In 2003, only 67% of over 1000 mothers interviewed were able to name at least one danger sign of tuberculosis, such as weight loss or cough with blood; in 2006, this increased to 98 percent. Given the shortage of health professionals in the developing world, this study suggests that governments can strengthen tuberculosis prevention and care programs at the local level by partnering with staff from nongovernmental organizations and community members.

PS-94525-06 Analysis of the effectiveness of face-to-face community communication for TB control in a poor area

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Objective: This study is intended to examine the performance and effectiveness of face-to-face community communication by local volunteers from partner organizations in the poor area in China.

Methods: A rapid appraisal including small-sized quantitative survey and qualitative study was carried out in 16 villages of 4 counties in two provinces (Anhui and Inner Mongolia). A total of 158 respondents (one from each household) including 84 men and 74 women attended the questionnaire survey, 85.4% (135) of which are 25–65 years old. Individual interviews were carried out in different levels with 16 TB programme officers, 28 officers of Women Federation and 26 township or village doctors.

Results: Out of the 158 respondents, 136 (86.1%) have received health education and communication on TB, 76.5% (104) of which received face-to-face communication by the community volunteers. The general awareness rate of 6-question survey of these respondents is 66.5%, 20% higher than that (48.9%) of the national KAP survey in 2006. The qualitative study indicates the willingness of making contribution from the volunteers and their working organizations.

Discussion: The assessment indicates that face-to-face communication is a productive and applicable strategy that can be further promoted although there are also difficulties and problems during the implementation.

PS-94759-06 Treatment support for vulnerable tuberculosis patients

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Background: Moldova's health care system places responsibility for tuberculosis (TB) treatment adherence on patients, who are overwhelmingly poor and marginal. Social assistance and social workers are not available for associated costs or patient education. In the northern city of Balti, which has a higher TB case rate than the national average, the community organization *Speranta Terrei* gives treatment support during the ambulatory, continuation phase in consultation with the TB dispensary. Treatment supporters, called moderators, offer vulnerable patients outreach and personal attention that doctors and nurses cannot.

Intervention: Moderators serve as intermediaries and peer counselors for TB patients from marginal groups. They bring medication from the dispensary to patients' homes, observe ingestion, answer questions, encourage completion, and report back to the dispensary. Through focus group discussions (FGDs) with practitioners, moderators, and patients, the study collected information on: 1) how patients vulnerable to treatment interruption are selected; 2) how patients view their interactions with practitioners versus moderators; 3) what are impediments and what helps patients to complete treatment; and 4) what support should be given patients during treatment.

Results and lessons learnt: Patients with drug-susceptible TB, multidrug-resistant TB (MDR-TB), and TB-HIV co-infection completed treatment under moderators' supervision. During 2006–2009, of 400 patients receiving treatment support, 10 were lost to default or death. Patients credited unhurried interactions with moderators and opportunity to ask questions repeatedly on treatment regimens as critical to treatment completion.

Conclusions and key recommendations: Personalized and coordinated support from community members is an effective intervention for alleviating the effects of poverty and marginality on TB treatment adherence.

PS-94871-06 Mobilizing community promoters to improve access to TB care in Chiapas, Mexico

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Background: Limited infrastructure, social exclusion, and scant resources undermine public health in Chiapas. In 2004, TB incidence in Chiapas was twice the national rate, and TB mortality triple the national average. Studies estimate fewer than 25% of TB cases in Chiapas are diagnosed. No TB information is available in indigenous languages; few providers speak them. HealthRight targeted communities in Ocosingo, Chiapas, first training existing community promoters to disseminate TB messages and encourage symptomatics to seek care. Distance and communication gaps continued to hinder TB control. To respond, HealthRight and State TB staff then designed a Community TB Care (CTBC) model for Ocosingo.

Intervention: In Phase I, HealthRight conducted a Knowledge, Attitudes, and Practices (KAP) survey. Responsive education materials—the first in Tzeltal—were developed, adapting national messages. HealthRight trained 221 promoters in TB education and case finding. In Phase II, HealthRight and State TB staff developed CTBC methodology to expand pro-

moters' roles to work with facilities to collect sputum samples for testing and monitor TB treatment. Health-Right monitored activities via monthly promoter meetings and data review at facilities.

Results: In Phase I, promoters reached 10 600 individuals. TB tests doubled from previous years at facilities in whose catchment area promoters worked. In Phase II, 100 promotores linked to pilot facilities were trained in CTBC. Presented results will include CTBC outcomes, endline KAP data, challenges, and lessons.

Conclusions: In many rural/minority areas, community promoters are a bridge to health systems. With support, they can advance Stop TB aims to engage all care providers and empower communities. Health-Right's CTBC pilot was developed with the state TB program, attentive to local challenges and robust monitoring. This can be replicated to improve access to TB care in other marginalized communities.

PS-95092-06   Integración de los subcomités intersectoriales de enfermería para favorecer la movilización social

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Objetivo : Lograr integración de subcomités sectoriales de enfermería en las Jurisdicciones Sanitarias Chiapas/México.

Método : Se organizaron con enfoque técnico, humanístico y de organización comunitaria de 16 horas cada uno para 09 Jurisdicciones interviniendo el sector salud: Secretaria de Salud (SSA), Instituto Mexicano del Seguro Social (IMSS), Instituto de Seguridad y Servicios Sociales del Estado (ISSSTE) y Secretaria de la Defensa Nacional (SEDENA). Se otorgo diferente entrenamiento dada la diversidad de etnias, logrando la sensibilización del personal de salud y concientización en el manejo de atención de los pacientes con tuberculosis.

Resultados : Integración de 9 subcomités jurisdiccionales, capacitación a : 400 enfermeras, 64 trabajadoras sociales y 314 médicos de la SSA, 325 enfermeras y 141 médicos del IMSS, 20 enfermeras del ISSSTE y 102 de otras instituciones.

Conclusión : El entrenamiento al personal de salud con enfoque técnico, humanístico y de organización comunitaria es una evidencia de los logros y éxitos de los conocimientos adquiridos debido a las acciones desarrolladas y las adecuaciones de entrenamiento en cada jurisdicción sanitaria por la diversidad de etnias que tiene Chiapas.

PS-95100-06   Community-based experience on DOTS for children in a government tertiary hospital in the Philippines

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Background: In 2007, the Lung Center of the Philippines, tertiary government hospital, DOTS certified and accredited clinic have started implementing the Administrative Order No. 178 Guidelines for Implementing Tuberculosis Control Program in Children issued by the Department of Health. Area of coverage is within catchment area in highly urbanized city in Metro Manila, with population of 350 000, 4th district of Quezon City. Such endeavor would be of great help in case detection, curtail dissemination of TB bacilli in the family and community.

Methods: Children with respiratory sign and symptoms related to TB are evaluated. Partnership between LCP DOTS for Children (DOTSCh) clinic, local government units, non-government community agency, faith based organization seeking assistance for proper diagnosis and management. Joint agreement has been established between the involved agencies: capacity enhancement of community staff acting treatment partners; sharing of responsibilities during operation; health information and dissemination during community outreach for referral of suspects to DOTSCh clinic for quality diagnosis.

Results: Partial analysis of 619 consultations since 2007 at LCP DOTSCh clinic showed 130 (21%) were enrolled; 124 (95%) pulmonary TB; 6 (5%) extra pulmonary, 124 (95%) from catchment areas; 6 (5%) outside Metro Manila. Among pulmonary TB, 4 (3%) smear positive. Demographic data: 68 (52%) are male; 62 (48%) female; 30 (23%) aged 0–4 year old; 60 (46%) 5–9 year old; 40 (31%) 10–14 years of age. Cohort of 66 patients treatment outcome showed 62 (94%) completed treatment; 3 (75%) cured; 1 (1.5%) defaulted. A total of 64 (50%) still ongoing treatment. One mother acting as treatment partner to 15 children. Four mothers are involved in community.

Conclusions: Findings show importance of partnership, sharing responsibilities in controlling tuberculosis, as essential tool in strengthening community involvement for quality diagnosis and treatment.

PS-95168-06   Community empowerment: community TB care for the poor along Thailand-Myanmar border areas

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Aim: To implement community TB care and community empowerment for the poor in 32 border districts

in ten provinces along Thailand-Myanmar Border Area.

Methods: The eight activities have been implemented by applying and supporting: 1) Political commitment of policy makers; 2) Providing well-trained TB out reach workers/community-based TB volunteers; 3) Supporting adequate drugs and Lab. equipment; 4) Using motor bicycle/bicycle DOT observers; 5) Developing health daily, bilingual TB education, information and communication/peer education via empowerment approaches; 6) Home visit program by providing health care set, rice and food/transportation coupons during the treatment; 7) In case of the poor and complicated cases, admission in the hospital for few weeks; 8) Monitoring and evaluation, recording and reporting system. From the outcomes of cohort 2007, out of 1643, 1285 (76%) cases were achieved treatment success, 132 (8%) died, 165 (11%) defaulted, 50 (3%) transferred out, 38 (2%) failed respectively.

Results: The current achievement of DOTS is limited to the area where people can access to health care services, but clearly inadequate among marginalized population. The invention and intervention of appropriate and sustainable health care system with participation of all stakeholders will be a long term benefit to Thailand.

PS-95350-06 Triad for sustained TB outcomes: empowered communities, accessible health services, enhanced livelihood

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Background: Sorsogon City was part of a project site for the Global Fund Round 2 TB grant. World Vision focused on Advocacy, Communication and Social Mobilization, a part of the National TB Program. 26 community-based TB Task Forces (TFs) were organized with 57% coverage of city population. TFs, composed of hamlet leaders, fishermen, and mothers, do TB awareness-raising, supporting TB services, referrals, treatment partners, and advocating local government support.

Midterm evaluation noted the efforts as directly contributing to increased case detection rates and cure rates (CDR-CR) by as much as 20–40%. The challenge was how to sustain results especially in remote and poor settings.

Response: The Social Mobilization on TB project provided grants as seed capital for income-generating projects where profit will be used to support TF activities. Of 26 TFs, 18 availed the grant, totaling 4984 Euros-rice retailing (67%), variety store (17%), buy and sell (11%) and e-loading (5%). TFs federated and formed the Sorsogon City TBTF Multipurpose Cooperative, registered in 2007 by Cooperative De-

velopment Authority. They now manage the grant and lends to members.

Results: Final Evaluation in 2008 pointed that TFs continued to contribute an additional 20% annually to CDR-CR in areas of operation. The cooperative has 283 members with individual and group loans. Profits from group loans are divided into two:defray TF expenses like snacks during meetings, fare of patients, sputum cups; and equal sharing among members. Shares of 1–3 Euros per day are used to buy family's basic needs. Unemployment rate in the region declined from 5.8% in 2006 to 5.3% in 2007–08.

Conclusions: TB is a disease of poverty, and the provision of loan is an additional route to de-linking the two. Strong linkages with local government and stakeholders results to local ownership of the project. TB programs should not just focus on health issues but also reducing poverty and empower communities.

PS-95451-06 Comunidades y unidades de salud unidas para la prevencion y el control de TB en Brasil

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Background and challenges to implementation: En Brasil, la tuberculosis continúa avanzando entre las poblaciones vulnerables debido a factores como: la desigualdad social, concentración de la población e la desestructuración de los servicios públicos de salud. Muchas personas no tienen informaciones sobre la enfermedad y no saben cuando deben procurar un servicio de salud. Éste es unos de los grandes desafíos. El Fondo Global para la TB en Brasil se esfuerza para fortalecer la estrategia DOTS y llegar a las poblaciones vulnerables y para esto ha iniciado un trabajo cooperativo con la sociedad civil organizada.

Intervention or response: Ha sido realizado un curso para instrumentalizar 9 comunidades y profesionales de salud que buscan realizar acciones de prevención de la TB en Río de Janeiro. El contenido de este curso pasa por los aspectos biológicos de TB y los aspectos subjetivos que la enfermedad trae para los agentes dentro de la comunidad. También hubo oportunidad de reflexionar sobre las posibilidades de implantar el DOTS llevando en cuenta la realidad de las comunidades y de las unidades de salud. Fueron 30 horas presenciales y 6 horas dedicadas a la integración entre agentes y profesionales de salud. Los agentes visitaron la unidad de salud y los profesionales de la unidad conocieron el trabajo comunitario de los agentes.

Results and lessons learnt: Nueve proyectos fueron implantados en 6 municipios del Estado de Río de Janeiro y esta experiencia será una referencia para otros municipios de Brasil.

Conclusion and key recommendations: La integración entre agentes comunitarios y profesionales de salud es uno de los puntos esenciales para el suceso en el control de TB y debe ser uno de los primeros pasos a ser trabajados. Para ello es fundamental la definición clara de papeles y funciones, la reflexión cooperativa y participativa de estos actores sociales.

PS-95623-06 La comunidad frente al VIH y la TB, tocando tu puerta

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Introducción : La comunidad, Vision Mundial (VM) y el gobierno de la República Dominicana, se unen para prevenir la coinfección de TB y VIH de manera interactiva y novedosa.

Visión Mundial en coordinación con estas instancias, desarrolla una estrategia de información y prevención sobre la TB y el VIH llamada Tocando tu Puerta, en áreas de incidencia de sus Programas. Procura el incremento del conocimiento sobre ambas enfermedades, reducción del estigma y discriminación, y demanda de servicios de salud.

Intervención : Mediante un abordaje con base comunitaria, la campaña se realiza mediante la visita casa por casa de sus adolescentes y jóvenes previamente capacitados. Primero, se descubre el conocimiento que tiene ésta, sobre las referidas enfermedades y se anotan sus inquietudes. Luego, con el material educativo sobre ambas enfermedades diseñado para tales fines, se expone el tema y se construye el conocimiento con la familia. Se aplica una post evaluación y se promueven los servicios de VM y de la Secretaria de Salud.

Resultados : Realización de 5 Campañas, alcanzando unas 20 000 personas y 5000 hogares visitados. **Sensibilización** de la población en ambas enfermedades, esperando un incremento en el uso de los servicios de salud, detección oportuna de casos y adherencia al o los tratamientos. El contexto familiar facilita la interacción y apertura para recibir información, fortaleciendo la sinergia entre la comunidad, los servicios de salud y VM.

Conclusión : Tocando tu Puerta es una actividad educativa comunitaria. Se requiere el diseño de material para analfabetos y traducción al idioma Creol para población haitiana, y se recomienda fortalecer las redes comunitarias para el referimiento de casos y seguimiento al DOTS.

KNOWLEDGE, ATTITUDES AND PRACTICES RELATED TO TB

PS-94079-06 Challenges and opportunites in tuberculosis control in garment factories, Dhaka, Bangladesh

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Background: Employees in garment factories in Bangladesh, often work in crowded rooms with poor sanitation and unventilated housing structures, creating an ideal condition for the spread of tuberculosis infection. Past outreach programs demonstrated low case-detection due to the challenges of gaining management commitment and easing workers' fear of losing job.

Objective: Identify remedial factors, opportunities, and feasible recommendations in improving TB case detection and treatment in garment factories.

Methodology: The study was conducted in 6 garment factories in Mirpur and Dhanmondi areas of Dhaka city. Eighty male and female garment factory workers were randomly surveyed from 3 factories. Fifteen TB patients with different demographic and socio-economic background were purposively selected for case studies, and in-depth interviews were conducted to explore perceptions about TB, health-seeking behavior, stigma, treatment experience, and workplace-related challenges. Nineteen factory managers from all 6 garment factories and 10 members of BRAC TB Control Program staff participated in an in-depth interview sessions.

Results: Both male and female garment workers in Dhaka had limited knowledge about TB. While workers and TB patients in the garment factories were aware of the impact of TB, drive for diagnosis was challenged by fear of losing jobs, being forced to take leave without pay, or stigma from colleagues. Unmarried women were most affected by stigma. TB-control activities in the garment factories were sporadic. Senior management was either in denial or largely ignorant of TB as a disease. Provision of health services to workers was influenced by buyers' compliance policy, conservative attitudes of owners towards workers, and male dominance of the management.

Conclusion: Effective advocacy and social mobilization among factory management and workers, greater efforts to increase general health compliance, and priority to patients' privacy are needed.

PS-94216-06   Side effects of anti-tuberculosis drugs and their management: knowledge among doctors working in Delhi

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Aim: Side effects to anti-tubercular drugs (ATT) are one of the most important factors affecting compliance to treatment. The aim was to study the knowledge of these side effects and their management among doctors in Delhi, India.
Methods: Pre-tested structured questionnaires were administered to doctors attending training sessions at New Delhi Tuberculosis Centre. Parameters of qualification and experience of doctors were analyzed with reference to performance on the questionnaire.
Results: 169 questionnaires (86 male, 71 female doctors; age in years—mean: 41.9, SD: 10.0, range: 22–59) were valid and analyzed out of 175 filled. The doctors were allied to different organizations: central government (28%), state government (8%), railways (12%), medical colleges (18%) and other institutions like general hospitals, municipal corporations, National AIDS control program. 47% of 169 doctors had received post-graduate education, 77% were managing TB patients in their practice and 38 doctors were associated with National TB control program (RNTCP). The mean total score on the questionnaire was 5.7 (SD: 2.9), range: 0–16. Men had better scores compared to women ($P = 0.004$). Age of the doctor <25 years (fresh graduates) was associated with better scores ($P = 0.02$). The doctors working with RNTCP were also more knowledgeable compared to doctors working in other organizations ($P = 0.02$).
Conclusion: RNTCP conducts regular training for its doctors to update their knowledge which reflects in their scores. Fresh medical graduates are also abreast with the theoretical knowledge compared to doctors practicing for some years. Side effects to ATT, as a cause of non-compliance, rank quite high in the list of treatment aspects affecting adherence to therapy and the success rates. It is therefore vital for doctors to be aware of side effects of ATT and their management. This can perhaps be addressed through periodic training modeled on RNTCP pattern.

PS-94219-06   Survey on student tuberculosis health promotion information awareness

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Objective: To understand the current status of students awareness rate of 8 items of tuberculosis (TB) key health promotion in China, and to provide baseline evidences and key points for more effectively implementing TB health promotion in schools

Design: A systematic multi-stage stratified random sampling was administrated. 60 counties in 19 provinces were totally selected as the sample frame, and 2 townships from each county, 3 villages from each township. Students were asked one by one on inquiry questionnaire face to face.
Results: A total of 5268 students were enrolled in the survey. Among the subjects, 70.0% of students know that TB is infectious; 53.2% know that pulmonary TB patients infect others by cough, sneeze or saliva out of their month when they speak aloud; 33.8% know that the major symptoms of TB include coughing and coughing with phlegm; 19.4% know that those who have coughed or coughed with phlegm over three weeks and those who cough out blood or blood sputum should be suspected as TB patients; 44.0% know the local special TB control and prevention organizations; 36.3% know that TB suspects should go to special TB prevention and control organizations to be checked, examined and managed; 56.1% consider that TB can be cured as long as TB patients persist in getting normal treatment; 38.5% know the national free for main checks, and 38.1% know free anti-TB drugs are provided for infectious pulmonary TB patients; 36.6% pay more attention to TB patients or do not discriminate them.
Conclusion: The awareness rate of students is low in the major symptoms of TB, TB suspected should go to local TB prevention and control organizations for checking, free check and anti-TB drugs provided for infectious pulmonary TB patients and do not discriminate B patients. These four items of TB information are important for students and it is necessary to strengthen propagandize those items of TB information to students in schools.

PS-94313-06   Knowledge attitudes and practices influencing TB outcome in Mexico

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In Mexico, national cohort information for 2007, indicates that 70.72% of TB cases were cured and an additional 6.73% completed treatment. 5.56% are reported as defaulting treatment, and 6.04% were reported as deaths. Diagnosis are made later rather than sooner. No published studies exist to document reasons for default, and there is no sufficient research on stigma and discrimination existing to determine its impact in detection and cure. Thirteen states in Mexico account for 65% of total cases, and 40 jurisdictions are considered a priority in TB control. SOLUCION TB Expansion works in 35 priority jurisdictions in the 13 priority States. The SOLUCION

TB Expansion (STBE) project of Project Concern International in collaboration with the US-Mexico Border Health Association and the Colegio de la Frontera Norte, are implementing a Knowledge Attitudes and Practice survey between March and September 2009. Cure rates are as low as 13% in some of the participant states (Michoacan), and mortality rates as high as 5.65% (Baja California). The highest treatment abandonment rate is reported in Baja California 13.86%. Four target audiences for the survey include: general public; persons with TB (PATB); family members of Persons with TB; and health service providers. The survey is being carried out in 5 priority jurisdictions out of 35 where the STBE project works. A total of 1,645 surveys will be completed. As the first study of its scope and kind, this will be an important resource to inform relevant TB norms and policies and service provision throughout Mexico. Findings will be relevant for the awareness of the general public, the training of service providers, and to promote the active participation of PATB and family members in TB control activities. Finally, once the study is completed, its methodology and tools will be available for utilization and replication of similar studies throughout Mexico.

PS-94398-06   The health and economic burden of tuberculosis in India

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Background: The aim of this study was to measure the changing health and economic burden of TB in India, and to assess India's progress towards achieving the MDG targets for TB on a national basis.
Methods: The health burden of TB in India was measured by calculating the number of Disability Adjusted Life Years (DALYs) lost to TB based on WHO epidemiological data from 1990–2006. The economic burden of TB was measured by applying the Value of Statistical Life Year (VSLY) concept to calculate the corresponding loss in economic wellbeing.
Results: The burden of TB in India has fallen dramatically since the 1990s reflecting the scale-up of the Revised National Tuberculosis Control Programme (RNTCP) and an improvement in underlying socioeconomic conditions. The number of DALYs lost from TB per 100 000 people has improved by 33% from 1990–2006. Similarly, the economic burden of TB in India has improved by 31% on a per capita basis. In 2006, India had achieved 95% of the MDG target for reduced TB prevalence and 66% of the MDG target for reduced TB deaths. However, TB is still the cause of immense burden in India particularly in terms of mortality. In 2006, TB caused 325 000 deaths, a loss

of 7.9 million DALYs and a reduction of US$ 23.7 billion in economic wellbeing—an amount equivalent to US$ 20.6 per capita.
Conclusions: The burden of TB in India has fallen dramatically since the 1990s and considerable progress has been made towards the MDG targets for TB on a national basis. However, further progress towards the elimination of TB will require India to focus on reducing the mortality rate for TB and to address emerging risks such as MDR-TB and HIV-related TB which potentially threaten to reduce the efficacy and impact of the TB control programme.

Indicators of burden (unit)	1990	2006	Change	% Change
Incident cases (000s)	1 444	1 933	489	33.9%
Prevalent cases (000s)	4 884	3 445	−1 439	−29.5%
Deaths (000s)	362	325	−37	−10.3%
Years of lost life (000 life-years)	7 501	6 927	−573	−7.6%
Years lost to disability (000 life-years)	1 280	931	−349	−27.3%
Disability adjusted life years (000 life-years)	8 780	7 858	−922	−10.5%
DALY rate (life-years/100 000)	*1 022*	*683*	*−339*	*−33.2%*
Mortality (US$ million)	23 153	21 886	−1 267	−5.5%
Morbidity (US$ million)	2 504	1 766	−738	−29.5%
Total economic loss (US$ million)	25 656	23 652	−2 005	−7.8%
Economic loss per capita (US$ per capita)	*29.9*	*20.6*	*−9.3*	*−31.1%*

PS-94408-06   Tuberculosis awareness among multipurpose health workers of a treatment unit

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Background: To investigate the awareness of Multipurpose Health Workers (MPHW) working under treatment unit of tuberculosis. A treatment unit consist of four Designated Microscopic Centres (DMC) and eight Primary Health Centres (PHC) in Adilabad district of Andhra Pradesh, India.
Design: A pre-test and post-test questionnaire was performed on 51 MPHW out of 100 during TU level training on Revised National Tuberculosis Control Programme (RNTCP). A 20 point open ended questionnaire designed to assess the awareness of MPHWs. All the participants are female MPHWs.
Results: During pre-test the study showed that a substantial number of MPHW have inadequate knowledge regarding signs and symptoms, number of sputum collection and importance of its examination, available treatment and its duration, correct doses of routinely used short-course chemotherapy drugs including colour of treatment boxes, which is easy to recognise the category of the patients. During pre-test,

less than 50% responded correctly for all 20 questions. The post-test result showed an improvement in awareness levels but not uniformity across the subjects. There is no effect of number of years of experience on the level of awareness.

Conclusions: There is a general lack of knowledge regarding various aspects of tuberculosis among MPHWs. There is need of series of capacity building programmes for MPHW on tuberculosis for a better implementation and achieving new case detection as per the guidelines of RNTCP in India.

PS-94436-06   Perceptions and experiences of DOT among TB patients and health professionals in Norway

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Background: Direct observation of therapy (DOT) is one of the basic elements of the current TB control strategy, and is meant to ensure cure and to prevent development of drug resistance. According to WHO, DOT should be practiced in a context-specific and patient-sensitive way. The aim of this study is to explore perceptions and experiences of DOT among immigrant TB patients and their health care providers in Norway.

Methods: Qualitative study conducted in Oslo, Norway, including in-depth interviews with 22 TB patients who originated from Somalia or Ethiopia and 20 nurses, doctors and TB coordinators. Thematic analysis was conducted to identify patterns of descriptions that characterised how patients and health professionals experienced the practise of DOT.

Results: Health care providers had divergent views about DOT. One group argued that all patients should follow the rule of DOT throughout treatment, based on the principle of equality. Another group argued that DOT interfered much in people's lives, and that a strict practise could conflict with doctors' wish to treat patients individually. Many patients experienced DOT as an instrumental act without room for individual sensitivity. Those who had jobs or attended school experienced that lack of flexibility had severe social costs. Men in particular described DOT as degrading and discriminating, while some of the women saw DOT as an expression of care and thorough follow-up.

Conclusion: DOT is perceived differently among both health professionals and patients. Patients report severe social costs that call for a more patient-sensitive practise of DOT in Norway.

PS-94632-06   Health care workers' knowledge of tuberculosis and infection control

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Aim: TB prevalence is higher among health care workers (HCW) employed in Russian TB care facilities than in other health care settings. Lack of knowledge about TB and infection control (IC) contributes to increased risk, but even when knowledge exists IC measures are not always implemented. At present, there are no studies which explore Russian healthcare workers' knowledge about TB or reasons for failure to implement IC measures. The aim of this study was to identify knowledge of TB and IC, as well as supports, barriers, and motivators to use of IC measures, among TB HCW in Russia.

Methods: In this mixed-methods, community-participatory study, a convenience sample of 97 HCW in 5 TB facilities in 2 regions of Russia was used to generate 15 focus groups. Homogeneous groups consisted of physicians, nurses, lab staff, or support staff. Subjects completed a 20 question knowledge assessment tool prior to discussing TB and IC measures. Rapid ethnographic assessment methods, using a facilitator and 2 transcribers, guided collection of qualitative data.

Results: There were differences among the groups on knowledge (F $(3,92)$ = 20.391, $P < 0.001$). Responses from focus groups indicated that all groups understood airborne transmission and respirator use. However, participants still reported not consistently wearing respirators. The most common reasons for not wearing respirators were: financial, comfort, respirator quality, respirators inhibited communication, and the perception of scaring children. HCWs felt supported by encouraging remarks from administrators. Motivation to wear respirators included fear of transmitting infection to family and friends, fear of losing benefits, and seeing colleagues contract TB.

Conclusions: Even with understanding transmission of TB and the role of respirators in prevention HCWs still did not consistently wear respirators. TB programs should consider implementing a system of supports and motivators that include role models and mentoring.

PS-94878-06   Percepcion de calidad de vida relacionada con la salud y trabajo en pacientes con tuberculosis

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En México son pocos los estudios de Calidad de Vida Relacionada con la Salud (CVRS) en pacientes con tuberculosis. Ésta se ve alterada en quienes la padecen y en consecuencia su trabajo; por ello, esta investigación tuvo el objetivo de evaluar la percepción de CVRS en los pacientes con tuberculosis en todas sus formas de un área del Sector Salud en Guadalajara, México. El estudio se realizó en el total de pacientes con este diagnóstico de cuatro unidades de salud y para evaluación se usaron el cuestionario SF-36 y la dimensión de trabajo del Sickness Impact Profile. Los resultados se presentan por dimensiones ; función física, rol físico, dolor corporal, salud general, vitalidad, función social, rol emocional, salud mental, evolución declarada de la salud y trabajo. Participaron 13 hombres y 11 mujeres, el 80% entre los 18 y 50 años, todos en tratamiento. Su percepción de la función física fue excelente para el 29% y el rol físico fue malo para el 33.5% de la población de estudio. El rol emocional fue excelente para el 45.8%, mientras que la vitalidad fue percibida como excelente solo para 25% de los pacientes. La percepción del dolor fue buena en el 60% y la salud mental regular a buena para el 50% de ellos. La función social se percibió de muy buena a excelente en 54%, mientras que la escala de salud general solo el 21% la calificó de muy buena a excelente. Comparando su salud con la de hace un año, el 70.5% consideran que es mejor o mucho mejor y el 29.5% la consideran peor. El 58.3% de los pacientes no trabajan, la mitad por estar desempleado, de ellos el 36% lo atribuyen a su enfermedad. Las dimensiones mayormente afectadas por la enfermedad fueron el rol físico, la vitalidad, la salud mental y la percepción de la salud general. La población estudiada se encuentra en edad productiva, lo que resulta fundamental para establecer medidas de prevención y para mejorar la CVRS y condiciones de trabajo de este tipo de pacientes.

PS-94896-06   KAP survey on TB prevention and control in prison population: ACSM plan as a tool in prisons

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Introduction: Surveys are a friendly tool for KAP surveys as a starting point for implementation of communications programs, or to measure the impact of health promotion interventions, because they give qualitative and quantitative data to develop strategies to vulnerable populations such as prisoners (PPL).

Objectives: To collect enough information to design a strategy for Advocacy, Communication and Social Mobilization in prisons as part of a national strategy for TB control.

Methods: A descriptive cross section study from March to September 2008. We reviewed PNCT operational reports and the National Directorate of Prisons Reports. The survey included 3 prisons, with over 43% of PPL in the country. 17 were conducted indepth interviews, 10 focus groups and 3 observational visits.

Results: There are 39 prisons with a population of 15 187 inmates. 57% of PPL has access to DOTS, 50% of TB cases are pulmonary TB registered BK+. The success of treatment is between 75 and 77%.

Barriers to implementing DOTS: Lack of an adequate physical space of TB program, lack of knowledge and bio-safety in the program, low inter-institutional coordination, difficulty for contact and transfer of the PPL to a health center, little knowledge of the PPL about TB and lack of health education programs.

Conclusions: Tuberculosis is major health problem in prison. The study met its goal, providing relevant information for the development of the ACSM plan in prison, that if they are applied it will help to eliminate access barriers and contribute to TB control in this population.

PS-94985-06   Misconceptions about tuberculosis transmission among healthcare students in Rio de Janeiro, Brazil

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Introduction: Tuberculosis (TB) is associated with stigma. Healthcare workers (HCW) should help patients and their families to deal with the disease with minimal stigma. In addition, HCW should be aware of their risk for TB infection and protect themselves from transmission. The aim of the present study was to evaluate knowledge of healthcare students about TB transmission and self-protection.

Methods: Junior (first year) and senior (last year) students from different areas, including Medicine, Nursing, Physical Therapy, Dentistry, Biology and Psychology from 3 Universities in Rio de Janeiro were offered a self-administered questionnaire.

Results: A total of 1010 students answered, 372 (37%) were seniors, 372 (37%) were male, median age was 22 (interquartile range 20–25) years. Answers are shown in the Table. Senior students had, in general, better knowledge than junior ones. Nevertheless, misconceptions exist even among them, some of which have direct self-protection implications: protection by use of masks by HCW and patients is unknown by 8.9% and 30% of senior students, respectively; over 80% do not know that manipulation of contaminated sputum can transmit TB; and around 25% and 40% do not know that sneeze and speech

can transmit TB, respectively. In addition, over 46% believe that patients with latent infection can transmit TB. Among the 372 seniors, 192 (30%) do not know the three main forms of TB transmission (cough, sneeze and speech).

Conclusions: Although much knowledge is added to undergraduate students' knowledge, much remains to be learned. Misconceptions can lead to unnecessary self-exposure and to inadequate orientation of patients and their families and stigma perpetuation. Core curricula revision regarding TB teaching is necessary.

Table Junior and senior students' answers to questions about tuberculosis transmission, Rio de Janeiro, 2008/2009

	Juniors	Seniors	OR (95% CI)
How is TB transmitted?			
Answered I don't know			
Yes	71 (11.2%)	18 (4.9%)	*2.48 (1.42–4.39)*
No	561 (88.2%)	353 (95.1%)	1.0 (reference)
TB is transmitted by cough			
No	82 (13%)	14 (3.8%)	*3.88 (2.06–7.12)*
Yes	550 (87%)	357 (96.2%)	1.0 (reference)
TB is transmitted by sneeze			
No	220 (34.8%)	**92 (24.8%)**	*1.62 (1.20–2.18)*
Yes	412 (65.2%)	279 (75.2%)	1.0 (reference)
TB is transmitted by speech			
No	402 (63.6%)	**150 (40.4%)**	*2.58 (1.96–3.38)*
Yes	230 (36.4%)	221 (59.6%)	1.0 (reference)
TB is transmitted by sexual intercourse			
Yes	27 (4.3%)	12 (3.2%)	1.34 (0.64–2.83)
No	605 (95.7%)	359 (96.8%)	1.0 (reference)
TB is transmitted by hugs			
Yes	10 (1.6%)	6 (1.6%)	0.98 (0.32–3.05)
No	622 (98.4%)	365 (98.4%)	1.0 (reference)
TB is transmitted by forks, spoons and glasses			
Yes	309 (48.9%)	**94 (25.3%)**	*2.82 (2.11–3.77)*
No	323 (51.1%)	277 (74.7%)	1.0 (reference)
TB is transmitted in biomedical laboratories			
No	581 (91.9%)	**348 (93.8%)**	0.75 (0.44–1.29)
Yes	51 (8.1%)	23 (6.2%)	1.0 (reference)
TB is transmitted by utensils			
Yes	133 (21%)	**45 (12.1%)**	*1.93 (1.32–2.83)*
No	499 (79%)	326 (87.9%)	1.0 (reference)
TB is transmitted by sharing toilets			
Yes	3 (0.5%)	1 (0.3%)	1.76 (0.16–44.16)
No	629 (99.5%)	370 (99.7%)	1.0 (reference)
TB is transmitted by sweat			
Yes	15 (2.4%)	6 (1.6%)	1.48 (0.53–4.3)
No	617 (97.6%)	365 (98.4%)	1.0 (reference)
TB is transmitted by French kiss			
Yes	342 (54.1%)	**145 (39.1%)**	*1.84 (1.40–2.41)*
No	290 (45.9%)	226 (60.9%)	1.0 (reference)
TB is transmitted by other kisses			
Yes	35 (5.5%)	18 (4.9%)	1.15 (0.62–2.15)
No	596 (94.5%)	353 (95.1%)	1.0 (reference)
By whom is TB transmitted?			
Answered I don't know			
Yes	93 (14.8%)	15 (4.0%)	*4.12 (2.29–7.54)*
No	537 (85.2%)	357 (96.0%)	1.0 (reference)
Patients with pulmonary TB			
No	116 (18.4%)	33 (8.9%)	*2.32 (1.51–3.57)*
Yes	514 (81.6%)	339 (91.1%)	1.0 (reference)
Patients with extrapulmonary TB			
Yes	120 (19.0%)	**48 (12.9%)**	*1.59 (1.09–2.32)*
No	510 (81.0%)	324 (87.1%)	1.0 (reference)
Patients with HIV/Aids			
Yes	22 (3.5%)	34 (9.1%)	*0.36 (0.20–0.65)*
No	608 (96.5%)	338 (90.9%)	1.0 (reference)
Patients with cured TB			
Yes	38 (6.0%)	11 (3.0%)	*2.11 (1.02–4.43)*
No	592 (94.0%)	361 (97.0%)	1.0 (reference)

(continued)

	Juniors	Seniors	OR (95% CI)
By whom is TB transmitted? (*continued*)			
Patients with TB infection without disease			
Yes	241 (38.3%)	**171 (46.0%)**	*0.73 (0.56–0.95)*
No	389 (61.7%)	201 (54.0%)	1.0 (reference)
Are healthcare workers at risk for TB transmission?			
No	53 (8.4%)	5 (1.3%)	*6.76 (2.56–19.38)*
Yes	574 (91.5%)	366 (98.7%)	1.0 (reference)
How can healthcare workers protect themselves?			
Answered I don't know			
Yes	87 (13.8%)	4 (1.1%)	*14.71 (5.15–47.49)*
No	544 (86.2%)	368 (98.9%)	1.0 (reference)
Self protection is unnecessary			
Yes	5 (0.8%)	2 (0.5%˙˙)	1.48 (0.25–11.03)
No	626 (99.2%)	370 (99.5%)	1.0 (reference)
Avoiding physical contact			
Yes	29 (4.6%)	11 (3.0%)	1.58 (0.75–3.41)
No	602 (95.4%)	361 (97.0%)	1.0 (reference)
Using white coats			
Yes	93 (14.7%)	36 (9.7%)	*1.61 (1.05–2.48)*
No	538 (85.3%)	336 (90.3%)	1.0 (reference)
Cleaning stethoscope and other equipments			
Yes	142 (22.5%)	**59 (15.9%)**	*1.54 (1.09–2.18)*
No	489 (77.5%)	313 (84.1%)	1.0 (reference)
Avoiding hand shaking			
Yes	15 (2.4%)	7 (1.9%)	1.27 (0.48–3.47)
No	616 (97.6%)	365 (98.1%)	1.0 (reference)
Avoiding talking to the patients			
Yes	15 (2.4%)	9 (2.4%)	0.90 (0.40–2.45)
No	616 (97.6%)	363 (97.6%)	1.0 (reference)
Using masks			
No	163 (25.8%)	**33 (8.9%)**	*3.58 (2.36–5.45)*
Yes	468 (74.2%)	339 (91.1%)	1.0 (reference)
Asking TB patients to use mask			
No	350 (55.5%)	**113 (30.4%)**	*2.85 (2.16–3.78)*
Yes	281 (44.5%)	259 (69.6%)	1.0 (reference)
Avoiding sputum manipulation			
No	423 (67.0%)	**330 (88.7%)**	*0.26 (0.18–0.38)*
Yes	208 (33.0%)	42 (11.3%)	1.0 (reference)
BCG protects against TB transmission			
Yes	253 (41.1%)	**125 (34.2%)**	*0.75 (0.56–0.98)*
No	362 (58.8%)	240 (65.8%)	1.0 (reference)

PS-94996-06   Access to medical-social services of key populations at higher risk to HIV-TB in Tajikistan

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Aim: Search of effective instruments in preventing the spread of TB-HIV co-infections in the existing TB and HIV epidemic is impossible without an assessment of availability, access, acceptability and quality of medical-social services to key populations at higher risk to HIV-TB.

Methods: AFEW realizes the project 'ACCESS' HIV/AIDS and HIV-TB Collaborative Efforts in Central Asia (www.afew.org) directed to improving access to prevention of HIV-TB, treatment, care and support of vulnerable groups using the Client Management approach. Within the project framework, a study was conducted in Sogd region of Tajikistan, in order to

assess needs and access to services for key populations at higher risk (TB patients, inmates, IDUs, PLHIV).

Results: Among 110 TB patients 68% did not know where they could test for HIV. 85% of the patients who were tested for HIV did that on the initiative of doctor; 45% of those patients did not receive pre-test counseling; 73% of them no post-test counseling. Majority of TB patients expressed the need for social services. Among 383 IDUs 13% have TB, however, only ¼ of them were diagnosed so. Respondents indicated that social and legal services are inaccessible, due to absence of services and high threshold (lack of information on existing services; high service cost; formal criteria that complicate obtaining of services; high level of stigma and discrimination).

Conclusion: The research data indicated that TB-patients had limited access to HIV testing and services; only 25% of the TB infected IDUs knew about their diagnosis. Those results show the necessity of improving access of key populations at higher risk to services and for an integrated approach in provision of specific services for target groups. The Client Management approach used in 'ACCESS' project may play a key role in preventing the spread of HIV-TB among key populations at higher risk.

PS-95004-06   Needs assessment for a tuberculosis patient network in Chiang Rai Hospital, Thailand

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Background: Chiang Rai Regional Hospital (CRH), Thailand, experiences a high tuberculosis (TB) caseload and high treatment default, especially among poor mobile populations (19–30%). Several international studies have shown that TB patient clubs/networks contributed to TB care. However, Thailand has not involved patients in TB care. This study assessed the need of a TB patient network from the perspectives of patients and health staff.

Design/methods: We conducted group discussion with six groups of people (a group of CRH staff, four groups of ex-TB patients (elderly, women, men and hilltribe) and a volunteer group of people with HIV). A simple self-administered questionnaire was sent to 200 ex-TB patients. Content analysis was used to analyze data from group discussions and descriptive statistical analysis was used for the questionnaires.

Results: Off the 200 ex-TB patients who were sent a questionnaire, 58 responded (64% men). Men (76.7%) had higher needs than women (65.0%) for home vis-

its by patient volunteers and higher demands for financial assistance during TB treatment (82.1%, 63.2%). On the other hand, women (63.2%) expressed higher interest to apply for membership of TB network than men (52.9%.). Health staff perceived low need for a TB network because TB is not a chronic disease and that TB service should be primarily improved by health staff. Patient groups perceived high need for a patient network. TB education and counseling provided by patient groups seem to be more effective because they share the same health and psychological situation.

Conclusion: Health staff perceived low need for patient network while patients expressed the need to set up a TB patient network, as they need psychological support from a peer group. Men had higher demand for support than women.

Table   Problems encountered and patients' needs during TB treatment classified by sex

Problems and needs during TB treatment, $n = 58$ (total % responded 'yes')	Men $n = 37$	Women $n = 21$
Lack of money for transportation to the hospital (45.1%)	50.0% (16/32)	36.8% (7/19)
Had to borrow money from others during TB treatment (42.0%)	45.2% (14/31)	36.8% (7/19)
Being shunned by other people (34.0%)	38.7% (12/31)	26.3% (5/19)
Had side effect of TB medicine (35.8%)	33.3% (11/33)	40.0% (8/20)
Depressed, stress, lacked motivation to take medicine (27.5%)	34.4% (11/32)	15.8% (3/19)
Need patient volunteers to do home visit (72.0%)	76.7% (23/30)	65.0% (13/20)
Need funding source where patients can borrow money (74.5%)	82.1% (23/28)	63.2% (12/19)
Need some TB patients to share treatment experiences (63.8%)	67.9% (19/28)	57.9% (11/19)

PS-95041-06   Knowledge, attitudes and practices regarding tuberculosis transmission among healthcare students

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Introduction: Healthcare workers (HCW) and students (HCS) are at risk for tuberculosis (TB) infection and should protect themselves from transmission. The aim of the present study was to evaluate knowledge, attitudes and practices of HCS regarding TB transmission and self-protection.

Methods: Junior (first year) and senior (last year) students from different areas, including Medicine, Nursing, Physical Therapy, Dentistry, Biology and Psychology from 3 Universities in Rio de Janeiro were offered

a self-administered questionnaire. Students who declared always using masks were compared to those not using/using it sometimes.

Results: Among 1010 respondents, 372 (37%) were seniors, 372 (37%) were male, median age was 22 (interquartile range 20–25) years. Among the 372 seniors, 192 (51.6%) did not know the three main forms of TB transmission (cough, sneeze and speech). A total of 379 (37.5%) students declared not to be afraid of catching TB and 58/998 (5.8%) believe that HCW are not at risk for TB. Out of 258 (25.5%) who had examined patients with persistent (>2 weeks) cough or with known pulmonary TB, 226 (87.6%) did not use self-protective masks always. Risk factors for not using self-protective masks are displayed in the Table.

Conclusions: Many HCS have misconceptions about ways of TB transmission, some are unaware of their risk and the vast majority does not constantly use self-protective masks when examining patients who put them at risk. Knowledge was not associated with use of masks, although our sample of students using masks was too small to ascertain this association. Unfortunately, we did not ask if masks were available at workplace. In summary, students put themselves at risk for TB transmission. Large campaigns are necessary to enhance awareness and stimulate self-protection. It is crucial to offer masks at workplace and to give the students the good example.

Table Use of self-protective masks among 258 healthcare students who examined patients with known pulmonary TB or persistent cough for more than 2 weeks in Rio de Janeiro, Brazil

	Did not always use mask	Always used mask	OR (95% CI)
Knows that cough transmits TB			
No	9 (82%)	2 (18%)	0.63 (0.12–4.47)
Yes	213 (88%)	30 (12%)	1.0 (reference)
Knows that sneeze transmits TB			
No	58 (83%)	12 (17%)	0.59 (0.26–1.37)
Yes	164 (89%)	20 (11%)	1.0 (reference)
Knows that speech transmits TB			
No	87 (84%)	17 (16%)	0.57 (0.25–1.27)
Yes	135 (90%)	15 (10%)	1.0 (reference)
Knows that speech, sneeze and cough transmits TB			
No	118 (85%)	21 (15%)	0.59 (0.25–1.37)
Yes	104 (90%)	11 (10%)	1.0 (reference)
Believes that healthcare workers are at risk for TB			
No	4	0	
Yes	218	32	—
Is afraid of catching TB			
No	82 (89%)	10 (11%)	1.36 (0.58–3.25)
Yes	133 (86%)	22 (14%)	1.0 (reference)

PS-95221-06 Knowledge, attitude and practice about TB in Albanian people

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Background: Poverty in Albania has marked regional dimensions, with rural areas being consistently poorer than the rest of the country. Poverty in rural areas is 50–66 percent higher than in urban areas.
Objective: To learn about KAP of TB of the Albanian population.
Design: The study material was performed in 2007 based on the data of 6400 people in 2000 household randomly selected. The study population was stratified by: geographic area and place of residence; income; gender; age and education.
Results: The KAP survey showed that people visited the doctor especially for severe symptoms. The survey showed that the overwhelming reason why people do not seek care is because of low family income. In the study 83% of rural people knew TB, and 88.4% of urban people didn't. 12% of the population surveyed was illiterate and proportion of illiteracy in rural areas was 18%. People with a high level of education have better knowledge about tuberculosis. 5.7% of the study population reported that 'it's shameful to have TB' (2.9% of urban people and 8.7% of rural people). For those who think it is shameful, the first greatest worry is that it is the disease of the poor (76%) and the second is a hereditary disease (23%).
Conclusion: The survey showed that lack of information and knowledge about TB was more significative in rural areas and in population with lower income. In addition, stigma was more present in this group of people.

PS-95367-06 Factors that contribute to adherence and non-adherence to anti-tuberculosis treatment in Bulawayo

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Aim: Adherence to anti-Tuberculosis treatment is vital in ensuring a cure. Effective management of Tuberculosis requires high adherence to medication to ensure positive treatment outcomes and prevention of Multi-Drug and Extensively Drug Resistant Tuberculosis. The aim of the study was to determine factors that contribute to adherence and non-adherence to anti-Tuberculosis treatment among people living with or have been previously treated for Tuberculosis. It also sought to establish ways of strengthening family and community support for people on treatment.
Methods: The study was a descriptive qualitative study which used open ended structured questionnaires administered to both public and private health

workers, general practitioners and providers of other non-medical services for TB patients, focus group discussion for TB patients, family members of TB patients, community home based care volunteers and community leaders.

Results: Factors perceived as contributing to adherence by service providers and the community were support from the family; counselling; availability of food and health education. TB patients expressed that getting enough food, quick response to treatment, family support and health education contribute to treatment adherence. Factors contributing to non adherence by patients were being too ill to walk to the clinic for DOT; hunger pains due to lack of food; when feeling better and need to seek employment in neighbouring countries; depression due to loss of faith in treatment; drug side effects; lack of counselling and family support; inadequate information about TB and its treatment. Service provider and the community felt adherence was hampered by side effects of drugs, lack of information and counselling, drug fatigue and lack of food.

Conclusion: Adherence to anti-TB treatment can be promoted through treatment literacy, provision of food supplements, family support and counselling.

PS-95608-06   Conocimiento y actitud ante la tuberculosis en jovenes de Lima, Peru

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Introducción : En Perú la población que más contrae TB son los jóvenes ; por lo que es importante conocer el grado de conocimiento y su actitud ante este mal.

Métodos : Se aplicó una encuesta anónima a 120 jóvenes voluntarios de centros de educación técnica superior en el centro de Lima. La encuesta comprendió 33 preguntas, la mayoría recopiladas de estudios previos similares.

Resultados : El 48% fueron varones, y tuvieron una edad promedio de 19,1 $\pm$ 2,2 años. A la pregunta: si tienes tos y flema por más de15 días ¿qué enfermedad puedes tener?, 55 (45,8%) personas contestaron tuberculosis, 37 (30,8%) no saben y 28 (23,4%) contestaron otras afecciones respiratorias. El 87% refirió tener la cicatriz de la BCG en el hombro, pero solamente 5 (4,2%) sabían que protegía contra la tuberculosis. 118 (98,3%) personas habían oído hablar de la TB, pero el 56,7% contestó conocer nada o muy poco sobre la enfermedad. Las mujeres reconocieron mejor el síntoma de la tos asociado a TB, la infección por VIH como factor de riesgo, creen más que los hombres que en el Perú se discrimina a los pacientes con TB y refieren saber como prevenir la enfermedad. El 27% sabe la existencia de cepas resistentes al tratamiento. El 80% cree que la información sobre TB en el Perú es nula o escasa y el 98,3% cree que se debe informar mejor. El 45% se informó sobre TB en su colegio, el 16,7% en el sistema de salud, el 14% por familiares ; solo el 4,2% fue informado por la televisión o radio. Dos personas refirieron haber padecido TB y 28 (23%) tuvieron un familiar con TB. Sin embargo, el 80% refirió no estar preocupado por el riesgo de enfermar de tuberculosis.

Conclusión : Se evidencia un conocimiento muy limitado de los jóvenes en general, con algunos mejores resultados para las mujeres. Existe poca preocupación sobre el riesgo de enfermar y se reconoce poca intervención de prevención del sector salud y medios de comunicación masivos ; así como la necesidad marcada de información.

PS-95645-06   Study of tuberculosis and HIV/AIDS stigma in Mexico

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Background: Stigma associated with tuberculosis has been identified as a major barrier to health care and quality of life in tuberculosis management. Research on the causes and sustainability of stigma is needed to guide public health interventions to reduce its effects.

Design/method: The study used a mix method approach consisting of the administration of the Tuberculosis and HIV/AIDS Stigma subscales originally developed by Van Rie et al. (2008) and translated to Spanish for a Mexican context by Moya et al. (2008) with 187 persons affected by tuberculosis in 5 locations in Mexico. In addition the stidy includes 30 indepth interviews using a semi-structured iguide (English and Spanish) with adult affected by TB in the US-Mexico Border.

Research questions are: 1) What are the characteristics of individual undergoing tuberculosis (TB) treatment in the El Paso-Ciudad Juarez region? 2) How do persons affected by TB in the El Paso-Ciudad Juarez region interpret their disease and give meaning to stigma? 3) What are the community perspectives toward TB and HIV/AIDS in a Mexico context as perceived by individuals affected by tuberculosis? 4) What are the TB patient perspectives toward TB and HIV/AIDS in a Mexico context? Data analysis included: descriptive, bivariate, multivariate analysis statistic techniques using Mplus) to establish validity and reliability of the Van Rie et al. (2008) tuberculosis

stigma scale for a Mexican-origin populations. Analysis is in the process of being completed. Cronbach alphas for the four subscales were high = .89.

Conclusion: This study offers important future considerations. The data will be used as preliminary groundwork for a collaborative tuberculosis knowledge, attitudes and practices study.

TOBACCO AND LUNG HEALTH I

PS-94185-06   Tuberculosis and tobacco control together: the need for cessation among tuberculosis patients

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Background: Globally, India ranks first in number of new TB cases and tobacco use is one of the most important risk factors for TB morbidity, mortality and relapse.
Objectives: To document the prevalence of tobacco use among male TB patients, investigate whether patients received cessation messages from physicians and investigate patients' sense of perceived risk of tobacco use as a factor associated with TB.
Methods: Semi structured interview schedules and focus groups (4) ($n = 25$) were used to collect data from 163 current male TB patients aged ≥ 15 years, registered at TB treatment units in Trivandrum, Kerala, India. The outcome measures were data on prevalence of tobacco use, perceived risk of tobacco and physicians' cessation message. Data analyzed using SPSS.
Results: Prevalence of tobacco use prior to the diagnosis of TB was 79% (97% smokers). The mean daily consumption of cigarettes/bidis was 18. Prevalence of smoking during the period of interview was 34.4%. Notably, 65% received cessation messages from physicians but majority interpreted cessation messages as general advice not to smoke.
Conclusion: It is imperative that smoking cessation be included in TB management. Physicians' cessation advice needs to be tailored to TB patients and describe specific health adversities of smoking on TB. We should not miss any opportunity for cessation; during diagnosis, treatment and follow ups, which are teachable moments when patients are primed to change their behavior and motivated to quit tobacco. Smoking relapse following completion of TB treatment may be a major challenge that necessitates culturally appropriate cessation strategies.

PS-94499-06   Public knowledge and opinions concerning cancer

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Setting: Early cancer treatment improves outcomes. Inadequate public awareness and knowledge contribute to delay in seeking medical care.
Aims: To gain insight into public cancer knowledge and opinions.
Design: A prospective questionnaire and community-based cross-sectional survey.
Results: 520 city-dwellers participated. 285 (57%) were men. Mean age $\pm$ SD was 34 $\pm$ 13.1 years. 386 (77%) had attended college/university. 180 (34%) had an acquaintance with cancer. 106 (21%) were exposed to some cancer awareness on mass media. 198 (40%) were unaware that cancer was abnormal growth of cells. 6 (1%) knew the life time risk of cancer and only 208 (42%) thought that lifestyle as a youth had an influence. 141 (28%) recognized the three commonest cancers. 311 (40%), 280 (46%) and 366 (30%) were incognizant of the protective benefits of fruits and vegetables, breast-feeding and stopping smoking respectively. Knowledge of carcinogens was variable, with more than half being uninformed of the risk posed by OCP, excessive sunlight or shisha smoking, but more than three-quarter mindful of the hazards associated with cigarettes, pan and gutkka. Knowledge pertaining to cancer symptoms was poor, with nearly two-third unaware of anorexia, haematuria, blood in stools and hoarseness; and one-third of haemoptysis, weight loss, breast lump as being worrisome. On management issues, 258 (51%) believed a biopsy and 195 (39%) that surgery causes dissemination. 181 (36%) agreed to close family knowing the diagnosis.
Conclusions: Significant gaps exit in the public knowledge concerning cancer care. Misgivings are common regarding impact of lifestyle, preventive measures, symptoms, biopsy, surgery and diagnosis sharing. There is a pressing need for public awareness programs.

PS-94520-06   Tobacco cessation treatment: knowledge, attitudes and practices of physicians in Karachi

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Setting: Intervention by physician increases tobacco cessation rates. Assessment of their knowledge, attitudes and practices are fundamental in implementing effective cessation strategies.
Objective: To asses knowledge, attitude and prac-

tice of physician of Karachi for tobacco cessation treatment.

Methods: A prospective cross-sectional questionnaire based study recruiting practicing physicians from Karachi. A 19 item questionnaire, which included six items each on attitudes and practice and seven on knowledge, was self-administered.

Results: One hundred and four physicians participated. 89 (85%) were men. There was strong agreement amongst physicians regarding the perception of tobacco use negatively impacting health outcomes [89 (88%)] and their role in discussing the issue with the patients [92 (88%)]. Physicians reported moderate to low levels of comfort in discussing cessation 62 (59%), developing tobacco cessation plan 38 (36%) and recommending pharmacological treatment 30 (28%). Self assessed knowledge of pharmacotherapy was judged by 56 (53%) to be very good/excellent. However, on objective knowledge assessment only 6 (6%) physicians were able to correctly answer all items. With regards to practices, 79 (76%) reported that they identified tobacco use status in every patient; with most 73 (70%) advising the users 'almost always/always' to quit.

Conclusion: Most physicians recognize the seriousness of the problem associated with tobacco use and the need to address it. However, significant gaps were identified in physician's skills, objective knowledge and effective methods in tobacco cessation treatment. There is a pressing need to enhance physicians' capacity to deal with tobacco related issues.

PS-94594-06   A methodology to evaluate knowledge shift in participants attending the Union's training programmes

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Objective: To test the effectiveness of a simple tool to assess changes in knowledge among participants attending The Union's International Management Development Programme (IMDP).

Background: The Union's IMDP offers a series of training programmes targetting intermediate and senior level public health programme managers from government and civil society. The programme seeks to build capacity in core areas such as leadership, human resource management, budgets and finance management. Participants have expectations at the start of the course and expect to objectively evaluate the change in their knowledge at the end of the course.

Method: A simple structured questionnaire is administered at the beginning and at the end of the course. The participant is queried on core knowledge that the course teaches. The responses are tabulated at the beginning and at the end to measure the change in knowledge and expressed as a proportion.

Discussion: Early results show an average increase in knowledge of nearly 10%. It is planned to administer this tool systematically over the next 10 training programmes and present a fuller picture by the time of the conference.

Conclusion: Pre and post training assessments contribute significantly to understanding participants' needs and planning future training.

PS-94631-06   Indonesian tobacco control legislation: why we haven't succeeded

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Objective: To provide an overview of some challenges faced by the Member of Parliament in drafting the Bill on Controlling the Impact of Tobacco Product on Health.

Materials and methods: This study uses depth interview with Members of Parliament of the Republic of Indonesia, especially Members who initiates the above-mentioned Bill.

Results: 1) Members of Parliament who initiate this Bill are facing numerous difficulties in drafting the Bill on Controlling the Impact of Tobacco Product on Health. 2) Those difficulty and problems is in the struggle to gain support from other Members of the House. 3) The tobacco business often promote and advertise tobacco products at the House complex and its weaken the fundamental nature in drafting the Bill. 4) The Government, in this case the Ministry of Health, and also tobacco business are indifferent about this Bill.

Conclusion: All those challenges faced by the initiator of the Bill on Controlling the Impact of Tobacco Product has cause the Bill to be delayed on its enactment.

PS-94735-06   Smoking among medical students at different levels of education

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The present study aimed to compare two equal groups of medical students, in the first year of faculty (240 subjects) and in the fourth year (240 subjects), which were on probation in our clinic. We especially tried to find some factors that could influence the smoking habit. All the subjects answered the questionnaires. Females were predominant 312 (65%). 58.33% subjects were smokers, 41.66% were non-smokers and 6.66% students were former smokers. In the smoke group we notice the same predominance of the female gender (57.14%) compare to males (35.7%). The age of the first smoked cigarette was ranging from 13 years—18 students (6.43%) to 21 years (10%). Most subjects started to smoke at

18 years. They all knew the harmful effects of this drug. The predominant motivations were: curiosity (104 cases), fun (80 cases) or 'cool' manners: 96 students. None of them were influenced by parents or teachers. They considered they could quit smoking but at the time they had not a good motivation. We noticed that the smoking habit in medical students is not very different at the diverse levels of education. Future doctors should be influenced by antismoking education about tobacco related diseases, tobacco epidemics and smoking cessation. They have to be involved in tobacco control activities as members of the medical profession.

PS-94772-06   Why tobacco taxation matters in Bangladesh

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Bangladesh, with about 40 percent people living below the poverty line, is one of the top 10 countries in terms of total number of tobacco users. More than 30 million people in the country use tobacco that includes smoking and smokeless tobacco. The poor constitute a large proportion of this population. To these people, price of tobacco is very important. It is evident that higher prices of tobacco play a very important role in reducing the use of tobacco through making it more expensive to poor people in particular. Unfortunately, in Bangladesh, hardly any measures so far have been in place to increase the price of tobacco for curbing the use of it. As a result, the demand for tobacco is increasing in the country. It is evident from the time series data that, in recent years, the total consumption of tobacco products has increased and, on the other hand, the real price of these products has been declining each year. An analysis of data on the price and consumption of tobacco from 1981 to 2004 shows that whenever the real price of cigarette has increased, the consumption of it has clearly gone down substantially (see attached graph). This paper uses strong economic analysis to show how increased taxes on tobacco products through increasing the real price can reduce the demand of tobacco products on one hand and increase the revenue earning of the
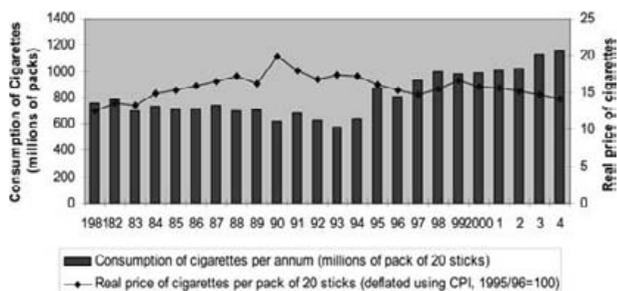
Figure Consumption versus real price of cigarettes: 1981–2004.

government on the other hand. The findings presented in the paper have important policy implications and are being used in Bangladesh in the advocacy for higher taxes on tobacco products.

PS-94882-06   How the tobacco industry targeted the IUATLD and TB groups to undermine tobacco controls

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Aim: The tobacco industry documents reveal how the major tobacco companies for decades covertly monitored the IUATLD, tuberculosis groups and the growing TB and tobacco epidemics in low to middle income countries. They collected intelligence using tens of thousands of public and private documents to: identify opponents of their expansion into developing counties; monitor key meetings and country action plans to reduce the epidemics; and develop relationships with TB and lung health groups with offers to fund research.
Methods: Tobacco industry documents publicly available on the Legacy website have been selected using the search terms IUATLD and TB for the period 1980 to the present. Medical evidence on how TB outcomes are worsened by tobacco use has been established by experts and will not be reviewed in this study.
Results: While other studies reveal how the tobacco industry undermined tobacco control efforts, including WHO's FCTC, this study exposes the industry's long term surveillance of the growing TB and tobacco epidemics and the delaying tactics they engaged in to deny and defer public health programs to millions of people.
Conclusion: The IUATLD and TB groups need to be aware of tobacco industry strategies to thwart, delay and deny tobacco control in countries with high disease burdens. Governments and civil society need to support the FCTC including Article 5.3 guidelines that recommend limited and transparent interaction with the industry including avoiding conflicts of interest by implementing binding policy rules that ban direct and indirect payments, gifts and services from the tobacco industry and related third parties.

PS-95063-06   Risk factors of lung cancer among women in India: population-based case-control study, Mumbai, India

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Globally, lung cancer deaths have increased by 20% among men during the past two decades but by 150% among women. In India, very few women smoke, therefore, finding the possible risk factors other than

cigarette smoking is of paramount important. A population based case-control study was conducted to evaluate the association between lung cancer and ETS exposure among women in Mumbai. A sample of 245 cases (reported in 2002–2004) and 489 neighbourhood controls were interviewed. Using interviewer administered questionnaire, information about exposure variables and possible confounders were collected. Multivariate analyses using logistic regression to estimate odds ratios with 95% confidence intervals were performed. Of the studied variables tobacco smoking, alcohol use, family income, types of fuel used for cooking, and ETS exposure from any one source [either husband, or other family members, or childhood, or other than family members] were found to associated with lung cancer at crude analyses. At the multivariate analyses, ETS exposure from any one source, alcohol use, higher income, and use of rock oil/wood/coal was significantly associated with lung cancer. Women who were exposed to ETS exposure from any one source (OR = 1.56), alcohol users (OR = 3.61), having higher family income (OR = 2.31) and users of rock oil/wood/coal (OR = 2.06) were statistically significantly associated with increased odds of having lung cancer. ETS exposure from any one source, alcohol use, higher family income, and use of rock oil/wood/coal increased the odds of lung cancer in Indian women.

PS-95101-06   Poverty and lung health: a case of Pakistan

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Pakistan is the 7th most populous country in the world. Almost, 40 per cent of the country's population lives below poverty line. 65 per cent of the total population of the country lives in rural Pakistan which is poor. 50 per cent men and women living in big cities of Pakistan are slum dwellers. The poor are increasingly felling victim of lung disease because of tobacco use. Rural poor use hukka (water pipe) whereas gutka, bedi, paan and cheap cigarettes are popular among the urban poor. Excessive use of tobacco is multiplying socio-economic problems of poor families and communities. More than 200 000 people die annually of lung diseases. A survey of slum dwellers in Islamabad, shows the slum dwellers spend large amounts of money each day on a variety of tobacco products, and comparatively little on nutritious foods or on education of their children. While the tobacco use is not the main cause of their suffering, it certainly contributes, through its health effects, and through the displacement of money used for its purchase. Tobacco industry is booming because of government support and its aggressive promotional ploys. Pakistan is the fifth largest tobacco producing country in

the world. The area under tobacco cultivation is about 57 000 hectares while the tobacco leaf yield is above 120 000 tons per year. Total per year consumption is 78 billion sticks while only 60 billion sticks are on record. Government of Pakistan ratified FCTC and promulgated laws in 2003 banning cigarettes advertisement on mass media outlets and smoking at public places and in public transports. However, implementation of laws is very weak. Tobacco-consuming illiterate and poor population is a great challenge for tobacco control activists. There is need to develop links between tobacco control initiatives and poverty reduction programs to assist in moving tobacco control further up in policy agenda.

PS-95103-06   District TB-HIV referral directories: an important tool in continuum of care

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Background and challenges: The Program for Appropriate Technology in Health (PATH) in collaboration with the National TB/Leprosy Programme (NTLP) introduced TB-HIV services in Tanzania in 2005. As most TB clinics lack integrated HIV/AIDS care and support services, HIV infected TB patients have to be referred to other facilities. TB patients prefer referral to a facility of their choice according to their conveniences and at times request to be referred to another district where their relatives reside. TB clinic staff in general do not posses information on all the facilities in a district and the services they provide.

Intervention: To facilitate accessibility to other diagnostic services and continuum of TB-HIV care at facilities which lack them, a District TB-HIV Referral Directory (DTH-RD) was developed and piloted in ten districts in Tanzania in 2007. The DTH-RDs were revised with inputs from facility staff and have become a useful working tool.

Results and lessons learnt:

- DTH-RDs are inexpensive to produce and introduce.
- Referrals for HIV care and other services have become easy and pains free.
- Improved timely client access to appropriate services.
- A threefold increase in number of referrals to appropriate services after introduction and use of DTH-RDs.
- Patient satisfaction and willingness to be referred.
- Referral of patients from one district to another is still a challenge.

Conclusions and key recommendations:

- A functional and effective referral and linkages system in TB-HIV services is crucial.

- DTH-RD is an important and practical referral tool that can facilitate entry of TB patients to HIV/AIDS care and treatment.
- DTH-RDs should be part and parcel of an effective and efficient TB-HIV referral system.
- The need for a Regional and eventually a National Referral Directory that can facilitate easy referral to other districts in a region or to different regions is evident.

PS-95109-06   Why do you smoke? An ethnographic query into the consumption of hand-rolled cigarettes in Bangladesh

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Background: Hand-rolled cigarette (bidi) consumption is a popular habit among poor people in Bangladesh. Eighty three percent of Bangladeshis live on less than two dollars per day thus bringing poverty and tobacco consumption into the discussion in this context. This project explores the bidi smokers' own perceptions of their smoking habit and seeks to identify the situational contexts that influence bidi smoking.
Design: Using purposive sampling, respondents were selected by observations and semistructured interviews were conducted based on an interview guide (Bernard 2006, p.189–190). After conducting thirty interviews, a repetition of themes was observed that was considered as the thematic saturations. Twenty-five hours of observational data were collected on a village tea-stall that was during interviews the commonly noted place for smoking.
Results: Bidi smokers' daily socio-economic problems were identified as influential factors, which in turn made them dissatisfied and influenced them to smoke. Smoking bidis was also argued to give relief from some physical ailments such as hunger, indigestion and constipation. Bidi was found to be a socially accepted mood-altering drug and it was seen to symbolize relief from their everyday tensions, angers, perceived exploitations and disappointments.
Conclusion: It is the socio-economic structure of Bangladesh with its inequality and poverty, which contributes to the tobacco consumption and related health problems of the poor. Understanding tobacco consumption in poor countries requires holistic perspectives that show links between cultural forms of gifting and sociability, socio-economic structures that perpetuate poverty and inequality, and the global context of expanding tobacco companies. Understanding the cultural and socio-economic factors for smoking in developing countries may help in formulating an effective way to reduce tobacco consumption.

PS-95193-06   Victims of smoking: an obstruction on elimination of poverty— a Bangladesh study

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Bangladesh enacted 'Bangladesh Anti-Tobacco Act, 2005' in minimum compliance of FCTC. But the Act, 2005 has some inherent defects, e,g; a narrow definition of public place was given, factories, markets etc were not included in the definition of public place, no provision was inserted for the requirement of pictoral warning, the Act mention of an 'Authorized Officer' to monitor implementation but again Govt. Officials are defined as Authorized Officer who have other priorities. Inherent lacking of the Act and failure to its implementation results that number of quitters are not sufficiently increased. As a results a considerable number of citizens are still victim of smoking as well as secondary smoking and the state thus failed to ensure the constitutional promise of improvement of public health. Consequently smokers as well as secondary smokers suffers from lung diseases, it reduced their working capability and they has to suffer early retirement and incurred significant expenses for treatment of tuberculosis, tobacco related and all other lung diseases. Because of their ill health and using significant part of their income for tobacco and also incurred expenses for tobacco related diseases they are eventually unable to get rid of the poverty. Furthermore, treatment of tobacco related diseases created a heavy burden on the National budget thus impose an impediment on the Govt to take effective measure to reduce/eliminate poverty.

PS-95127-06   Banning tobacco advertising as evidence based policy in East Java, Indonesia

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Background: In Indonesia, smoking rates among youth have been increasing. Indonesia is the fourth most populous country in the world with over 217 million people, and 30 percent of the population is under 15 years of age. The goal of the research was to provide evidence on cigarette advertisement and its association to youth smoking in order to support the advocacy to ban tobacco advertisement.
Method: A cross sectional survey was conducted in two cities and two districts using a modified version of the Global Youth Tobacco Survey questionnaire concerning smoking among 1630 students in 40 high schools. Variables that appeared related to smoking status (current smoking) were then analyzed using multivariate logistic regression analysis.
Results: Some exposure channels appeared to be much more effective in reaching the students audi-

ence than others. Billboards and TV advertisements were seen very often by high percentage of all students, 71% and 89%, respectively. Surprisingly, 11% of them seen cigarette advertisement on teen magazines and this medium appeared to be associated with higher current smoking prevalence. The prevalence of current smoking was especially high among those who think that smokers are perceived as attractive, smoking facilitates socialization, better group work, increased concentration, self confidence, and good grades, make life easier. In multivariate analysis, having lots of reasons to smoke was significantly associated with increased likelihood of smoking (OR = 12.98; 7.18 – 23.46).

Conclusions: The perceptions were pervasive advertising themes. Banning cigarette advertisement is a powerful way to undermine the (erroneous) association of smoking with attractive, self confidence, etc. that is a key message of cigarette advertisement. Complete ban on advertising is mandated.

Table Reasons for smoking among students and exposure to cigarette advertisements

Variables	Sample distribution $N = 1630$ n (%) (1)	Distribution among current smokers $N = 333$ n (%) (2)	Prevalence of current smoking % (2)/333
Reason			
To be accepted by a group	44 (3)	8 (2)	18%
Forced by friends	99 (6)	23 (7)	23%
Perceived as attractive	112 (7)	90 (27)	80%
Facilitates socializing	254 (16)	192 (58)	76%
Better work in a group	227 (14)	173 (52)	76%
Increases concentration	91 (6)	75 (23)	82%
Increases self-confidence	249 (15)	200 (60)	80%
Makes life easier	158 (10)	132 (25)	83%
Helps to get better grades	82 (5)	63 (19)	77%
Helps to lose weight	776 (48)	179 (54)	23%
Exposure to cigarette ads very often			
Teen magazines	114 (7)	36 (11)	32%
Adult magazines	312 (19)	73 (22)	23%
Newspapers	527 (32)	112 (34)	21%
Billboards	1152 (75)	236 (71)	20%
TV	1417 (87)	296 (89)	21%
Radio	684 (42)	160 (48)	23%

PS-95273-06 Effective enforcement of smoke free environment able to reduce poverty and lung health

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Bangladesh has enacted a tobacco control law in 2005 in accordance with some of the provisions of WHO FCTC. However, tobacco consumption in Bangladesh is increasing, especially among the youth and poor. The increase in tobacco consumption is due to many reasons. Recent socio-economic development and increase in population size make the country a lucrative market for the tobacco industries. Easy availability of cheap tobacco products, lack of strong tobacco control regulations and weak enforcements of existing regulations are also important factors. A study in Bangladesh has shown that tobacco consumption has a direct impact on the health of poor households, with poorer people spending less on food, resulting in malnutrition. The study found that the typical poor smoker could add over 500 calories to the diet of one or two children with his or her daily tobacco expenditure. Applied to the whole country, an estimated 10.5 million people currently malnourished could have an adequate diet if money spent on food were spent on food instead. Tobacco-related illnesses such as cancer, cardiovascular and respiratory diseases are already major problems in Bangladesh as in most countries of this Region. Due to a very high prevalence of chewing tobacco use in various ways, Bangladesh has significant incidents of oral cancers in the world. Hunger Free World has experience to work with media. Also, work on media material. Hunger Free World thinks that strategic media campaign will help to work on effective enforcement of smoke free policies and establishment of smoke free work places and able to reduce Poverty and Lung Health.

PS-95284-06 Tobacco-free work place: reduce poverty and lung health in Bangladesh

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Bangladesh faces a big challenge of gradual increasing of Tobacco users. The use of tobacco in the country has a long history and somehow this is embedded in the rituals and guest entertainment during any social gathering. Due to various campaigns and the legislation that was passed in 2005, awareness among a very limited group of people was raised and smoking has been reduced among them, while the poor and the youth still smoke at an alarming rate. According to WHO, 59% of Bangladeshis in the age group of 15+ smokes regularly and the annual average number of cigarette consumption per person are 245. Besides smoking of cigarettes, there are other forms of tobacco use in the country. They are; bidi, hukka, chewing tobacco pan (betel leaf) masala etc. Any from of tobacco intake is equally harmful to individuals as well as the family and community health. The wastage of money is so high that only 69% of the total amount spent for tobacco use can save lives of 350 children among 700 die every day from hunger, malnutrition and other related diseases. Bangladesh is a Party to the Framework Convention on Tobacco

Control (FCTC) and has national tobacco control legislation. The legislation makes a provision for smoke free public places with specifications of authorized officers and violations for enforcement. However, not many in the general population are well aware of the laws. Enforcement remains poor. There is an urgent need to raise awareness about existing provisions of the legislation and in particular, use the laws to protect people from harmful effects of second hand tobacco smoke. SROTH, from its long experience and strong association with the District Lawyers' Associations. In order to motivate the government agencies to come forward to enforce the law of 'ban on smoking in the public places'.

PS-95369-06 Building awareness to prevent smoking-related lung disease

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Tobacco increases the risk of lung related diseases, if not causes it, and this has been validated by various and numerous research all over the planet. Yet then consuming nicotine in various forms such as chewing, smoking, seems to be a popular habit and reality is far from having a nicotine free Earth. In the face of such situation I believe that the best policy of anti-tobacco campaigners is to create awareness amongst people and various target groups of the dangers of smoking and motivate them on refrain from tobacco consumption habit in any form. Educating people on the dangers of smoking and teaching them easy, and feasible ways of prevention by far is the most effecting tool to decrease the rate of smoking. Many activities have already commenced to create awareness being aware of this fact some of which I will high light here below. Smoking bans benefit non-smokers and smokers alike. Every time a smoker enters a banned a smoking areas, they are aware of the negative impact. In a smoking banned place, non-smokers are exposed to significantly less second hand smoke, while smokers tend to smoke less, have greater cessation success, and have increased confidence in their ability to quit. There should also be more bans and restriction on tobacco product marketing, since tobacco marketing increases cigarette consumption and seduces new smokers in the addiction. Awareness can also be build, by putting health warning on all tobacco products and this is guaranteed to reach all users, and also is does not involve and extra cost. Public health campaigns should be continued and increased to raise awareness amongst smokers and non-smokers alike. Mass communication, health education, and reliable information are essential elements for tobacco control success. Popular movies and media should also stop depicting actors smoking cigarettes to mentally coach the viewers, that smoking is not good.

PS-95636-06 India Smokefree national mass media campaign: lessons for success

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India is arguably the world's most complex media programming environment. It is a remarkably diverse country with a population of more than 1.15 billion people comprising approximately one-sixth of the world's population. There are more than two thousand ethnic groups, including broad social parameters, cultural and religious parameters. The media environment to cater to this rapidly developing cultural milieu is also diverse with more than 200 television stations and a multitude of regional radio and print media outlets. Given these enormous challenges, the media can also be a powerful tool to set agendas and facilitate behaviour change in relation to tobacco control, lung health initiatives. This paper explores the development, implementation and evaluation of the National Government's Smokefree campaign to support legislation to curb smoking in all public places in India. Key performance indicators, research methodology and sampling frames are presented with key findings. Lessons learned from this large scale, mass media intervention are reviewed to provide an optimized mass media programming model.

PS-95494-06 How subversion of tobacco advertisement bans defeat tobacco control policy objectives

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Background: Framework Convention on Tobacco Control as well as the Indian tobacco control legislation prohibits all forms of direct and indirect advertisement and promotion of tobacco products since 2004. However the tobacco industry (Both small and big corporate) has mastered the art of indirect and surrogate promotion in India.
Objectives: To understand the strategies and methods used to promote tobacco products in India which is a growing market with increasing disposable income and economic aspirations.
Methods: Qualitative analysis and evaluation of all the existing advertisement was undertaken over a period of one year. The form and manner of advertisement was observed and the patterns were identified from the point of view of marketing and trade penetration desired by the tobacco industry.
Results: It was found that even after the ban on all direct and indirect tobacco advertisement bans, the tobacco industry continues to circumvent the legal provisions and keeps on finding innovative ways to reach youngsters, females and its other target seg-

ments. The industry acts in a proactive manner (to its interest) and is always willing to test the limits of legal action.

Conclusions: The industry is using the weakness of the tobacco control laws to its advantage and is increasing the level of association of its various products with articles to indirectly promote its products. There is a clear long term strategy by the industry. The enforcement and proactive action by the tobacco control forces is lacking.

TB-HIV I

PS-94211-06   Analysis of tuberculosis screening among HIV/AIDS patients in Zhejiang Province

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Objective: To facilitate the prevention and control of TB-HIV co-infection through ascertaining the prevalence and trends of TB-HIV co-infection in patients with HIV/AIDS.
Methods: New registered HIV/AIDS patients in 2007 were screened through symptoms, chest X-ray films, sputum test.
Result: 33 tuberculosis cases were found among 577 HIV/AIDS patients which were screened, and the detection rate was 5.72%; 31 were active pulmonary tuberculosis cases were found, detection rate was 5.37%; 4 sputum positive cases were found, the detection rate was 0.69%. TB detection rate was 3.36% among HIV patients, and 12.50% among AIDS patients, the difference was statistically significant ($\chi^2 = 16.36$, $P < 0.01$). Conclusion HIV/AIDS patients were high risk population for TB infection which in hence should be regularly screened for TB for early detection and early treatment.

PS-94427-06   HIV testing and counseling among tuberculosis suspects

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Background and challenges to implementation: In 2008, Lesotho reported 13 200 cases of tuberculosis (TB); 76% of those tested for HIV were positive. A Tuberculosis Suspects Register has been used in Lesotho but did not capture HIV data. Thus, TB suspects who were confirmed not to have TB did not learn of their positive HIV status and missed an opportunity for early HIV care and treatment.
Intervention: The TB Suspects Register was revised

to include HIV indicators. HIV testing and counseling (HTC) was offered to TB suspects and results recorded in the register. Records of examinees in the TB Suspects Register for the period July–December 2008 from Berea District Hospital were utilized for the evaluation. Data from the register were entered and analysed in EpiData Entry (v3.1) and EpiData Analysis (v2.1). The main outcome measures were: prevalence of smear positivity among suspects and proportion of TB suspects who did not have TB but were HIV-infected.
Results: Of 730 TB suspects registered, 130 (18%) were smear-positive. Whilst 253 (35%) had a known HIV positive result prior to visiting the TB Clinic, 290 (40%) were tested for HIV and 187 (25%) were not. Of the 290 tested for HIV, 123 (42%) were positive. The most affected age group was 25–44, accounting for 64% of those HIV-positive. Of the 600 suspects who were smear-negative, 207 (35%) knew their HIV-positive status before visiting the TB Clinic. Of the 231 smear-negative suspects tested for HIV, 99 (43%) were HIV-positive. The 25–44 age group was most affected, accounting for 65% of HIV-positive cases. All those found to be HIV-infected were referred for HIV care and treatment.
Conclusions and recommendations: TB diagnostic facilities in high prevalence areas should offer HTC to all TB suspects so that those infected, whether they have TB or not, receive HIV care and treatment early. Adding HIV data to TB registers facilitates service integration.

PS-94441-06   Capacity building on introduction and expansion of TB-HIV services in Tanzania: PATH experience

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Introduction: Introduction and scaling up of TB-HIV services requires a number of interventions to make it a success. Among them, capacity building was a very crucial intervention prior to introduction and scaling up of TB-HIV services in the five PATH-supported regions in Tanzania where most if not all health care workers lacked the knowledge and skills in the provision of TB-HIV services. Health care workers at TB-HIV service delivery outlets require continued support after their training; this has been well achieved by the TB-HIV coordinators.
Successes:
- Establishment of decentralized regional teams of facilitators enhanced the efficiency in training of health workers at different sites simultaneously.
- By September 2008, every TB clinic in 283 PATH-supported health facilities in 26 districts had at

least two providers trained on TB-HIV services and each district had a coordinator trained in TB-HIV collaborative services.

- Selection of different cadres for TB-HIV training made the services patient-centered.

Challenges: Key challenges include rapid staff turnover (mobility between clinics and public/private sector) and frequent transfers of trained staff from the TB clinic to another department or facility. Additionally, the costs of training have increased over time.

Lessons learned:

- Involvement of local leadership in selecting trainees created sense of ownership.
- Training of HIV/AIDS clinic staff tremendously boosted their performance and their collaboration with TB clinic staff.
- Decentralized TOT's facilitates training of a big number HCWs and is more cost-effective compared to centralized teams.
- Awarding certificates immediately after the training (rather than late) highly motivated staff performance.
- Informing trainees on the average per capita cost of their training motivated them to be serious and value the training.
- Refresher training to staff is an essential motivating factor.

PS-94445-06   Living with HIV/AIDS and dying of undetected TB: the case of Zambia

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Background: Tuberculosis is one of the leading causes of morbidity and mortality among people whose sero-status is reactive In Zambia with the advent of HIV/AIDS for over two decades, TB has reached dramatic figures. The objectives of the study were to access the availability of TB preventive measures being put in place on PLHAs accessing ART from these canters, how often they are screened to identify TB suspects and rule out TB.

Methods: The study instrument was an in-depth oral interview in which some answers were given orally and some in written. The sample consisted of 200 people living with HIV (PLWHA) on anti-retro viral therapy (ART) accessing their treatment from four ART centers in Lusaka.

Results: 20% of the respondents showed ignorance of the existence TB prophylaxis of all the 200 clients interviewed, no single client confirmed being screened for TB as a routine checkup to identify TB suspects and rule out active TB without the presence of signs and symptoms suggesting a queried TB case at the centers where they access their ARVs.

Conclusion: To dramatically reduce the global burden of TB by 2015 in line with the millennium development goals and the stop TB partnership strategies, an holistic approach is required where TB and HIV treatment collaborative activities should carried out at all centers providing ART so that PLHAs who develop TB should have access to treatment and care from the centres where they access their ARV drugs other than going to another health facility on referral for TB screening and management.

PS-94448-06   Improving district performance through TB CAP support in Uganda

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Background and challenges to implementation: The International Union Against Tuberculosis and Lung Disease (The Union) through the Tuberculosis Control Assistance Program (TBCAP) received USAID funding to strengthen TB-HIV collaboration in Uganda. A situational analysis was conducted in 2007 to map out TB and TB-HIV collaborative services in 26 districts. It showed: districts lacked coordination mechanisms for TB-HIV collaborative activities, few health workers were trained, frequent shortages of HIV test kits and cotrimoxazole, inadequate dissemination of national policy guidelines and TB-HIV IEC materials, few health units had infection control plans and poor recording and reporting.

Intervention or response: Starting September 2007, The Union supported the Ministry of Health (MoH), its partners and 12/26 districts to implement TB and TB-HIV activities under four outputs of: increased national and district capacity to improve TB-HIV coordination, management and leadership; improved quality of CBDOTS implementation; increased access of TB-HIV services for TB patients and PLHIV; and improved TB infection control (TBIC) at health facilities.

Results and lessons learnt: Information from 11/12 districts indicate that between December 2007 and December 2008: health workers were trained in TB-HIV (1827), CBDOTS (398) and TBIC (167); Case Detection Rate increased from 43.3% to 48.1%; Treatment Success Rate from 42.9% to 70.9%; TB patients tested for HIV from 42.5% to 72.6%; HIV positive TB patients on CPT from 49.6% to 87.1%; and HIV positive TB patients on ART from 12.3% to 17.5%. 48 health units have developed TBIC plans.

Conclusions and key recommendations: These initial improvements show that through supporting planning and coordination, logistics management, capacity building and monitoring and evaluation, districts can demonstrate improved implementation of TB and TB-HIV activities.

PS-94459-06   Contribution of private-sector in the expansion of TB-HIV integration in Tanzania

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Introduction: Tanzania ranks 14th among the 22 high TB burden countries in the world and with co-infection rate of about 50%. TB-HIV activities begun in 2005 and nationally over 80% of all TB cases are tested for HIV. This success has been significantly contributed by the private health care sector.
Approach: The Program for Appropriate Technology in Health in collaboration with the National Tuberculosis Control Programme and the Association of Private Health Facilities in Tanzania in 2005 launched the scale up of collaborative TB-HIV activities in 4 regions with total of 10 districts in public and private Health facilities (HF). PATH recruited District TB-HIV Coordinators (DTHCs) to coordinate activities.
Successes: By September 2007, 140 HF were providing collaborative TB-HIV services in 17 districts supported by PATH, among these, 50 (37.5%) were private HFs. By September 2008, following expansion to 26 districts, 283 HF were providing TB-HIV services among which 101 (49.5%) were private HFs. And for human resource strengthening by September 2007, 2 staff in each private HF was trained in TB-HIV integration. By September 2007, 14,036 TB patients were registered among which 4437 were from private HF and of these 3056 were tested for HIV, and by September 2008 among 19643 new TB patients registered, 5699 were from private HFs of which 4997 were tested for HIV.
Challenges: Frequent staff turnover, Lack of free HIV test kits and cotrimoxazole, Lack of incentives from the government.
Lessons learned: Involvement of Council health management teams (CHMTs) and other stakeholders can alleviate HIV test kits and co-trimoxazole stock-outs, DTHCs are a good link between the CHMTs and private Health providers (PHP) at district level, Most PHPs are willing to offer TB-HIV services despite lack of government incentives. Training private HCWs and Sensitization of the private HF owners on TB-HIV services is important.

PS-94475-06   HIV testing for partners of TB patients in Kenya: experience of initiation of PwP activities

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Background: Prevention of HIV transmission cannot succeed without partnering with those who are HIV infected. Focus on Prevention with positives as a package has been introduced in TB clinics as entry point to prevent transmission of HIV. The goal of the exercise is to test all TB patients and their partners for HIV and provide comprehensive counseling care and support.
Methods: TB registers have been revised and upgraded to include PwP variables which include Partner testing and Partner HIV Status. Data captured for 2008 using the revised registers were reviewed with specific focus on: TB cases notified, proportion tested for HIV, proportion testing HIV+, proportion of partners tested for HIV and their HIV status.
Results: In 2008, Kenya notified a total of 110 215 all forms of TB. HIV testing was offered to 83% of these patients and 45% turned HIV positive. A total of 6712 (16%) HIV positive TB patients had their partners offered HIV testing in the context of counseling, consent and confidentiality. More than 2404 (36%) of the partners tested HIV positive, 2328 (35%) tested HIV negative and 1980 (29%) declined HIV testing.
Discussion: The PwP initiative has shown that 35% of partners are HIV negative which is comparable to the national HIV prevalence which showed that 45% of the HIV+ couples have one of their partners being discordant. In addition, 29% of the partners declined to be tested. This provides an avenue for more proactive preventive measures which can include the provision of condoms in TB clinics and more sensitization to ensure that the HIV negative partners remain negative.
Conclusions: TB settings offer an avenue for prevention of HIV transmission.
Recommendations: There is urgent need to address reasons leading to decline by partners for HIV testing. Additionally measures should be put in place to ensure that partners who are HIV negative partners are not infected with HIV.

PS-94659-06   Incremental cost-effectiveness of ICF and IPT for HIV-infected patients in Battambang, Cambodia

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Background: Previous research suggests that intensified case finding may be highly cost-effective in regions with high prevalence, low case-detection, and moderate to high treatment adherence.
Objective: To analyze the incremental cost-effectiveness of intensified case finding (ICF) and isoniazid

preventive therapy (IPT) relative to passive case finding for HIV infected patients in Battambang, Cambodia.

Methods: We constructed a Markov decision model using published data and collected clinic data on costs, patient volume, default rates, prior probability of tuberculosis among HIV-positive populations, and estimated effectiveness of intensified case finding and isoniazid preventive therapy. We compared the costs, number of cases detected and the estimated number of cases averted by ICF and IPT relative to a baseline (reference) passive case finding screening and treatment.

Results: The incremental cost per case detected for ICF and IPT relative to passive case finding and treatment was US$1055. When the number of potential tuberculosis cases averted was considered, the incremental cost per TB case averted fell to US$411.

Conclusion: The incremental cost-effectiveness ratio was sensitive to baseline assumptions on patient volume, default rates, and the cost of treating an active case of tuberculosis. We find that the incremental cost-effectiveness of ICF and IPT relative to passive case finding drops considerably when the potential number of cases averted from higher detection rates is considered. Further research is needed to assess the sensitivity of the model to baseline assumptions and to determine whether the incremental cost-effectiveness of ICF and IPT falls within recommended willingness-pay-thresholds for developing countries.

PS-94660-06 Contribution of the integrated HIV care program to reorganization of TB care in DR Congo

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Setting: DRC is one of the 22 TB high burden countries in the world. The National TB Program has recorded significant progress with 100% districts having achieved DOTS coverage and 86% of patients being successfully treated. But according to WHO, case finding remains below target, with a 67% Smear+ cases detection rate (CDR).

Method: As part of a joint effort with the AIDS program to develop of a cohort based information system for HIV care with support of The Union's IHC program, the NTP has piloted systematic recording of distance to facility to assess geographical access to diagnosis and treatment of HIV-associated TB patients in 23 TB centers, in the unstable eastern province of North Kivu (38% CDR) and the peaceful western province of Bas Congo (53% CDR).

Results: As HIV status was unknown when TB care was sought, the sample is considered representative of the TB cases population. A qualitative survey among a patients' sample revealed that inexact addresses because patients move in relation with service unavailability or stigma was limited. Distances between patients' home and clinic are presented in the Table. In both provinces, most patients are recruited within a 15 km radius around the centers, while distance between centers left large areas uncovered. In the peaceful province where case detection performs better, catchment areas are also larger.

Discussion: In a context of insufficient case finding, a simple measure of physical accessibility is a valuable indicator and should be collected systematically. These findings highlight the need for the NTP to adjust its center network to population density by rationalizing the involvement of facilities where functional, and identify strategies to meet the demand where no facility exists.

Table Distance between patients' residences and their clinics as of September 2008. Updated data to June 2009 will be presented

	North Kivu	Bas Congo
<5 km	294 (76%)	168 (41%)
5–15 km	77 (20%)	200 (48%)
>15 km	16 (4%)	44 (11%)
Total	387	412

PS-94715-06 Trends in mortality in TB patients with HIV in Rwanda

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Background: The TB and HIV epidemics cause major public health challenges in Rwanda. HIV infection significantly increases the morbidity and mortality from TB and complicates TB diagnosis. The National Tuberculosis (TB) Program (NTP) reported 2560 (34%) TB patients infected with HIV in 2008. We report on mortality for sputum smear positive pulmonary TB (PTB+) (reported since 1990), sputum smear negative pulmonary TB (PTB-) and extra-pulmonary TB (EPTB) (reported since 2006).

Intervention: The Ministry of Health developed a national policy and guidelines on TB-HIV and established a working group. One-stop services for counseling, testing and treatment of TB patients with HIV through the TB service is recommended. NTP strengthened support to district teams by revision of the supervision guidelines, introduction of a new mentorship approach for site support including quarterly decentralized evaluation meetings and assessment of standards of care.

Results: The mortality in PTB+ patients was around 7% until 2002 when it gradually decreased to 4.9%

in 2007. Mortality in PTB− and EPTB, decreased from 19% in 2005 to 16% in 2007. Of all TB cases that died in 2007, 57% were HIV-infected. Mortality was 19.4% and 7.4% in HIV-infected and uninfected patients, respectively. HIV testing in TB patients increased from 59% in the first quarter of 2005 to 96% by the end of 2008. By the end of 2008, 24% of PTB+ patients and 46% of PTB− and EPTB combined tested HIV positive, 87% were on cotrimoxazole preventive therapy (CPT) and 45% initiated antiretroviral treatment (ART).

Conclusion: Strengthening of the TB Program activities at central and district level yielded substantial improvement in outcomes, including decrease in mortality. Nevertheless, TB mortality remains higher in HIV infected TB patients. Further efforts are needed to enable early and accurate diagnosis of TB in HIV infected patients and prompt initiation of CPT and ART through the one-stop service model.

PS-94767-06   Philippine experience on HIV testing of TB patients

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Background: Philippines ranked 9th among the 22 high TB burdened countries and prevalence of HIV is less than 1%. Access to HIV services in the country is limited. In response to the need to address TB HIV co-infection, HIV testing among TB patients is one of the activities of TB HIV Collaboration. The aim of this study is to describe the activities undertaken to start the implementation of HIV testing among TB patients.

Intervention or response: A TB HIV Collaborating committee was formed to ensure proper collaboration between the TB Control Program and the HIV/AIDS Control Program. Policies and guidelines were formulated and implemented in selected DOTS facilities. Activities undertaken were advocacy meetings, orientation and planning workshops, training of health staff on Provider Initiated HIV Counseling and Testing and HIV testing proficiency. All TB patients enrolled for treatment at the DOTS facilities were counseled and tested for HIV.

Results and lessons learned: Twenty DOTS facilities in 6 cities are providing on-site HIV testing among TB patients. A total of 1608 TB patients have been counseled and 1462 were tested for HIV or an acceptance rate of 91%. All the results were non-reactive for HIV. Trained health staff at the DOTS facilities can provide HIV counseling and testing. Provision of HIV counseling and testing at the DOTS facilities has increased the awareness of the health workers and

the community regarding prevention and control of HIV infection.

Conclusions: Conduct of HIV testing for TB patients can be done in the DOTS facilities and is acceptable among the health workers and the TB patients.

PS-94768-06   Trend of HIV prevalence in tuberculosis patients in Taiwan, 2001–2008

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Background: The risk of developing active TB is high in HIV-infected persons, even during the HAART era. Taiwan had a median tuberculosis (TB) incidence (63.2 per 100 000 population in 2007) and low human immunodeficiency virus (HIV) prevalence (0.07%). This study is to describe the trend of HIV prevalence among TB patients in Taiwan during the period 2001–2008.

Methods: Data were obtained from the Taiwan CDC national surveillance register of all patients notified with TB (all forms) and linked with the Taiwan HIV registry during the study period.

Results: The number of annual new report TB cases remained stable in the first 4 years then declined gradually since 2004, from 16 784 cases to 14 347 cases in 2008. On the contrary, the number of HIV-infected patients increased steadily after the first case reported in 1984. By the end of 2008, the cumulative number of reported HIV-infected persons in Taiwan was 16 478 and people living with HIV reached 14 279 persons. The HIV prevalence among TB patients showed a significant increasing trend from 0.26% in 2001 to 0.69% in 2006, fluctuated in the next 2 years (Figure). If restricted to adult aged between 15 to 49 years old, the pattern was similar but even higher prevalence was noted. The HIV prevalence was lower among women than among men (adjusted odds ratio [aOR] 0.10, 95%CI 0.06–0.14). It peaked in the age group 30–39 years (aOR 68.7,
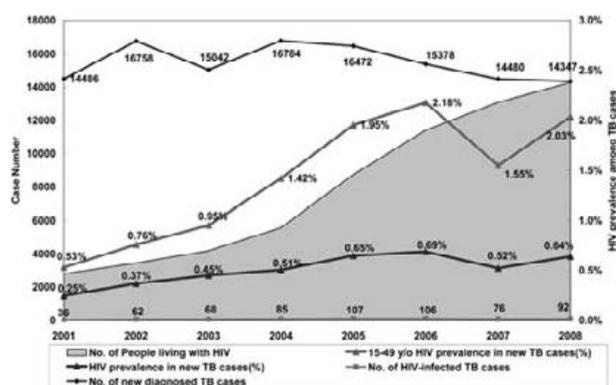
Figure   Trend of HIV prevalence among new TB cases.

95%CI 9.6–490.6), 3.8–198.6 followed by age group 20–29 years (aOR 37.6, 95%CI 5.2–270.1) and age group 40–49 years (aOR 27.7, 95%CI 3.8–198.6).

Conclusions: HIV prevalence among new diagnosed TB cases increases annually in Taiwan, especially in cases aged 30 to 39 years old. Though HIV testing for all TB patients is strongly recommended, the actual testing case number remained low and such prevalence is underestimated. So we should aggressively implement HIV counseling and testing program among TB patients in order to identifying unrecognized HIV infection.

PS-94793-06   Integration of routine tuberculosis clinical screening in HIV counselling and testing in Nigeria

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Background: In Nigeria, the national TB and HIV programs were largely managed as parallel vertical programs; however, with an estimated HIV prevalence of 30% among TB patients, program collaboration became necessary. The Ministry of Health in collaboration with GHAIN institutionalized routine TB clinical screening among HIV counselling and testing (HCT) clients using a revised national HCT Client Intake Form (CIF).

Methods: The following TB clinical screening criteria were integrated into the national CIF: 1) cough >3 weeks; 2) weight loss >3 kg in last 4 weeks; 3) Lymphadenopathy; 4) fever >2 weeks 5) Night sweats >2 weeks. HCT clients with ≥1 of the criteria (TB suspects) were referred for sputum AFB microscopy. The implementation was monitored using monthly routine service statistics of the pilot facilities.

Results: The monthly number of HCT clients increased from 31 387 at 96 facilities in Apr 2007 to 70 904 at 302 facilities in Oct 2008. The overall HIV prevalence was 11%. The proportion clinically screened for TB among HIV negative clients increased from 53% to 86% and among HIV positive clients from 57% to 95%. Among those clinically screened for TB, 9% of HIV negative clients scored ≥1, compared to 51% of HIV positive clients. Improved referrals of TB suspects from HCT to TB microscopy resulted in a rise in sputum AFB done among 'HIV positive TB score ≥1' clients from 1% to 27%.

Conclusion: Routine TB clinical screening in HCT services increases the detection of TB suspects, particularly among HIV positive clients. The resulting increase in sputum AFB testing of TB suspects can be further improved by strengthening referral systems. Routine TB clinical screening among HCT clients in countries with a high prevalence of co-infection should be implemented as one of the strategies to increase TB case detection.

PS-94824-06   Improving TB-HIV collaboration in selected health centers in Ethiopia: challenges and lessons

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Background: A preliminary assessment in October, 2007 revealed that TB-HIV collaboration is unheard of in most health centers; health workers were untrained; referral linkages and care to TB-HIV co-infected patients were poor.

Aim: USAID-funded projects are endeavoring to establish TB-HIV collaboration in 450 supported health centers.

Methods: Data were collected from interviews with workers and management, exit interviews with clients, and center records during the regular mentoring of the health centers from November 2007 till present. More than 400 health care workers were trained on TB-HIV collaboration; standard of care introduced, registers, reporting formats, and job aids were made available. Data were analyzed using SPSS version 11.5.

Results: By now, PITC is being delivered, registered, and reported in all health centers in contrast to 80 (18%) health centers prior to the inception of the projects; point-of-care HIV testing in the TB clinics increased from 5/140 (3.6%) to 74/140 (52%) health centers; referral linkages were being documented properly in 128 (91%) health centers compared to only 12 (8.6%) previously.

HIV testing is being offered to all: 92% (13 363/14 525) having been tested compared to a previous 34% (4692/13 800), prevalence of HIV among tested TB patients 16% (2324/14 525), about 94% (2185/2324) of co-infected patients are put on Cotrimoxazole Preventive Therapy as compared to the previous record of 78%. In contrast to the previous 65%, about 98% (2278/2324) are linked directly to HIV care where more than 78% (1777/2278) are started on ART.

Challenges faced include intermittent supply of HIV test kits; and a shortage of health staff (POC testing has proven difficult in clinics with over 60 patient-visits per day).

Conclusions: The quality of TB-HIV services can be improved through proper and frequent mentorship of facilities, provision of needed tools, leveraging resources and partnerships among various stakeholders.

PS-95302-06   Kenyan recipe for success in TB-HIV control

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Background and implementation approach: Kenya is severely affected by both HIV and TB—WHO 2006 estimated that 50% tuberculosis patients are co-infected with HIV. Constraints to carrying out TB-HIV activities included a lack of policies/guidelines, stigma, and a shortage of trained staff. To address constraints, the TB program and partners developed policy/implementation guidelines on HIV testing for TB patients and innovative strategies to reduce the stigma.

Analysis design and methods: HIV and TB stakeholders developed HIV testing policy and TB-HIV guidelines through a series of consultative workshops. To implement the guidelines TB-HIV coordination committees were set up at all levels of healthcare. Activities included health managers' sensitization; distribution of HIV test kits; and frontline staff training on task shifting, reducing stigma. Stigma reduction pillars included public campaigns and advertisements, word of mouth, the effective 'opt-out' approach to HIV testing in TB clinics and the decentralization of HIV care services, including free opportunistic infection and ART, which increased access.

Results: The MOH and partners quickly adopted and implemented the guidelines resulting to sharp increase in the percentage of TB patients offered HIV testing rose from 40% in 2005 to 100% in 2008. Of those 100%, 80% consented, and 42% were found dually infected. As a result, 80% of eligible patients received CPT and 35% were initiated on ART within the first three months of TB treatment. TB patients and sometimes their treatment supporters now demand HIV testing in TB clinics.

Conclusions and recommendations: The MOH should consider offering universal HIV testing and TB screening to all clients who seek medical care in all public health facilities. To boost ART uptake, train District TB mangers on ART, allow them to initiate ART for eligible patients. Support TB and HIV programs collaboration in making joint plans, sharing tools and indicators on TB-HIV control.

PS-95329-06   Feasibility of survey methodology for intensified tuberculosis case finding in 4 districts in Uganda

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Background: Routine tuberculosis (TB) assessment among people living with HIV (PHAs) is a key entry point to TB care. Although TB screening among PHAs is routinely carried out and the World Health Organization has redefined the indicator, data sources and frequency of data collection, key challenges remain of how to abstract the information from the client card at the facility resulting in lack of information on intensified TB case finding (ICF) in HIV care settings.

Intervention or response: A feasibility study was undertaken in four (4) Eastern Region Tuberculosis Control Assistance Programme (TBCAP) supported districts to assess and evaluate the ease of using a bi annual survey methodology that requires a retrospective monthly review of client cards to collect data on ICF in PHAs. A data collection form was developed and used by research assistants to abstract information from client cards on: month of attendance, number in attendance per month and TB screening status.

Results and lessons learned: The data collection form was simple to understand and administer and data were collected in 3 days. In the previous six months, on average 55% of PHAs attending health care facilities were screened for TB (Table). For all other patients, it was not easy to establish whether ICF was carried out since there was no information recorded in the client cards.

Conclusion: A bi annual survey methodology using a simple data collection form is feasible and can provide timely and accurate information on ICF.

Table   Results of assessment of TB screening among PHAs

Month	Attendance	Screened n (%)
October	1150	725 (63.0)
November	1147	659 (57.5)
December	1139	607 (53.3)
January	1131	679 (60.0)
February	1131	663 (58.6)
March	1130	621 (55.0)

PS-95475-06   HIV prevalence in tuberculosis cases and suspects at an urban TB facility in Durban, South Africa

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Background: The deleterious interaction between TB and HIV has created a formidable public health challenge in South Africa. The paucity of data on TB-HIV co-infection, poor uptake of HIV testing among TB patients, and the absence of HIV surveillance at TB facilities hinders an assessment of the co-infection problem as well as planning and monitoring efforts. The study aimed to determine the HIV prevalence among TB suspects and cases at an urban TB facility in Durban, South Africa.

Method: Sputum specimens obtained from 411 TB Suspects and 330 TB Cases for the purposes of sputum

microscopy were tested for HIV using the OraQuick HIV1/2 Assay. HIV prevalence was computed for TB Suspects and TB Cases. The prevalence in TB Suspects who were found not to have TB was also estimated.

Results: The mean age of suspects, cases and suspects who were found not to have TB were 36.4 (SD = 11.17), 34.8 (SD = 11.48) and 37.5 (SD = 11.09) years respectively. The prevalence of HIV was 69.8% (287/411, CI = 65.4–74.3) in TB Suspects, 71.2% (235/330, CI = 66.3–76.1) and 66.8% (153/229, CI = 60.7–72.9) in TB Suspects who were found not to have TB.

Conclusion: HIV surveillance at TB facilities provides important information about both epidemics. The high prevalence of HIV in TB suspects suggests that HIV services should be available to all individuals who present to the facility. The high prevalence of HIV in individuals who do not have TB, but who present to the facility, provides an opportunity to offer HIV services to a group of self-identified patients at risk.

DOTS EXPANSION II

PS-94222-06   Strengthening quality assurance through capacity building of non-laboratory supervisors

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Introduction: District Laboratory supervisors (DLS) are mainly responsible for implementation of Quality assurance (QA) in districts. Mobility of DLS and quantum of work are the main barriers in effective implementation of QA. To overcome this limitation, enhanced capacity of non-laboratory supervisors, i.e., District TB coordinators (DTC), through laboratory trainings proved to be an effective tool for strengthening and effective dispensation of QA. All 35 DTC of Punjab are mobile as they are provided with vehicles and in routine they visit diagnostic centres on regular basis to share the excessive workload of DLS.

Objective: To strengthen quality assurance through enhanced capacity of non-laboratory supervisors for laboratory monitoring.

Design: Retrospective analysis of laboratory performance after training non-laboratory supervisors.

Results: 7 DTC from different districts were imparted non-laboratory supervisor training for 3 days in Q3 of year 2008. Out of 7 districts 6 showed marked improvement in terms of minimization of major errors in the next quater. One district which failed to show optimal results, had old defective microscopes which were later replaced.

Conclusion: Efficient and effective implementation of QA activities is key to quality laboratory performance. Support of non-laboratory supervisors after

their capacity building through standardized trainings assisted DLS in acquiring desired QA results of the diagnostic centres.

PS-94522-06   Assessment of logistic management information system performance: experience from Tajikistan

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Background: LMIS is essential for maintaining an uninterrupted drug supply. A LMIS for first-line anti-TB drugs was developed and implemented by Project HOPE and JSI with the USAID funds. A LMIS Manual was approved by Ministry of Health in 2006. Nine LMIS trainings for Central, Regional and District levels were conducted from 2006–2008 using USAID/GFATM support. All TB facilities were supplied with LMIS recording and reporting forms to be completed and reported quarterly to the higher level.

Objective: To assess the effectiveness of LMIS performance.

Methods: LMIS evaluation indicators were developed. Check lists were used for data collection. In 2008, data collection was conducted in 58 districts and Dushanbe. The assessment covered 88.7% of the country's TB facilities.

Results: 90% of the facilities evaluated completed recording forms without errors; the quantities of drugs recorded corresponded with the drug stocks in 85% of the facilities; 63.3% of the facilities sent their reports at least once to the upper level. Of these, 71% prepared reports independently; only 17% of the facilities evaluated had some expired drugs in stock; in 58% stock exceeded the needs for one quarter. Drug needs quantifications and ordering was done regularly by 56.7% of TB facilities. Security system and storage conditions were adequate in the most of the visited facilities.

Conclusion: LMIS has been successfully implemented and contributes to uninterrupted drug supplies in over 80% of assessed facilities. Reporting to the higher levels of the system needs to be strengthened to improve quantification and ordering procedures.

PS-94598-06   TB CAP Patient-Centered Approach Package

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A patient-centered approach has been embraced by the global TB community. It is an underlying principle of the Stop TB Strategy. Moreover, empowerment of

patients to participate in TB control is underscored by the Global Plan to Stop TB. In response, TB CAP developed several patient-centred tools.

We describe seven tools:

1 The International Standards for TB Control and Care (ISTC) describes a patient-centered approach as the focus for providing TB treatment (Standard 9);

2 The Patient's Charter for Tuberculosis Control and Care, based on international human and health rights, outlines the rights and responsibilities of TB patients aiming at increased participation;

3 The QUOTE tool assesses the quality of TB services provided by health facilities as perceived by patients aiming to improve services;

4 The Patient Costing tool estimates costs of TB patients before and during diagnosis and treatment. The results provide evidence for potential interventions to improve equity in access to care;

5 The TB-HIV Literacy tool consists of different aides (video, pictures etc) to increase awareness on TB, and counseling/treatment for HIV among patients. TBCAP generated several patient-centred studies, of which results are useful to improve patient centred services:

6 engagement of Community-based Organizations in TB-HIV Collaborative Activities: A Case Study in Nigeria and

7 death audits in Malawi as an intervention to decrease TB mortality.

The TB CAP Patient-Centered Package, accompanied by a strategy for implementation provides NTPs with a comprehensive set of tools to facilitate a patient-centered approach, thereby, strengthening equal access to TB services.

PS-94673-06   High death rate in tuberculosis patients in Ghana

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Background: One of the key challenges facing the National TB Control Programme in Ghana is the high tuberculosis mortality rate currently at 9%. This is despite Ghana having one of the lowest HIV rates in the Sub-Saharan Region (1.9%). The TB mortality rate is one of the reasons why Ghana has been slow in achieving the TB treatment success rate target.

Objectives:

1 To assess the extent of the problem of TB mortality in Ghana

2 To provide a platform for the interventions needed to improve case management under the USAID-funded TB Control Assistance Program (TB CAP)

Method: In September 2008, an external mission to assess TB case management was conducted at Korle Bu Teaching Hospital and four other facilities in Accra. This was followed by a retrospective analysis of the national, regional and facility-level TB mortality data (1996–2006). Data was captured and analyzed using excel 2007.

Results: National TB mortality rates have fluctuated between 6–9% from 1996–2006. In 2006, the two teaching hospitals (Korle BU and Komfo Anoyke) reported the highest TB mortality of up to 25%; out of the ten regions in Ghana, four regions (Central, Brong Ahafo Upper West and Upper East) had TB mortality higher than the national average of 9%. Assessment findings at Korle Bu Hospital are: limited capacity at the local level to attend to TB complications and identify risk of dying; no standard procedures for determining the initial risk of dying of TB and attention to complications; concentrated capacity in one specialized service to attend to TB patients with complications.

Conclusions: Despite the low HIV prevalence rates, TB mortality rates remain unacceptably high, particularly in the two teaching hospitals and the four regions. Further studies should be conducted to ascertain the underlying causes of the high TB mortality rates.

PS-94711-06   Monitoring and evaluation of DOTS implementation in Russia based on standardized methodology

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Introduction: Effective monitoring and evaluation (MandE) is the essential part of National TB programs (NTP).

Methods: The standardized methodology (SM) of DOTS MandE developed by WHO Country Office in Russia based on WHO and Russian MandE experience. SM is composed of 1) training guidelines for the TB managers involved in MandE process, including pre- and post-tests of trainees with Epi-Info program of test results analysis, 2) work-book with standard tables for data collection and evaluation and 3) guidelines on standard 5-day monitoring visit (MV).

Results: In 2007 WHO trained 48 Russian experts through the three training courses based on the guidelines and analysis of pre-test outcomes. In the framework of the World Bank TB control project the trained experts have provided 67 MVs in 2007–2008 using developed work-book and MV guidelines. The system of work-book tables for MandE includes: 3 statistical tables on overall regional data on TB detection and treatment available before MV and updated by an expert during MV; 5 case-based and aggregated working tables (WT) for evaluation of TB detection and treatment based on TB recording forms TB01,

TB03 and TB04; 4 case-based and aggregated WT with the results of medical staff and patients interviews based on a standard questionnaire on drug administration and dose control; 4 WT on TB drugs availability, sputum collection and infection control; 1 WT for political commitment evaluation. Only problems discovered are entered into WT. MV guidelines outline the actions to be undertaken during a 5-day visit to regional and local medical facilities: TB centers, public health care and penitentiary institutions, and TB laboratories. The results of the visit to each facility are entered into the corresponding tables from the work-book.

Conclusions: The SM allowed to analyze and evaluate TB projects' indicators achievement and can be used for routine MandE activities in any NTP.

PS-94751-06   Implementing Ziehl-Neelsen staining for TB microscopy in Rwanda

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Background: The national TB program in Rwanda has used the Kinyoun stain for detection of acid fact bacilli (AFB) since 1997. The national case detection rate in Rwanda has not met WHO projections (28% vs 70%), and smear positivity declined from 13.7% to 6.6% between 2005–2007. The National TB program and the National Reference Laboratory (NRL), supported by ICAP-RW, therefore introduced the more sensitive Ziehl Neelsen staining method throughout the national TB lab network.

Methods: A national training of trainers (TOT) for 43 TB lab personnel from district hospital on standard ZN methodology was held in January 2008, followed by a training session for 142 biotechnologists from 135 health centers and 7 private clinics. A simplified TB manual for quality control (QC) was developed, and NRL established a mentoring system for ZN implementation including QC. Each CDT collects 60 QC slides/year and respective district laboratory conducts first level QC analysis and discordant results are review by the NRL. Impact of the ZN staining technology has been recorded within 2008 quarter 2,3 and 4 registers.

Results: In 2007 quarter 3, 146 289 sputum samples were tested using the Kinyoun staining method and AFB were detected in 4.7% samples. By 2008 quarters 2 and 3, all TB testing laboratories in Rwanda were implementing the ZN methodology, and AFB were detected in 11 749 of 157 569 (7.45%) samples [4.7% vs 7.45%, $P < 0.0001$]. In 2007, all CDT participated at least once in QC and 82.5% (9057/10980) of expected QC slides were collected. Data (e.g., dis-

cordancy rate) based on the new QC approach will be presented after the record from quarter 4.

Conclusion and recommendations: The Rwandese experience shows that it is possible to implement a new methodology for TB diagnosis when the process is linked with a good training and a strong mentoring.

PS-94810-06   Comparative study on TB case finding before and after interventions in 8 districts in Senegal

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Aim: Improvement of TB patient's traceability to reinforce the quality of TB case-finding.

Methods: From year 2007, in 4 districts involved in the Foresa_3 project Interventions aiming quality improvement of care were introduced such as : application of locally existing guideline for management of respiratory diseases in PHC, for recording and reporting, for quality sputum collection and reorganization of the lab to enhance access. Data collected from PHC registers were analyzed with Epi Info.

Results: In the districts of interventions one can note a quality improvement on data collection and identification of contagious pulmonary tuberculosis cases is performed. The traceability of diagnosed patients and a referral circuit are set up. Case finding moves as follows: in 2005, the reporting revealed 8868 patients with respiratory symptoms, 36 ones had persistent cough, present for more than 15 days, 94 (1%) patients got a request for bacteriological examination of sputum, results were notified for 8 patients and 1 of them was smear+. Data collected in 2008 made known, 4345 patients were notified for respiratory symptoms, 18% (772) of those patients presented persistent and productive cough, but 688 of them got a request for smear examination and results were known for 84% patients including 135 (23%) smear+. In control districts during the year 2005, 9950 patients attended PHC for respiratory symptoms, 121 patients were recorded for cough, and 201 of them had a request for BAAR without results. In 2008, 3994 patients attended for cough, roughly 27 were TB suspected patients, however 7% (281) got a request for BAAR, 89 results were registered including 17 (19%) of patients smears+.

Conclusion: TB Case finding depends on quality of services, as well as access to laboratory by the referred patients, however patient's traceability is the key for a monitoring of the activity.

PS-94818-06   Scaling up quality DOTS in Kabul City, Afghanistan

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Background: Kabul city with an estimated population of 5 million has 20% of the country's population. Millions of refugees and IDPs live in crowded conditions at high risk for TB dissemination.
Aim: To assess the extent of and reasons for low DOTS performance in Kabul and plan an appropriate response by USAID/TB CAP, WHO and JICA.
Method: During 2005 to 2008, two assessments and one retrospective data analyses of the current TB MandE system were conducted at selected health facilities in Kabul. Data were captured and analyzed using Excel 2007.
Findings: There were 111 public and private health facilities, with no systems for Public Health interventions or technical and financial support. Laboratory services were very limited; most health facility staff were not trained on DOTS; public hospitals were not implementing DOTS activities and there was poor engagement of the private sector. DOTS coverage in public and private health facilities was estimated at 15% (national average 85%), case detection rate was 38% (national average 73%), conversion rate 53% (national average 87%) and cure rate was 54% (national average 84%). These are the lowest in the country.
Conclusion: TB control activities in Kabul are inadequate in quantity and quality, and the risk of spread of TB infection and disease in this large population is high. In the current absence of a government system to support public health interventions in specialized and private hospitals, all key partners (NTP, USAID/ TB CAP, WHO, JICA,) are supporting the formation of a common, evidence-based strategy for quality DOTS implementation in Kabul city.

PS-95182-06   Twelve years of DOTS strategy in Cameroon: achievements and challenges of an NTP

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Setting: Cameroon.
Objective: To evaluate the achievements of the Cameroonian National Tuberculosis Programme (NTP) after 12 years of DOTS implementation.
Design: Descriptive and retrospective study. Basic indicators for the coverage and annual results of the NTP, including collaborative TB-HIV activities, for the years 1997–2008 were collected from TB registers, Cotrimoxazol registers, and activity reports. Mayor

achievements are highlighted and major challenges identified.
Results: The number of TB Diagnostic and Treatment Centres increased between 1997 and 2008 from 34 to 216. The number of cases notified increased from 544 in 1997 to 25 125 in 2008, among them 14 232 sm+ PTB cases or 93% of those expected. The proportion of patients with treatment success increased from 76% in 1998 to 78% in 2007. The proportion of TB patients accepting HIV testing at time of diagnostic increased from 48% in 2007 to 71% in 2008, the overall HIV-TB co-infection rate being 40%.
Conclusions: The detection rate for sm+ PTB cases in Cameroon is satisfying while the detection rate for sm− PTB and extrapulmonary TB cases has to be increased. The treatment success rate showed increase, but has still not reached the objectif. TB-HIV collaborative activities within the NTP are encouraging. Major challenges are a rising number of MDR-TB cases and a consequent reference system for TB-HIV co-infected patients needing ART.

PS-95251-06   What role do incentives play in tuberculosis treatment?

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Setting: Guarulhos is located in São Paulo State with 1 279 202 inhabitants in 2008. In 2004 a collaboration agreement was set with USAID. To improve adherence in tuberculosis (TB) treatment and in DOT was given to each patient free transport benefit (FTB), a food package (FP) and breakfast service (BS).
Objective: Analyze the percentage of TB patients under DOT and the cure rate and also analyze the individual perception of incentives given to them.
Method: The secondary data was obtained from TBweb, São Paulo's state information system. For qualitative research, to study individual perception, was utilized Collective Discourse (CD). CD is a qualitative approach which allows capturing a pool of social representations, gathering responses from different individuals with discourse content of similar sense to build collective statements. The questions applied to 65 TB patients under DOT were: 'What do you think about that? Does it work? Discuss it a little further.'
Results: The percentage of new positive cases under DOT had an improvement of almost four times (20%—2005 to 77%—2007) The cure rate had an improvement of 11.6% (70.7%, 2005 and 82.3%, 2007). The main concerns (71.6%) were that incentives help the patient to take the medication. Some of them (19.2%) think that incentives doesn't help.
Conclusion: The percentage of patients under DOT and the cure rate had a significative improvement. The main subject addressed by interviewed patients

was that the incentives contribute to DOT adherence and therefore contribute to an increase of cure rates.

PS-95252-06   Accessibility to tuberculosis diagnosis and treatment in primary health care, Paraiba State, Brazil

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Aim: To evaluate, according to health family teams' perspective, the accessibility conditions to the diagnosis and treatment of the tuberculosis in the health services in the metropolitan area of Joao Pessoa, Paraiba state, Brazil.

Methods: An epidemiological descriptive survey-like study was performed by 100 health care workers, were surveyed by means of the Primary Care Assessment Tool. This instrument was adapted and validated to be used in Brazil for TB care. The respondents answered each question according to a pre-determined scale (Likert's scale) ranging from zero to five. Data was organized using computer software—Statistical Package for the Social, being presented with graphics and analyzed according to a measure of central tendency: the median.

Results: About the bacteriological diagnosis, 76% of the interviewee answered that the user always has to go somewhere else to do sputum smear test; the unit never has a pot for sample collection; being 7 days the average time for the result. For 71% of the interviewed, the tuberculosis clinic exam is never done and only 46% said that they always offer the sorology for HIV. About the treatment, 73% of the interviewed answered that can have a medical appointment in up to 24h; 72% have regularly the medicines for the treatment, and only 18% count on the benefits for the sick ones. The supervised treatment is done by 78% of the interviewed, reaching a cover of 76% for the treatment in the health family unit. For 87% there is always the participation of the sick person in the decision making about the follow up. The reference to the specialized services is done written by 81% of the interviewed, but only 63% said to have received information of the specialists.

Conclusion: It is evident that restrictions imposed by organization aspects, point to the necessity of adopting management mechanisms that increase the solving capacity of the health family teams, and promote the effectiveness in the services.

PS-95257-06   Modelo de intervencion en la atencion de pacientes con tuberculosis y la Red TAES de Enfermeria, Mexico

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Objetivo : Contar con personal de enfermería comprometido que contribuya en detección, seguimiento y cuidado de pacientes con tuberculosis en tratamiento hasta su curación.

Metodología : Establecimiento de fases de implementación, consolidación y acreditación. Las dos primeras contemplaron las líneas de acción : Información, comunicación, movilización social, sensibilización, capacitación e Integración de grupos. La acreditación contempló investigación operativa, documentación de experiencias, difusión, reconocimientos y publicaciones. Se realizó convocatoria para integración, capacitación técnica, humanística y de organización comunitaria, planes de trabajo, asesoría y seguimiento de actividades.

Resultados : Entre 2003 y 2008, Se realizaron 6 eventos nacionales, 9 regionales de capacitación y evaluación, 4 cursos a distancia con la Escuela Nacional de Enfermería, 32 estados con Red TAES, Incorporación al 'Comité Alto a la TB', difusión en 8 foros nacionales e internacionales, 3 documentos normativos, seguimiento de pacientes, consejería, pruebas VIH, 7 indicadores (evaluación y monitoreo) y movilización social en 32 estados.

Conclusiones : La Red TAES de Enfermería es una estrategia costo efectiva del Programa Nacional de Tuberculosis que ha logrado la movilización social de distintos sectores, en detección, curación de pacientes y la incorporación al entorno laboral, familiar y social.

PS-95345-06   Nationwide electronic nominal registration system performance evaluation survey 2008

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ENRS was applied nationwide at peripheral level since 2006, and updated in 2008, after two years of implementation there was a need of nationwide onsite evaluation to find the gaps. The survey took place form April to August 2008. Four supervisory teams formed from governorate coordinators of tuberculosis (GCTs) and information technology persons (IT), 3 levels of checklists were developed to fill through each supervisory visit. 22 governorates (out of 27) and 105 (out of 157) chest units were visited, within the chest units visited 134 staff were working on ENRS officially. Out of the 131 interviewed no regular data entry was recorded for 6 interviews. So analysis of performance was done for 125 staff only,

22 GCTs and 23 IT person were interviewed. The results of the survey were about 36% of GCTs didn't receive the electronic file on monthly bases, 59% of GCTs didn't receive the files form all TBMUs in their governorates, 77% were not aware of their responsibilities or their TOR of the ENRS and 59% Didn't use the ENRS in analysis of the data nor developing the quarterly report. The main recommendations of the survey were conducting monthly provincial meeting and continuous supervision.

PS-95373-06   Community participation in TB treatment in a high-burden TB country: Kenya

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Background: Community-based DOTS (CB-DOTS) was introduced in Kenya in 2004 after successful piloting in 1997 in Machakos district. Assessment of the contribution of this initiative has not been carried out.
Aim: To evaluate success and challenges of CB-DOTS strategy in TB control in Kenya
Study design: Descriptive cross-sectional survey was curried out in fifteen CB-DOTS districts to document best practices and lesions learnt. Four research assistants were trained to interview district TB coordinators in the selected districts, one facility based health worker where CB-DOTS was being implemented and one from facility that was not implementing, 4 community health workers (CHW) providing CB-DOTS and 8 patients on CB-DOTS per facility.
Results and lessons learnt: 134 TB patients were interviewed, 12% patients interrupted treatment when CHW failed to deliver medicine. 27% of patients reported they were not on DOT. 75% of CHWs observed client treatment only once a week. The treatment success rate was higher in CB-DOTS centers (78%) compared to Non CB-DOTS (73.6%). This strategy is a viable option for offering TB care to patients within communities.
Conclusions and recommendations: CB-DOTS strategy is reinforcing the facility based DOTS and should be expanded to cover all districts in the country. Patients should be encouraged to keep their own medication to avoid failure by CHWs to deliver the medicines. In addition, health education to patients on the importance of having a DOTs observer should be emphasized.

PS-95396-06   Patient delay in seeking treatment among pulmonary tuberculosis patients at Jericho Chest Clinic

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Background: Early tuberculosis case detection and treatment remains the cornerstone of tuberculosis control programmes. Among several inter-linking factors, late presentation, diagnosis and thus treatment of tuberculosis patients lead to increase in the number of PTB patients. Left untreated, each person with smear positive pulmonary tuberculosis (PTB) disease is capable of infecting about ten persons every year.
Method/design: A descriptive cross sectional study was used. Interviewer administered study instruments (questionnaires) were used to elicit informed responses from 102 new smear positive PTB cases receiving treatment at the chest clinic. These patients were recruited voluntarily using the consecutive sampling approach.
Results: The mean age of respondents was 45.4 years (SD $\pm$ 13.54).There were a total of 41 (40.2%) males and 61 (59.8%) females. The overall median delay in seeking treatment among study subjects was 60 days (3 –180 days), with a patient delay prevalence of 61.8 per cent. For income earners, the mean weekly family income was 29 (SD $\pm$ 20) US dollars. The knowledge score showed no significance between those who delayed for greater than 30 days (8.57 $\pm$ 1.36) and those who delayed for less than 30 days (8.41 $\pm$ 1.16) ($P = 0.542$). Binary logistic regression showed that socio-demographic characteristics, gender (OR = 5.25), religion (OR = 3.33, Christianity vs. Islam), place of residence (OR = 3.86, rural vs. urban), age group >46 vs. <46 (OR = 2.38) and stigma (OR = 7.56) were all statistically significant with respect to patients delay.
Conclusion: Delay in assessing treatment for PTB is not necessarily due to lack of awareness about the signs and symptoms of PTB, socio-demographic factors play significant roles in determining the health seeking behavior of PTB patients.

PS-95427-06   An analysis of TB retreatment cases after cure in a district with high MDR-TB burden in South Africa

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Aim: To evaluate the reasons for high retreatment cases after cure.
Background: The TASC II TB project works at all levels of health care to assist the NTP, Provinces and districts to strengthen TB DOTS implementation.

Supportive supervision is provided to selected facilities to improve TB treatment outcomes. NMM Municipality is a district with the highest TB and MDR-TB burden in the Eastern Cape Province. Alcohol abuse and high rates of unemployment and associated poverty are thought to be contributing factors.

Method: Paper based TB registers were reviewed from 10 facilities. Case finding data for quarters 1 and 2 in 2007 and 2008 was analyzed using an Excel spreadsheet. The following indicators were looked at: Number PTB, Number New PTB, Number retreatment. The retreatment was analyzed further into retreatment after CURE (RC), Retreatment after FAILURE and retreatment after INTERRUPTION. Patient clinical records were then reviewed to confirm evidence or record of previous cure for all RC.

Results: From the TB registers 60% of all PTB are new cases, 40% retreatment. Of the retreatment 60% are RC. Clinical record review of RC showed 30%–60% of RC had no evidence or record of previous cure and had been incorrectly categorized based on information given by the patient. The average treatment success rate in this group was <30% with defaulters at >20%.

Conclusion: Incorrect categorization of patients results in poor patient management and may be a significant contributor to the high numbers of MDR-TB cases in this district.

Recommendations: Intensified community education on TB, poverty alleviation including addressing alcoholism is key to reducing TB in this district.

PS-95456-06 Strategy for reachable, affordable and supportive TB services for tribal populations in Orissa, India

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Setting: The DOTS programme was started in 1997. Initially, the programme gave priority to inclusion of districts with a high proportion of tribal populations; the coverage gradually extended to cover entire state with 30 districts by 2004. However, while the district level data generally showed satisfactory data, pockets of unreached populations remained in geographically difficult areas.

Aim: To identify barriers to access to diagnostic and curative facilities for TB suspects and TB patients in tribal districts of Orissa and develop strategic recommendations to ensure reachable, affordable and supportive TB-services for poor marginalized population.

Method: A qualitative study was carried out in two districts. 19 individuals were interviewed including health staff and private practitioners, 4 focus group discussions were conducted with villagers in remote villages. In addition, experiences and findings from a four-pronged intervention study were utilized.

Results: Lack of physical access to health institutions was a key infrastructure problem. A number of derived problems included lack of health education, lack of access to diagnostic services, preference for unqualified providers, large indirect costs involved in free treatment, difficulty in reaching institutions within set opening hours and late reporting for diagnosis. There was no chronic disease management, except for locally provided symptomatic treatment provided by private, unqualified providers. Two factors were found to be very important for villagers' choice of treatment: distance and travel time. Local providers were preferred over distant ones, which lead to delay of diagnosis and treatment, and often also involved expenditures that could have been avoided if villagers were empowered to take better informed decisions when requiring medical treatment.

Recommendations: A strategy was developed to ensure reachable, affordable and supportive TB-services for tribal.

PS-95489-06 Reduction of in-patient TB death rates in Malawi

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Background: One of the key constraints to achieving Millennium Development Goals and Global TB targets in Malawi is the high death rates among TB patients. At the national level, on average about 13% of TB patients die every year. Various factors contribute to this high TB death rate including TB-HIV co-infection, 'cause of death' misclassification, poor recording systems and poor clinical care.

Aim: To identify key gaps in the management of TB patients and audit in-patient TB deaths in Zomba and Mangochi district.

Methods: Over ten years ago, the National TB Programme of Malawi instituted a quarterly TB death audit for all hospitals. Since October 2007, the USAID-funded Tuberculosis Control Assistance Program (TB CAP) has assisted in conducting audits in Zomba and Mangochi districts by ascertaining the real cause of death among patients admitted in TB wards, improving classification, recording and reporting of TB deaths, and improving clinical care of admitted TB patients.

Results: The percent of in-patient TB deaths declined from 16% (65/405) and 17% (43/253) in April–June 2007, before the intervention, to 5.7% (33/577) and 4.9% (11/224) in April–June 2008 in Zomba and Mangochi districts respectively after the interventions. The two districts also have reported improved clinical and nursing care for the patients.

Conclusions: Improved clinical and nursing care of TB in-patients and strengthened recording, reporting and classification of TB deaths can significantly reduce high reported TB deaths in Malawi.

PS-95514-06   The positivity rate of the early morning sputum sample for diagnosis of pulmonary tuberculosis

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Introduction: From a public health context, emphasis on AFB microscopy for TB diagnosis is justified in resource-poor setting for detecting active TB among transmitters of the infection. AFB microscopy detects 95% of the infectious cases. Target 8–The Millennium Development Goals 6 is to halt transmission of TB and begin to reverse its incidence by the year 2015. The guidelines to diagnose pulmonary TB in resource-constrained setting advocates for 2 sputum samples.

Objective: To assess the usefulness (relevance) of early morning sputum sample (2nd sample) in AFB direct smear microscopy in order to reduce the number of visits the TB suspects make to the lab for diagnosis, reduce the work load for busy laboratories and also reduce the cost of TB diagnosis.

Method: We retrospectively reviewed the AFB direct smear result of 2821 TB suspects that submitted 3 sputum samples (spot, early morning and spot) for AFB direct smear microscopy in the National TB Reference Laboratory, Lagos. The data source is our laboratory register.

Result: Out of 450 smear positive cases studied, 328 (72.9%) of the spot sample (1st sample) were positive for AFB while 378 (83.1%) of the early morning samples (2nd sample) were positive for AFB and 325 (72.2%) of 2nd spot (3rd sample) were positive for AFB. $P < 0.0001$.

Conclusion: This study revalidates the use of early morning sample for AFB direct smear microscopy. A good sputum sample is required for accurate result. The best sputum sample is obtained early morning because secretions have accumulated overnight.

PS-95576-06   Mejora en la deteccion de casos con seguimiento e incentivos en Tomatlan, Jalisco

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Introducción : La falta de diagnostico de casos en años recientes, asi como la oportunidad en el proceso de detecciones, resultado de un diagnostico de la operacion del programa, impulso la verificacion de la aplicacion de lineamientos normados y el reconocimiento al desempeño del personal operativo, para Incrementar los indicadores cobertura de detección y diagnostico oportuno y detectar las barreras.

Método : Observacional cuasiexperimental, longitudinal comparativo.

Resultados : El año de comparación fue 2007, en 2008 agregar el programa de vigilancia epidemiológica solo incremento 0,16 el promedio mensual de baciloscopias, en 2009 al combinar seguimiento con las visitas de vigilancia epidemiológica y con un programa de incentivos al personal, el promedio mensual se incrementa casi seis veces. Así mismo en seis semanas se cubrió la meta anual para 2009.

Conclusión : En el análisis del número de baciloscopias realizadas entre 2001–2009 se observa un incremento notable en 2005 (año en que se apoyo con un laboratorio móvil). Con la presente intervencion, se incremento la deteccion completandose la meta anual en un tiempo muy corto, y la búsqueda activa de casos en grupos vulnerables ; en este grupo se diagnostico un caso nuevo en 2009. El reconocimiento al desempeño, la verificacion de normas y de la aplicacion de la estrategia TAES, en su concepto amplio, permiten mejora en procesos clave para el combate a la tuberculosis.

MDR-TB DIAGNOSIS AND TREATMENT

PS-94105-06   Lessons from conducting a rapid XDR-TB survey in Swaziland

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Background: The Swaziland National Tuberculosis Programme (NTP), USAID Health Care Improvement Project managed by URC and tuberculosis (TB) partners undertook the first national survey to obtain a rapid 'snapshot' of the occurrence of extensively drug-resistant-TB (XDR-TB) among patients at high risk for XDR-TB in 2007. We describe lessons from implementation of the survey.

Design/methods: Subjects passively reporting at diagnostic centres (189 Category II, 49 multidrug-resistant [MDR] TB cases and 20 symptomatic MDR-TB contacts) were enrolled. Two of the three sputa from each patient (spot-morning-spot samples) were shipped to the Supra National Laboratory (SRL) for TB culture and first and second-line drug susceptibility testing (DST) while only culture and first line DST was performed on the third sample at the national referral TB laboratory (NRL).

Results: Factors contributing favourably to the implementation of the rapid survey were: re-organizing the TB Culture facility at the NRL (sample collection-processing-results-linkage to treatment); proficiency panel testing was done preceding the study with good results; capacity building and conducting collaborative meetings of key health care workers (laboratory, nursing, clinical), NTP and partners; meticulous preparations at diagnostic sites; and a commercial specimen transportation system. Factors contributing negatively were inadequate communication strategy for positive results, lack of immediate isolation space for X/MDR-TB on diagnosis, delays in receiving results from the SRL and the exercise being a first experience for stakeholders. Four XDR-TB cases were identified, concordance of DST results between NRL and SRL was high (68%) and contamination at the NRL (6.6%) was low.

Conclusions: Careful planning, training, validating systems and sorting out sample collection and transportation logistics beforehand are essential for proper implementation of a rapid XDR-TB study.

PS-94193-06   Nitrate reductase assay for detection of drug resistance in *Mycobacterium tuberculosis*

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Aim: Tuberculosis (TB) is one of the most important health problems around the world. The emergence of *Mycobacterium tuberculosis* multidrug-resistant strains has hindered tuberculosis control. For this reason the rapid diagnosis of TB drug resistance is a priority to avoid dissemination of resistant strains. The aim of this research was to evaluate the performance of the nitrate reductase assay (NRA) for detection of resistance to the first-line antituberculosis drugs.

Methods: The NRA was used as an alternative for resistance detection to the first-line antituberculous drugs isoniazid, rifampicin, ethambutol and streptomycin. A total of 175 strains of *M. tuberculosis* were studied during 2007 and the results were compared with the proportion method (PM) on Lowenstein-Jensen medium.

Results: The average time to obtain results was 10 days. The sensitivity of the NRA was 100% for isoniazid and ethambutol. For streptomycin and rifampicin was 98.67% and 95.83% respectively. The specificity was higher than 95.57% for all drugs. The overall agreement between the NRA and the PM was 97.14%.

Conclusion: The NRA constitutes a useful tool for detection of TB drug resistance in low-resource countries with limited laboratory facilities due to its low cost, ease of performance and lack of requirement for sophisticated equipment.

PS-94194-06   Application of nitrate reductase assay using nicotinamide for detection of pyrazinamide resistance

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Aim: The current pyrazinamide (PZA) susceptibility testing methods are difficult due to the poor growth of *Mycobacterium tuberculosis* in acid medium which is required for drug activity. One alternative has been the use of nicotinamide, an analogue of PZA. The purpose of this study was to develop the nitrate reductase assay (NRA) for the rapid detection of PZA resistance in *M. tuberculosis* using nicotinamide.

Methods: The PZA susceptibility was studied in 94 *M. tuberculosis* strains belonged to the collection of the National Reference Tuberculosis Laboratory at the IPK. The NRA was standardized using three different concentrations of nicotinamide (500 µg/ml, 1000 µg/ml and 2000 µg/ml) and the results were compared with Wayne method which was used as gold standard.

Results: The Wayne method results were obtained in 4 or 7 days whereas NRA results were available between 7 and 14 days. A total of 15 strains and 76 strains were reported as resistant and susceptible by both methods respectively but there were three discordant results. Using 1000 µg/ml nicotinamide, the NRA showed the best sensitivity of 93.75% and specificity of 96.80%.

Conclusions: The NRA employing nicotinamide is an attractive option for rapid detection of PZA resistance. The assay is rapid, accurate and could be useful in limited-resource countries with high levels of resistance.

PS-94377-06   Predictive factors of tuberculosis resistance to isoniazid, rifampin or MDR

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Introduction: Resistance to the principle anti-tuberculosis drugs, (H, R, or both) makes complicates patient management, requires treatment using of less effective and more toxic drugs, and prolongs the time of contagiousness and treatment.

Objective: To analyze the factors associated to resistance to H, R, or both (MDR) in Barcelona from 2000 to 2007, a time period with an important increase of immigration from 4% to 16%.

Methods: A cross-sectional study was performed on cases detected by the TB Program residing in Barcelona with culture confirmation and drug sensitivity testing (DST) performed for first-line drugs. The relationship between socio-demographic factors, country of birth, previous treatment, use of alcohol and injected drugs, HIV infection and H or R resistance, or MDR was analyzed by logistic regression using the odds ratio with 95% confidence intervals.

Results: 3903 TB cases were detected during the study period. 2943 (75%) had positive culture and the DST was performed on 2314 (79%) of the cases. 252 cases had resistance at least one drug (11%); 105 (4.5%) to H, 4 (0.2%) to R, and 47 (2%) MDR, of which 2 (0.08%) were XDR cases. The cases with the highest risk of H or R resistance or MDR were those with previous treatment, OR 3.4 (2.1–5.3), HIV infected injecting drug users, OR 2 (1.03–3.7), those born in India-Pakistan, OR 2.5 (1.4–4.6), Latin America, OR 3.2 (2.1–4.9), Eastern Europe, OR 11.5 (5,7–23), Sub-Saharan Africa, OR 5.8 (2.4–14.2), and the rest of Asia, OR 3.8 (1.7–8.6). Alcohol consumption presented less risk of resistance, OR 0.5 (0.3–0.8).

Conclusions: Previously treated patients, HIV infected drug-users and foreign-born cases had the highest risk of H or R resistance and of MDR. The low risk of resistance observed in alcohol consumers could be related to the previous implementation of directly observed treatment in this subpopulation.

PS-94405-06   Clinical characteristics and outcome of multidrug-resistant tuberculosis treated as outpatients

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Objective: To assess the clinical characteristics, resistance pattern and outcomes of HIV negative multi-drug-resistant tuberculosis (MDR-TB) treated at a tertiary care center in Karachi, Pakistan.

Methods: An observational study of 53 consecutive, culture proven MDR-TB patients without HIV infection between August 1999 and March 2007. Data were collected on predesigned performs regarding patient's demography, clinical features, radiological findings, drug sensitivity, treatment and outcome.

Results: A total of 53 HIV negative patients (27 males), with mean age of 36 years received treatment for culture proven MDR-TB. 51 patients (96.2%) had pulmonary while 3 patients (5.6%) had extra-pulmonary TB. Previous exposure to tuberculosis patients was found to be the most common risk factor

among 36 (67.9%) patients. Chest X-Ray revealed cavitary lesion in (60.4%). Resistance against Pyrazinamide (77.4%) was highest among the other first line drugs followed by ethambutol and streptomycin. Treatment regimen with 2nd line drugs was decided on individual basis. The mean duration of treatment was 18 months. Gastro-Intestinal symptoms (like nausea, vomiting, constipation) were the most common side effects seen in 22 patients (41.5%) followed by drug induced hepatitis and neuropathy. 10 patients (18.9%) underwent surgical intervention. 25 patients (47.2%) had completed treatment and cured with sputum smear turned negative, 25 patients (47.2%) were loss to follow up in clinic and 3 patients (5.7%) are under treatment.

Conclusion: MDR-TB in synergism with HIV infection acts lethal as known to the world, but in HIV-negative patients the response to chemotherapy is very reassuring. The main challenge in this study was the high default rate.

PS-94474-06   MODSPOD: a mobile TB and MDR DST laboratory facility

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Background and challenges: The capital cost associated with creation of a new TB laboratory facility is high. There are several epidemiological situations—complex humanitarian emergencies and refugee camps, outbreak settings, prevalence surveys, active case-finding campaigns in prisons or TB/MDRTB hotspots, outreach campaigns in remote areas—in which there may be only a transient requirement for enhanced local TB laboratory capacity, which does not justify the investment required to create, maintain or staff a new facility. A mobile TB culture laboratory could deliver a practical, flexible and cost-effective solution to this problem.

Intervention: We designed, built and implemented a stand-alone mobile TB culture and rapid MDR testing laboratory—the MODSPOD—in Peru, utilising a 20-foot shipping container conversion to guarantee (a) mobility and (b) that the modular design can be readily replicated. Following a national laboratory competition—intended to kick-start interest in laboratory engineering—we developed a final design together with specialists in biomedical engineering, architecture, biosecurity and mycobacteriology.

Results and lesson learnt: The principle challenges were ensuring biosafety, temperature control under extreme conditions and energy delivery so that the MODSPOD could operate as an independent entity.

The total final costs of the MODSPOD, as built by local contractors under the supervision of the competition winners, should not exceed $40 000 including all laboratory and office equipment, container conversion, air-conditioning and generator.

Conclusions and key recommendations: The MODS POD is a biosecure laboratory capable of delivering TB culture and MDR DST; which can be built by local manufacturers in any town where shipping containers may be found; and which can be readily moved to and from sites where the need is transient.

PS-94532-06   Drug resistance in Dushanbe City, Tajikistan

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Background: Tajikistan, one of the Central Asian countries, is considered a hot spot for MDR-TB. In order to provide reliable information on drug resistance, the Tajikistan National TB Program (NTP), supported by Project HOPE and UNDP Tajikistan, conducted a Drug Resistance Survey (DRS) in Dushanbe City and neighboring Rudaki District.
Aim: To analyze preliminary results from the DRS and provide initial information on drug resistance rates and the most common resistance patterns.
Methods: The DRS started on April 1, 2008, and included all smear positive TB cases registered by the program. Initial sputum samples were cultured at the National Reference Laboratory in Dushanbe and positive cultures sent to the Gauting Supranational Laboratory in Germany for drug susceptibility testing (DST) for first and second line drugs. The SDRTB4 program was used as a database for first line drugs and Epi Info for second line drugs.
Results: A total of 165 DST results were collected for patients enrolled during the first seven months of the study, 89 new and 76 previously treated patients. Any resistance was detected in 36 (40.4%) of new cases and 60 (78.9%) of previously treated cases. MDR rates were 11.1% and 60.5% respectively. The highest resistance rates were found for Streptomycin, with 62, 6% in new cases and 64.4% in previously treated cases. The most common MDR pattern in both groups was resistance to all first line drugs. XDR was detected in 14 (8.5%) cases, all of them previously treated.
Conclusions: Although these data are not representative for the whole country, high MDR and XDR rates are serious challenge for the TB control program in Tajikistan. Completion of the DRS and collection of data for a period of one year will provide an opportunity for the NTP to take adequate measures for improvement of MDR-TB control.

PS-94629-06   Inter-laboratory comparative analysis and accreditation for the MTBDRplus LPA in South Africa

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Introduction: Policies regarding the use and implementation of the MTBDRplus® Line Probe Assay (LPA) by the World Health Organization (WHO) in 2008 necessitate the need for accreditation, as set out by the International Organization of Standards (ISO), of all laboratories involved in mycobacterial diagnostics. Numerous pre-requisites need to be complied with before mycobacterial diagnostic laboratories, in accordance with ISO 15189, can be certified as accredited. A key constituent of this process is inter-laboratory comparative analysis and forms an integral part in the accreditation process. This is the first report on a inter-laboratory comparative analysis of MTBDRplus® LPA performance and its subsequent accreditation status.
Methods: Test samples were obtained from the supranational reference laboratory in Antwerp. Subcultures were prepared by the NICD in Johannesburg and bacterial DNA was sent to the NHLS TB Molecular Diagnostic Division in Greenpoint, Cape Town, for comparative analysis in December 2008. Two sets of 10 unknown DNA specimens were tested using the MTBDRplus® LPA and results were submitted within the allowed time frame of 5 days. The South African National Accreditation Standards (SANAS) subsequently assessed the test method, and other pre-requisites, in February 2009.
Results: The MTBDRplus® LPA showed 100% accuracy upon feedback from the EQA department at the NICD, and the mycobacterial diagnostic laboratory at Greenpoint, also obtained certified accreditation for the new LPA.
Discussion: It is suggested that similar inter-laboratory comparative analyses are done in all TB diagnostic laboratories, which are aiming for accreditation status.

PS-94639-06   Susceptibility patterns of *Mycobacterium tuberculosis* in the mycobacteriology laboratory, Braamfontein, 2006–2007

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Introduction: Tuberculosis (TB) is one of the leading causes of morbidity and mortality in South Africa. The emergence of drug-resistant TB poses a serious

challenge to the TB control program. The aim of this report is to describe the susceptibility patterns in a mycobacteriology laboratory in the period 2006–2007.

Setting: The laboratory serves the primary health care institutions and tertiary hospitals in greater Johannesburg as well as referred specimens and isolates for further testing from other provinces and countries.

Methods: Laboratory results of routine susceptibility testing for first and second line drugs during the period of 2006 and 2007 were obtained from the laboratory information system and analyzed. Susceptibility testing in Braamfontein is done per clinician's request, by testing for isoniazid and rifampicin resistance. Isolates that are sensitive to isoniazid and rifampicin are not tested further, and those resistant to either isoniazid or rifampicin or both are then tested for ethambutol and streptomycin. Second line drug testing was done on clinician's request; however, from September 2006, all multidrug resistance (MDR) TB isolates (i.e., those resistant to isoniazid and rifampicin) were tested for second line drugs (ethionamide, kanamycin and ofloxacin).

Results: See Table.

Conclusion: The total number of isolates tested for first line drugs increased by 57%. The increase in testing for second line drugs, prompted by the reports of extensively drug resistance (XDR), saw a 63% increase in the number of tests performed. Among the MDR-TB isolates tested ethionamide showed the highest level of resistance and kanamycin the least. This data motivates for increasing the capacity for first and second line drug testing to improve the case detection of resistance.

	2006 $n = 5449$	2007 $n = 12719$
Isoniazid and rifampicin		
Isoniazid and rifampicin susceptible	3733 (68%)	9419 (74%)
Isoniazid and rifampicin resistant (MDR)	1208 (22%)	2226 (17.5%)
Isoniazid resistant	372 (7%)	2921 (23%)
Rifampicin resistant	136 (2%)	2605 (20.5%)

PS-94780-06 A better cure rate of MDR-TB treatment can be achieved: an experience of the NTRC

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Background: Multidrug resistance (MDR) tuberculosis (TB) is a great challenge for the National Tuberculosis Programme in Nepal. It is one of the focused international attentions because of the reduced response to standard short course chemotherapy with first line drugs, leading to higher mortality and treatment fail-

ure rates and increased periods of transmission. MDR-TB requires a longer duration of treatment (24 months) to achieve cure in comparison with six to eight months treatment for drug susceptible tuberculosis, depending on the regimen used. The 2006/7 MDR survey carried out in Nepal showed 2.9% MDR tuberculosis among new positive tuberculosis patients in Nepal. The Nepalganj TB Referral Centre (NTRC), run by International Nepal Fellowship (INF), in Banke District, Mid Western Region of Nepal, is one of the five original pilot sites for Nepal's DOTS Plus Trial for MDR-TB treatment.

Objective: To assess the treatment outcome of MDR-TB patients registered at the Nepalganj TB Referral Centre since January 2006.

Methods: A cohort analysis was done using data from patients with MDR-TB registered in INF Nepalgunj TB Referral Centre.

Results: From January 2006 until February 2009, 47 multi drug resistance tuberculosis patients were registered for treatment in the Mid Western Region of Nepal. Among them 14 cases were female and 1 was child, and 21 cases were still on treatment by March 2009. Out of 26 patients who completed their treatment 18 (69%) patients got cured, 2 (8%) died, 3 (12%) defaulted and 3 (12%) cases were transferred out to other treatment centres.

Conclusion: NTRC achieved a better treatment cure rate than has been reported elsewhere.

PS-95141-06 Desafio: curar TB resistente en dos pacientes de zona marginada con un equipo interdisciplinario

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Objetivo : Demostrar la importancia del EI para adherir y curar a pacientes de comunidades rurales marginadas.

Metodología : Se formo un equipo profesional con: médico familiar, infectólogo, otorrinolaringólogo, oftalmólogo, cirujano, cardiólogo, enfermeras de primer y segundo nivel de atención, psicólogo, nutriólogo. Además instituciones como el sistema de desarrollo de la familia ; actores políticos : regidores y alcaldes ; auxiliares comunitarios y, protagónicamente, se integra a las familias ; se llevaron a cabo reuniones para firmar compromisos, para sensibilizar al equipo de salud y con las familias, para comprometer a los integrantes de la misma para que proporcionaran apoyo físico y emocional a los pacientes ; se gestionaron apoyos alimentarios durante el tratamiento y apoyos de transportación de los dos pacientes para que acudieran a sus interconsultas y estudios de seguimiento integral.

Resultados : A pesar de la pobreza, lejanía, estigma y discriminación ; se ha logrado la adherencia de todo el equipo, incluyendo actores políticos ; logrando

superar la fase de administración parenteral (intensiva) y negativizar los primeros cultivos de control.
Conclusiones : Los pacientes marginados y resistentes en TB son un gran reto y es preciso asegurar la formación de un equipo interdisciplinario para superarlo.

PS-95146-06   Genotype MTBDRplus assay for rapid detection of MDR-TB

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Introduction: Culture and DST on solid or liquid media takes weeks to month and require sequential procedure for isolation of *M. tuberculosis* complex and its drug susceptibility testing to diagnose MDR. Genotype® MTBDRplus assay is a multiplex PCR and reverse hybridization assay for rapid detection of *M. tuberculosis* complex and its resistance to INH and RMP by mutations in the *rpo*B, *kat*G and *inh*A genes.
Objective: To address rapid MDR diagnostic tool.
Methodology: Total 476 samples from DOTS PLUS pts (Cat II treatment failure) received at GENETUP from Sept 2005 to Sept 2008 were cultured on LJ media. Positive cultures identified as *M. tuberculosis* complex were performed DST by conventional proportional method. The Genotype® MTBDRplus assay was performed according to protocol.
Result: Out of 476 patients, 426 (89.5%) were culture positive, 41 (8.6%) were culture negative and 9 (1.9%) were culture contaminated. Among the 426 positive cultures, 403 (95.5%) were identified as *M. tuberculosis* complex, 19 (4.5%) were NTM and 4 were incomplete result. 27 (6.7%) true RMP susceptible strains were detected by both methods and of the 376 correct resistant strains 370 (sensitivity 98.4%) are detected by conventional DST and 368 (sensitivity 97.8%) by Genotype® assay, while from 383 true INH resistant strains, 380 (sensitivity 99.2%) were detected by conventional DST and 346 (sensitivity 90.3%) were detected by the Genotype® assay. Mutations in the *inh*A gene were found to be 59. Six of these mutations were accompanied by mutations with *kat*G gene. 53 (13.8%) were the additional contribution to the diagnosis of INH (low level) resistance, while through mutations in the katG gene, 293 (76.5%) (high level) resistance was detected. 373 (92.5%) true MDR strains were identified in this study, of which 368 (98.6%) were identified correctly by conventional DST, while 335 (89.8%) were detected by the Genotype® assay.
Conclusion: The Genotype MTBDRplus assay reduced the time to detect MDR.

PS-95330-06   Prevalence of and risk factors for second-line drug resistance in MDR-TB patients in the PETTS study

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Setting: A prospective study of ~1,600 MDR-TB patients enrolled 2005–2008 in Estonia, Latvia, Peru, Philippines, Russia, South Africa, South Korea, and Thailand.
Objectives: To determine the prevalence of and risk factors for baseline resistance to second-line drugs (SLD).
Methods: Baseline data from 1364 patients were merged into a central database. CDC has completed drug susceptibility tests (DSTs) by the proportion method on Middlebrook 7H10 agar for 12 drugs for 1011 baseline isolates. DST results were compared with 20 key predictor variables and with TB treatment history. Using Bonferoni's correction, we considered associations to be significant for $P < 0.001$.
Results: 834 patients had both baseline DST results and a matching record in the database. The sample was relatively balanced in terms of numbers of subjects from Latin America (168), Former Soviet Union (158), and Africa (181), with more data from Asia (327). Over 40% of isolates had resistance to $\geqslant 1$ SLD, 16.9% to $\geqslant 1$ injectable SLD and 11.4% to $\geqslant 1$ fluoroquinolone (FQ); 5.8% of the patients had XDR-TB at baseline. The prevalence of XDR-TB ranged from 1.1% to 14.2% in different countries. XDR-TB did not differ signficantly between those who tested positive (10.3%) vs negative (7.8%) for HIV infection ($P > 0.4$), but was only 0.7% among those not tested for HIV. FQ resistance ranged from 7.1% to 22.7%, and was more frequent among smokers (16.1% vs. 9.6% in non-smokers), and those who were disabled (45.0%, including disabled due to TB) or retired (21.7%) than unemployed (11.5%) or employed (10.3%). Resistance to injectable SLDs was significantly higher in alcohol abusers (32.8% vs. 12.9% of non-abusers), smokers (32.2% vs. 12.2% of non-smokers), and smear negative patients (31.1% vs. 13.2% of smear positives).
Conclusions: Among MDR-TB patients enrolled in PETTS, resistance to crucial SLDs was more frequent in smokers, drinkers, smear-negative patients, disabled and retired persons.

PS-95376-06   Organization of diagnostics and treatment of patients with MDR-TB in Donetsk oblast, Ukraine

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Diagnostics and treatment of multidrug-resistant tuberculosis (MDR-TB) patients in Donetsk oblast is being conducting according to 'MDR-TB Protocol' which is elaborated by specialists of TB and Pulmonology Chair of Donetsk National medical university and Donetsk oblast clinical TB hospital with the technical support of World Health Organization (WHO) and international experts. It is approved by Ministry of Health of Ukraine, National TB Institute named after F. Yanovsky and Donetsk oblast Health Administration. MDR-TB patients are diagnosed by MDR-TB Consilium. During 2007–2008 the following activities have been introduced: bacteriological laboratories were prepared, trainings for TB specialists on MDR-TB and lab technicians had been conducted, specialized MDR-TB department were repaired and opened. Starting from the Project beginning, 357 patients were diagnosed as MDR-TB patients. Treatment results were assessed for 97 patients. 1 group consists of 34 patients, who received treatment according to standard treatments scheme (scheme #1): Pyrazinamid (Z), Ethambutol (E), Capreomycin (Cap), fluoroquinolones (Q), Prothionamide (Pt), PAS, Cycloserine (Cs); 2 group of 63 patients received treatment scheme #2—Z,E, Kanamycin (Km), Q, Pt, PAS. Preliminary treatment results are assessed basing on culture conversion. In group # 1 during 6 months of treatment culture conversion was registered in 17 patients (50.0%), in group #2 culture conversion was registered in 14 patients (22.2%) ($P < 0.05$). Findings testify that scheme #1 is preferable for treatment of MDR-TB patients in Donetsk oblast's conditions.

PS-95392-06   Benefits to MDR-TB patients derived from rapid diagnosis by line

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Conventional diagnosis of MDR-TB results in long delay before appropriate treatment can be started, resulting in increased morbidity, mortality, drug-resistance, patient loss and transmission of disease. During 2007–2008 a large demonstration project was conducted in South Africa, to determine feasibility and overall benefits of LPA's for diagnosis of smear-positive MDR-TB under TB Control Program conditions. Patients were put on treatment based on the result of the Line Probe Assay. We report on patient benefits derived from rapid diagnosis of MDR-TB as compared to conventional diagnoses. Expected patient benefits derived from rapid diagnosis include improved morbidity at baseline (indicated by weight), earlier favorable response to treatment, reduced risk of death before and early in treatment and improved treatment outcomes. We were not able to show improved weight at baseline; follow-up of the cohort to assess the other indicators are ongoing. 39.0% of total MDR-TB's diagnosed ($n = 351$) were lost before treatment could be initiated, gain in case finding was 8.2%, mostly due to high contamination rates of conventional procedures. 14.9% of MDR-TB's were under/overdiagnosed ($n = 51$). In the majority of these cases (74.5%) the LPA was still able to pick up mono-resistance towards either rifampicin or isoniazid. For routine use of LPA, any resistance found by LPA should be confirmed by conventional tests, MDR-TB treatment should immediately be started following diagnosis of MDR-TB or rifampicin mono-resistance. Other major benefits of rapid MDR-TB diagnosis are ruling out of drug-resistance among problematic sensitive cases and reduced turn-around-time for XDR-TB diagnosis.

PS-95397-06   Bacteriologic evolution in MDR-TB patients: the experience of the Peruvian National Control Program

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Introduction: Multidrug-resistant tuberculosis (MDR-TB) represents a substantial challenge to TB control programs, as the treatment is expensive and frequently less successful than for non-resistant strains. The bacteriologic evolution is an important piece of information used to determine treatment failure. Current WHO recommendations define treatment failure as two positive cultures after 6 months of treatment. **Materials and methods:** All patients in the National TB Control Program in Peru receiving second line drugs treatment since 1996 to 2008 were tested monthly for a sputum culture and a sputum smear during treatment. In order to understand the longitudinal variation of the bacteriologic status during treatment, the overall proportion of all patients with a positive culture as well as a positive smear were estimated at each month of treatment. The proportions of positive bacteriology were calculated stratified for each of the four sputum smear conditions (−, +, ++, +++) at the beginning of the MDR-TB treatment. **Results:** In both the culture and sputum smear the proportion of positive cases decreases rapidly within the first four months of treatment. After that time, the

proportion of positive bacteriology reaches an stable pattern (Figure). Patients starting treatment with a higher sputum load of bacilli had always a lower probability to convert and never catched-up the patients with an initial low load of bacilli.

Conclusion: The probability of bacteriologic conversion in MDR-TB patients decreases rapidly within the first months of treatment. Patients with a higher bacilli load at the beginning of the treatment are always less likely to convert and therefore cure, compared to less compromised patients.

Recommendations: We propose to review the definition of treatment failure with an earlier assessment of persistent positive cultures and to incorporate the information of the initial sputum smear status in the failure definition.
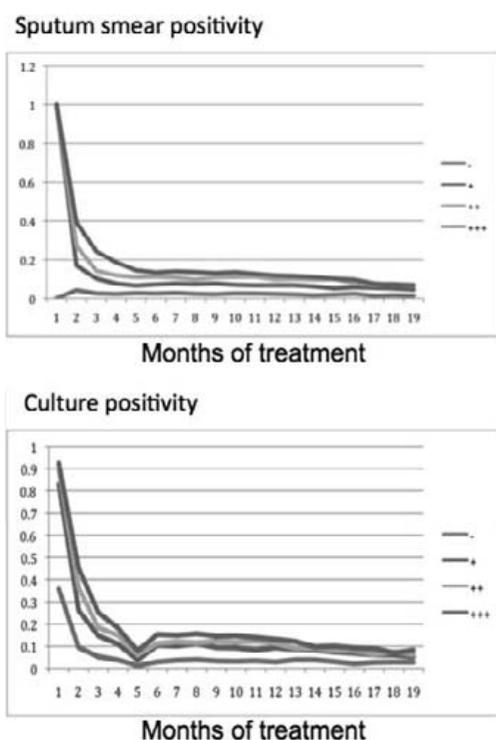
Figure Bacteriologic evolution in MDR-TB patients.

PS-95452-06   Characterization of pyrazinamide resistance among *Mycobacterium tuberculosis* MDR isolates from Poland

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Setting: Pyrazinamide (PZA) is one of the most effective antituberculosis drugs. The susceptibility testing of *M. tuberculosis* to PZA is technically difficult because PZA is only active at acidic pH. BACTEC 460TB is the recommended reference method for the detection of PZA resistance in *M. tuberculosis*. This method is recommended that each laboratory should establish their own protocol for the inclusion of PZA in the panel of primary drugs tested. One of the most important factors that help this decision is the prevalence of PZA resistance, particularly PZA resistance MDR in the related community.

Objective: To determine the extent of PZA resistance in *M. tuberculosis* MDR isolates in our region, and to determine PZA resistance among MDR *M. tuberculosis* strains.

Materials and methods: PZA resistance was analyzed with an Bactec 460TB with the borderline concentration 100 µg/ml. Strains isolated from 137 patients 46 patients with primary drug resistance and 91 with aquired drug resistance.

Results: High percentage of PZA resistance among MDR strains was found excreted by both patient groups in 33/46 (71.7%) treated patients and in 62/91 (68.1%) untreated patients ($P > 0.05$). In both of them resistance to PZA was correlated with drug resistance pattern INH+RMP+SM+EMB 51.5% in untreated patients vs. 37.0% in treated ones ($P < 0.001$). Among resistant strains MIC for PZA was: in 20% from 100–300 µg/ml, in 13% 300–600 µg/ml, in 15% 600–900 µg/ml and in 40% $\geqslant$ 900 µg/ml. The obtained results show that resistance to PZA is common and MIC value are very high.

Conclusions: 68–72% of the MDR strains isolated from the patients were found to be PZA resistant without statistical significance within patient groups ($P > 0.66$). It was stated that PZA resistance among the MDR within two patient groups occurred more frequently when associated with SM than EMB ($P > 0.03$ in untreated patients, $P < 0.001$ in previously treated patients).

PS-95459-06   Use of incident command structure in a multi-jurisdictional, MDR-TB jail contact investigation

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Background: In March 2008, a frequent cross-border traveler was detained in Maverick County Jail (MCJ) in Del Rio, Texas along the US-Mexico border and near the Kickapoo Nation. The inmate was transferred 150 miles to Bexar County Jail (BCJ) in San Antonio, Texas where initial screening found active TB. Following hospital treatment, he returned to BCJ until release on April 29, when he reported to San Antonio Metro Health District (SAMHD) for follow up. Two days later, rifampin and isoniazid resistant MTB was discovered. Incident command structure (ICS) was established to coordinate and standardize efforts between public health agencies, jails and medical staff.

Methods: A unified ICS was established, positions and teams were assigned using personnel from both public health agencies. Action plans were developed by integrated teams in each key area of operations, planning, logistics, finance and information. Inmates and staff at both jails were screened for TB. All inmates were also screened for HIV and Syphilis as blood was drawn for LFTs and CBCs. Counseling was available as needed.

Results: ICS facilitated the transfer of resources across jurisdictions, the enlistment of extra human resources within each jurisdiction and across the state and the standardization of operations. A combined total of 297 inmates and 237 staff were screened at both jails. Thirty-three TST conversions were identified, 6% overall; separately this was 9% for inmates and 3% for staff. Five became suspects, of which three of these five were diagnosed as clinical cases. Blood screening identified one new HIV case and two new syphilis cases. 30% of converters were born in countries with high rates of TB.

Conclusions: ICS is an extremely useful tool to manage and coordinate large scale TB investigations that cross jurisdictions. It provides a forum for consensus decisions, allows for an integrated response team and facilitates the use of additional resources and personnel.

PS-95465-06   Time to culture conversion in MDR-TB/XDR-TB treatment

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Objective: To evaluate whether the baseline resistance profile was associated with time to culture conversion during individualized therapy for drug-resistant TB.

Methods: A retrospective chart review was conducted for patients initiating individualized therapy for MDR-TB between August 1998 and July 2002. Data were collected for baseline clinical and socio-demographic characteristics, previous anti-tuberculosis treatment history, and bacteriologic evolution. The primary outcome measure was time to culture conversion, defined as the first of two consecutive negative sputum cultures. The primary exposure was the resistance profile of the infecting strain at baseline.

Results: 651 patients had isolates tested for XDR-TB. 48 met the definition for XDR-TB; 402 had resistance to INH and RIF but neither to a fluoroquinolone (FQ) nor second-line injectable; 150 had resistance to INH, RIF, and a second-line injectable but not to a FQ; 51 had resistance to INH, RIF, and a FQ but not to a second-line injectable. Median time to culture conversion overall was 60 days, and 90, 59, 71, and

84 days ($P < 0.01$), respectively, in the above four mutually exclusive groups (Figure). Multivariable analyses will be performed to evaluate potential confounders and effect modifiers of this association. The predictive value of conversion time for final outcome will also be explored.

Conclusion: These results suggest that preserving susceptibility to both a second-line injectable and a fluoroquinolone, is key to early treatment response. One way to avoid generating resistance to these drugs is by introducing them in regimens administered while strains are likely to remain susceptible to other highly active agents, i.e., before repeated exposure to anti-tuberculosis treatment. This approach may lead to better outcomes among patients with MDR-TB. Findings about the association between sputum conversion in solid medium and final endpoints may inform the conduct of future, prospective studies.
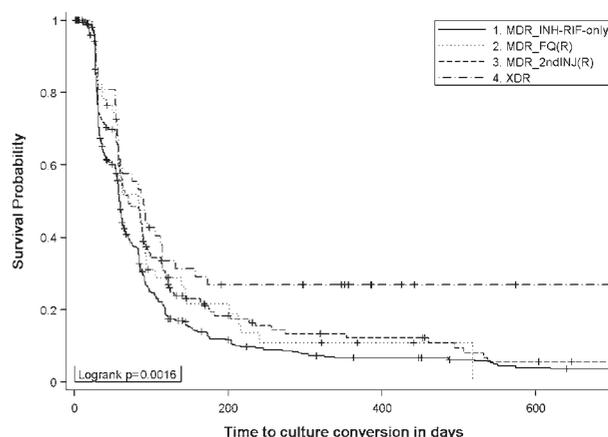
Figure   Time to culture conversion in four groups of patients treated for drug-resistant tuberculosis.

PS-95497-06   Tuberculosis resistance: monitoring the indigenous population of Mato Grosso do Sul State, Brazil

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Background: Nearly 90 000 cases of tuberculosis (TB) are reported each year in Brazil. In the state of Mato Grosso do Sul around 1000 cases are reported annually, 30% of them occurring among the indigenous population. TB particularly affects this population, the second largest (approx. 60 000) in the country. Before 1999, treatment was provided by hospitalizing these patients in a single hospital in the state, leading to high dropout rates. In that year, a decentralized program under guidelines of the Ministry of

Health was implemented using the DOTS Strategy. Culturing of samples also began to be carried out at other centers in the state, using methods recommended for low-complexity laboratories. In 2006, the Ogawa-Kudoh technique was implemented in the county of Amambai, which holds the second largest indigenous population and currently has the highest incidence of tuberculosis in the state (419.5/100 000). Culture was implemented in order to monitor resistance to antituberculosis drugs.

Method: Culture using the new methods was started as part of a decentralized approach in Dourados city in 1999. The other 26 counties with indigenous population were instructed to refer samples to the Public Health Central Laboratory of Mato Grosso do Sul, where they were decontaminated using the Petroff method and inoculated in Lowenstein-Jensen medium. Resistant cases were identified by sensitivity tests using the proportion method. The data presented correspond to 1999–2008.

Results: As many as 4891 samples were inoculated in Ogawa-Kudoh medium; 1949 samples were referred to LACEN-MS and inoculated in Lowenstein-Jensen medium. From the positive samples, 447 were tested for sensitivity, leading to the identification of 15 cases (3.35%) of resistance to one drug and 4 (0.89%) cases of resistance to two drugs (isoniazid and rifampicin).

Discussion: Four cases of MDR-TB were detected in the indigenous population, all of them resistant to two drugs.

PS-95603-06   Heteroresistance and superinfection among suspected MDR-TB patients

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Background: There is scarce information regarding the identification of heteroresistance and super infection among suspected MDR-TB patients and its impact on the outcome with second line anti-TB drugs.

Methods: This study was performed as part of larger study that evaluated the performance of MODS method for the diagnosis of MDR-TB in comparison with proportion method (PM) among 142 suspected pulmonary TB at risk for drug resistance in Rio de Janeiro, Brazil. Forty three (30.3%) patients (99 samples) had clinical specimens with discordant results. Among those eligible patients, heteroresistance to rifampin and/or isoniazid was evaluated by PM, and super infection by spoligotyping. Sixty nine samples of 38 patients were included for final analysis; 23 patients had at least two samples each.

Results: Heteroresistance to rifampin and/or isoniazid was found in 8/38 cases (21.0%) and super infection in 11/38 cases (28.9%). All heteroresistance cases had a history of treatment failure or relapse. Genotype analysis showed higher frequency for LAM 9 and T1 (16.9%, each), LAM2 (11.7%); Haarlem1 (10.4%) and, Haarlem 3 (9.1%). Comparison of biological and clinical data showed that 10 retreatment cases were infected with two different strains. There was no association with clinical outcome and genotype strains.

Conclusion: The present study that include more than one sample from MDR-TB suspects showed high rate of heteroresistance and super infection, mainly in retreatment cases. Further studies with larger sample size are warranted to confirm these results and evaluate its impact on the clinical management of suspected MDR-TB patients.

MYCOBACTERIOLOGY

PS-94116-06   Diagnosis of tuberculosis: direct microscopy vs sputum cytology analysis and bleach sedimentation

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Background: The increased positivity rate from two techniques proposed to improve sputum smear microscopy was investigated: bleach concentration by sedimentation (BCS) and sputum cytology analysis (SCA).

Methods: A prospective diagnostic study was undertaken in a Medecins sans Frontieres-supported hospital in Mindouli, Republic of Congo. Three sputum samples from consecutive PTB suspects were processed according to WHO guidelines for direct smear microscopy. The remaining sputum was then homogenised with 2.6% bleach, sedimented overnight, smeared and examined blindly to the direct smear result for AFB. The direct smears were also examined for SCA. If fewer than 3 good-quality sputum samples were received from a patient, based on SCA results, further samples were requested. Sediment smear examination was performed independently of the SCA result. McNemar's test was used to compare positivity rates.

Results: The positivity rate increased from 43.2% to 47.9% with a case definition of 1 positive smear (1AFB/100 high power fields) out of 3, and from 42.1% to 43.9% with 2 positive smears. SCA resulted in 87.9% of patients producing at least 2 good-quality sputum samples, with 75.7% producing 3 or more good-quality sputum samples. Using a case definition of a single positive smear, BCS gave an incremental yield of 11.6% (95%CI 6.5, 18.6, $P = 0.001$). Using

both BCS and SCA gave an incremental yield of 12.4% (95%CI 7.1, 19.6, $P = 0.002$). Using 2 positive smears, BCS and BCS + SCA gave an incremental yield of 4.2% (95%CI 1.4–9.6, $P = 0.062$) and 5.9% (95%CI 2.4, 11.8, $P = 0.016$), respectively.

Conclusion: The combination of BCS and SCA results in significantly increased microscopy positivity rates using both case definitions of one or two positive smears per patient.

PS-94293-06   Detecting *Mycobacterium tuberculosis* in MGIT 960 cultures by cord formation and immunochromatographic assay

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Aim: The rapid, automated cultivation and detection system, BACTEC MGIT 960, is widely used in Taiwan. But the high nontuberculous mycobacteria (NTM) isolation rate is a concern that should be carefully evaluated. The aim of this study is to evaluate the ability of identifying *Mycobacterium tuberculosis* (*M. tuberculosis*) in positive BACTEC MGIT 960 cultures by cord formation (CF) method and commercial immunochromatographic assay (MeDi-Pro *M. tuberculosis* Antigen Rapid Test, ICA).

Methods: We tested 1658 positive BACTEC MGIT 960 cultures with CF and ICA at Taipei Medical University-Wan Fang Hospital from March 1, 2007 through June 30, 2008. The results of these two rapid tests were compared with mycobacterial species identification by conventional biochemical testing.

Results: There were 1604 (96.7%) results in CF method and 1651 (99.6%) results in ICA test were regarded as conclusive. Among the conclusive results, the sensitivity, specificity, and positive/negative predictive value of CF method were 96.5, 90.0, 95.8, and 91.8%, and those values of ICA test were 94.7, 86.7, 94.3, 87.6%, respectively. Taken these 1658 results together (i.e. both conclusive and inconclusive results), positive results in both CF method and ICA test had higher specificity (95.2%) and positive predictive value (97.8%); positive results in CF method and/or ICA test had higher sensitivity (98.4%) and negative predictive value (95.6%). Among 54 inconclusive results of CF method, ICA test showed similar sensitivity (91.9%) but lower specificity, positive/negative predictive value (47.1%, 79.1%, and 72.7%, respectively). However, in the 7 inconclusive results of ICA tests, the sensitivity and negative predictive values of CF method were as high as 100%.

Conclusions: Either CF method or ICA test might be suitable for rapid detection and identification of *M. tuberculosis* in BACTEC MGIT 960 cultures in routine clinical practice.

PS-94318-06   Development of an agar proportion method for pyrazinamide susceptibility testing

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Objective: To develop an inexpensive pyrazinamide (PZA) drug susceptibility testing (DST) for routine clinical practices.

Methods: Twenty-one clinical *M. tuberculosis* complex isolates and two quality control (QC) strains (anti-TB drugs pan-susceptible *M. tuberculosis* 14323 and PZA mono-resistant ATCC 35828) were used for accuracy and reproducibility evaluation. Acidic (pH 6.0) Middlebrook 7H11 agar media, containing either 10% fetal bovine serum (FBS) or 10% oleic acid-albumin-dextrose-catalase (OADC), were prepared at the reference laboratory. A proportion method using in-house PZA-containing (300, 900 and 1200 µg/ml) agar media and a commercially liquid system (BD BACTEC™MGIT™960 PZA Kit, 100 µg/ml) were compared in synchronization.

Results: *M. tuberculosis* grew equally well in 7H11 agar media supplemented with either OADC or FBS. However, FBS-containing media had higher contamination rate for cultivation. In comparison, high false-resistant results using 7H11/FBS agar media were obtained. Nevertheless, the DST results gained from 7H11/OADC agar media containing 900 µg/ml PZA or the liquid system with 100 µg/ml were comparable with up to 90% agreement. Excellent (100%) reproducibility was found. In addition, actual proportion in agar of PZA resistant bacteria could be determined but not in a liquid system.

Conclusion: Middlebrook 7H11/OADC agar medium containing 900 µg/ml PZA was sufficient for PZA DST.

PS-94324-06   Application of liquid-based Peng's interlayer vessel technique on detection acid-fast bacillus

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Objective: To evaluate the application of liquid-based Peng's interlayer vessel technique on detection acid-fast bacillus.

Methods: 676 morning sputum specimens and 1209 timely sputum specimens were collected from 1252 patients with suspected pulmonary tuberculosis, each sputum specimen was detected by the following three methods at the same time: liquid-based Peng's interlayer vessel technique, AFB sputum smear microscopy (direct AFB) and Löwenstein-Jensen (L-J) culture. Then to compare positive rates of three methods, get the sensitivities and specificities of liquid-based Peng's interlayer vessel technique and direct AFB with

the method of L-J culture as golden standard, and evaluate the differences on detection out the patients with TB by using morning sputum and timely sputum.

Results: Among 676 morning sputum specimens, the positive rates were 23.96% by Peng's interlayer vessel technique, 13.02% by direct AFB and 26.78% by L-J culture; among 1209 timely sputum specimens, the positive rates were 19.11%, 9.59% and 22.5%. The sensitivity and specificity of Peng's interlayer vessel technique were 69.09% and 94.41% while taking the L-J culture as golden standard, and there was significant difference lying on the corresponding indexes of direct AFB ($P < 0.05$). The method of liquid-based Peng's interlayer vessel technique showed that: the positive rate of 676 morning sputum specimens were significantly higher than that of 1209 timely sputum specimens ($P < 0.05$).

Conclusion: The method of liquid-based Peng's interlayer vessel technique could increase the sensitive of sputum detecting and had higher specific. It was worthy to popularize as a method of pulmonary TB diagnosis for its standardized operation, easily developing in grassroots level with a simple apparatus besides the above advantages.

PS-94699-06   Comparison of the TB-Biochip oligonucleotide microarray system and MGIT 960 methods of detection

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Setting: Previously we have shown that the TB-Biochip system is comparable in sensitivity and specificity to the conventional bacteriological method.

Aim: To evaluate the sensitivity and specificity of TB-Biochip analysis of *Mycobacterium tuberculosis* resistance to rifampicin (RIF) and isoniazid (INH) compared to modern conventional MGIT 960 method.

Materials and methods: We analyzed 400 samples of *M. tuberculosis* using the TB-Biochip and BACTEC MGIT 960 System.

Results: TB-Biochip methods have demonstrated 80% sensitivity for INH and 85.7% for RIF compared to MGIT 960 system. A specificity of TB-Biochip was 93.3% for INH and 82% for RIF. The advantage of TB-Biochips is direct identification of mutations in *rpoB, katG, inhA* and *aphC* genes associated with multi-drug resistancy of *M. tuberculosis* and TB-biochip detection is faster (2 days) than MGIT 960 method (3 weeks).

Conclusion: TB-Biochip method has been demonstrated to be highly sensitive, specific and faster approach compared to conventional MGIT 960 method.

PS-94371-06   Comparision of AFB smear and PCR for *Mycobacterium tuberculosis* in pulmonary TB suspects

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Aim: The prospective study was undertaken to determine the diagnostic test for pulmonary tuberculosis (TB) diagnosis in term of acid-fast bacilli (AFB) smear and polymerase chain reaction (PCR) for clinical justment in suspected pulmonary TB cases.

Methods: Patients with chronic cough for more than 2 weeks with abnormal chest X-rays (CXRs) suggestive of pulmonary TB were included at our Pulmonary TB demonstration clinic, Khon Kaen, Thailand. AFB smear, PCR and sputum culture for *Mycobacterium tuberculosis* were performed between June 2008 and December 2008.

Results: A total of 429 patients were enrolled by inclusion criteria in study period with 58 cases positive for AFB smear, AFB positive rate was 13 percent. 233 and 260 specimens were valid for analysis in term of PCR and culture. 56 culture positive were found from 260 specimens in our study which represents 21.5 percent TB prevalence from suspected cases with abnormal CXRs in our clinic. The sensitivity and specificity of PCR in our study is 70.8 and 78.3 percent while AFB smear is 39.6 and 98.0 percent in comparison to culture. The positive predictive value is 68.0 for PCR and 85.1 for AFB smear. The negative predictive value is 80.5 for PCR and 84.9 for AFB smear.

Conclusion: PCR is the one of test which can be used for diagnosis TB along with Sputum microscopy examination because of high sensitivity more than AFB smear in comparison to culture in our study. PCR could be useful in case of suspected pulmonary TB with smear negative for clinical justment in practice.

PS-94372-06   Evaluation of sensitivity and specificity of direct fluorescence microscopy in pulmonary tuberculosis

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Aim: Assess the sensitivity and specificity of FM classic and LEDs; Compare the Se, Sp of FM classic with LEDs FM ; Compare the Se, Sp of FM classic and LEDs FM with ZN.

Design/methods: 203 TB suspects attending a specialised chest clinic in NHTRD subjected to three sputums (spot, morning, spot) examination by ZN and FM. Reading by classic FM, LEDs FM microscopy and ZN in blind, compare with culture as a gold standard to assess the results of three direct microscopy method. With only one smear is evaluated by three methods (in order of reading: classic FM, LEDs

FM and bright-field microscopy). This avoids technique faulses in previous studies because of doing two stained smears, one ZN stained and other FM stained.

Results: Agreement, smear positive versus smear negative, occurred in 98% (kapp 0.7, $P < 0.001$) between Reading by classic FM and LEDs FM microscopy. The yield was simlilar with both techniques in Se and Sp: Se 61%, Sp 93% and Se 59%, Sp 95% for classic FM and LEDs FM microscopy, respectively. Fluorescence microscopy appears to be more sensitive to detect bacilli than bright-field microscopy (61%, 59% and 45% for classic FM, LEDsFM microscopy and bright-field microscopy, respectively) and has similar specificity (93%, 95% and 98%).

Conclusion: Application of the fluorescence technique will significantly increase the sensitive of the tests directly, to help detect patients AFB (+).The use of LEDsFM microscopy in the laboratories of NTP is a need to orient attention in the coming period.

PS-94506-06 Identification of mutations leading to extensively drug-resistant tuberculosis (XDR-TB) in Pakistan

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Pakistan has a tuberculosis (TB) incidence rate of 181/100 000 annually. Diagnosis and treatment of TB is further complicated globally by emergence of extensively drug-resistant tuberculosis (XDR-TB), showing extensive resistance to second-line anti-TB drugs in addition to resistance to isoniazid and rifampicin (MDR-TB). Previous studies of MDR-TB in Pakistan have identified that >90% of isolates resistant to rifampicin have mutations in the *rpoB* gene, with most resistance to isoniazid conferred by mutations in katG codon 315. Resistance of amikacin, kanamycin and capreomycin has been localised to mutations in the ribosomal gene rrs, while resistance to fluoroquinolones is due to mutations in *gyrA* and *gyrB*. We have investigated mutations in XDR-TB strains which were received at the Aga Khan University Hospital Clinical Laboratory during the period 2006–2008. These 18 clinical MTB strains were DNA sequenced in specific 'hot spot' target regions; rpoB, katG, rrs and gyrA. Sequences of clinical strains were compared with the wild type *M. tuberculosis* H37Rv strains. rpoB mutations in codon 531 (56%) and 516 (33%) were most prevalent. katG mutations in codons 315 (79%) and 379 (11%) were most common. Resistance in rrs was 78% at nucleotide 1400. All strains had gyrA mutations at codon 95; 76% at codon 94; 28% at codon 90. This study establishes important baseline data on mutations in XDR-TB clinical isolates in Pakistan. This will aid the development

of rapid drug susceptibility testing for *M. tuberculosis* and to improve case detection and screening.

PS-94623-06 Field experience of fluorescence microscopy using simplified light emitting diode system

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Background: Fluorescence microscopy (FM) increases sensitivity and reduces laboratory workload. Simplified light emitting diode (LED) FM system used with light microscopes seems a good alternative to conventional FM microscope for peripheral laboratories. We compared the FluoLed Easy Blue™ FM system to Ziehl Nielsen (ZN) microscopy in an urban health clinic in Nairobi.

Method: 3 sputa were collected over 2 days. Direct smears were stained with ZN and Auramine (FM) from each specimen and examined using 100× and 40× objectives per 100 and 40 fields respectively. A 4th specimen was collected and sent to the Kenyan Medical Research Institute for Lowenstein Jensen culture. McNemar's test is used to compare positivity rates, sensitivity and specificity. A random of FM slides were blindly re-read on a conventional FM microscope.

Results: A total of 1062 sputa from 387 TB suspects were analyzed. No significant increase in smear positivity rate was found between ZN (19.4%) and LED FM (19.6%), $P = 0.7$. Culture results were available for 281 patients (824 sputa). No significant difference in sensitivity was found between ZN 64.3% (137/213) and LED FM 63.8% (136/213), $P = 0.7$. Specificity was 98.2% for both methods (600/611), $P = 1$. Mean duration of FM smear reading was 1.1 minute. Agreement between LED FM and conventional FM microscope results was high, Kappa = 0.83.

Discussion: The LED FM system is an effective and simple method to decrease workload in high burden peripheral laboratories. Reading was 3 times faster than ZN (mean 3.7 minutes*). The lack of increased detection is disappointing. Increasing the number of fields read, could possibly improve detection, but would prolong reading time and potentially reduce specificity.

* Bonnet et al. CID 2008.

PS-94676-06   External quality control of drug susceptibility testing of *M. tuberculosis*, Peru, 2006–2008

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Aim: To assess the quality of drug susceptibility testing (DST) of first line antituberculosis drugs using the Proportion Method on Löwenstein-Jensen medium in six Peruvian Regional Reference Laboratories by External Quality Control (EQC).

Methods: In the last two years the Mycobacteria National Reference Laboratory (MNRL) sent five panels of *M. tuberculosis*, each consisting of 20 to 30 strains (drug susceptible and resistant) which were tested against streptomycin (SM), isoniazid (INH), rifampicin (RIF) and ethambutol (EMB).

Results: In 2006–2008, six regional reference laboratories completed the EQC for these four drugs, the mean value of sensitivity, specificity, efficiency and reproducibility for RIF was 98% in all five rounds. For INH, in the round 1, the values of sensitivity, efficiency and reproducibility were 84%, 88% and 75% respectively, but in round 5 the values increased (94%, 98% and 100% respectively). INH specificity was 98% in all rounds. For SM the values were very variable for all indicators ranging from 89% to 95%, but the mean value was 93%. For EMB sensitivity, efficiency and reproducibility in the first round were 29%, 55% and 75%, respectively, these values had a significant increase in the round five (100%, 90% and 95% respectively), the mean value of specificity was 95% in all rounds.

Conclusion: EQC improved the quality of DST in the Peruvian Regional Reference Laboratories.

PS-94378-06   Evaluation of radiorespirometric technique for detection of *Mycobacterium tuberculosis* strains

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Aim: Tuberculosis (TB) is a major public health problem, particularly in the developing world. The primary isolation of tubercle bacilli from clinical specimens by visual growth method (VGM) currently used for diagnosis are less sensitive and time consuming. Radiorespirometry (RRM) utilizing radiolabeled carbon with Biphasic Vial System is an efficient system for early detection of bacterial growth. Hence RRM

is compared with VGM for detection of *Mycobacterium tuberculosis* strains.

Method: Total 207 sputum samples were collected from patients diagnosed as cases of pulmonary TB, attending the OPD of Department of TB and Chest Diseases of Sir J.J. Groups of Hospitals, Mumbai. Smears were made from these samples and stained by Ziehl-Neelsen's method. Samples were subjected to concentration procedure. These digested and neutralized samples were processed by VGM and RRM for detection of *M. tuberculosis* strains.

Results: Sputum samples were found to be positive (+ve) for *M. tuberculosis* by smear, VGM and RRM in 27.53%, 21.7% and 33.3% respectively. Total 26.57% samples were +ve by RRM and smear both, while 6.76% samples were +ve by RRM and −ve by smear. Further, 14.49% samples were +ve by RRM and VGM both, while 18.84% samples were +ve by RRM and −ve by VGM. There is significant difference between three methods related to sensitivity, specificity, +ve and negative (-ve) predictive value for detection of *M. tuberculosis* strains. There is a correlation of number of bacilli in smear and rate of growth in RRM and VGM. Average reporting time of VGM and RRM is significantly different, which is 34.47 days and 9.48 days respectively.

Conclusion: RRM technique employing biphasic vial system is a very sensitive method that can be used for early detection of tubercle bacilli, as well as drug susceptibility testing from clinical specimens. It is a much cheaper technique than the existing radiometric methods of detection of *M. tuberculosis*.

PS-94414-06   Population structure of multidrug-resistant *Mycobacterium tuberculosis* in Taiwan

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Background: Taiwan CDC has implemented a DOTS-plus program since May 2007, multidrug-resistant (MDR) *Mycobacterium tuberculosis* isolate obtained from individual tuberculosis patient has to be confirmed by the reference laboratory. Population structure of MDR *M. tuberculosis* isolates was investigated.

Methods: From May 2007 to December 2008, 494 MDR *M. tuberculosis* isolates were submitted from four geographic regions for genotyped. Of the 494 isolates, 488 (98.8%) with sufficient DNA were able to be genotyped. Drug susceptibility testing of four first-line drugs was performed according to standardized methods. Spacer oligonucleotide typing (spoligotyping) were adopted from previously published methods. The resolved spoligotype was designated by comparing to SpolDB4 database.

Results: Eighty-five spoligotypes were resolved. Beijing lineages (244/488, 50.0%) were the predominant genotypes, followed by Haarlem (89/488, 18.2%), U (32/488, 6.6%), EAI (28/488, 5.7%), T (21/488, 4.3%), LAM (6/488, 1.2%), Bovis (2/488, 0.4%), CAS (1/488, 0.2%), H37Rv (1/488, 0.2%) and 64 (13.1%) undesignated ones. Beijing lineages were prevalent in northern and eastern regions, while EAI in southern region. In addition, MDR-TB patients infected by LAM (33.3%, 2/6) and EAI (25%, 7/28) have higher rate of extensive drug-resistance (XDR). The association between genotype and treatment outcome is currently under investigation.

Conclusion: The study highlighted Beijing and Haarlem lineages were predominant among MDR-TB, and suggested LAM and EAI lineages had propensity to become XDR.

PS-94529-06 Evaluation of Ziehl-Neelsen bleach sedimentation method for diagnosis of smear-negative tuberculosis

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Background: World Health Organization (WHO) recommends direct smear microscopy using Ziehl-Neelsen (ZN) technique for tuberculosis (TB) case finding in resource poor settings. This method has a low sensitivity. Bleach methods have been shown to increase sensitivity in some settings. This study was carried out in peripheral centers in a setting with high burden of dual TB-HIV infection.

Objective: To evaluate the ZN bleach sedimentation technique for diagnosis of smear negative specimens from new TB suspects in peripheral centers.

Method: 1122 direct ZN smear negative sputum specimens from new TB suspects attending three peripheral health centers in Nairobi were collected. At each center, sputum specimens were homogenized then divided into two equal portions. One portion was processed for culture. The other portion was treated with 3.5% bleach. The treated specimens were kept at room temperature and left overnight for at least 15 hours. Smears were prepared from the deposit and examined using ZN method.

Results: Of the 1112 smear negative specimens, 968 were analyzed. Of these, 84 (8.7%) were culture positive. Of these, 23 (27.3%) were both culture and smear positive. The sensitivity was (27.4%) with a specificity of (98.4%), a PPV of (66%) and a NPV of (92%). There was a significant increase in sensitivity ($P > 0.005$).

Conclusion: Bleach with sedimentation significantly increased the sensitivity of ZN smear microscopy and should be recommended for use in smear negative specimens to enhance case detection in TB control programmes especially in settings with high burden of dual TB-HIV infection.

PS-94721-06 Rapid detection of *Mycobacterium tuberculosis* resistance to rifampin and isoniazid

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The emergence of drug-resistant strains of *Mycobacterium tuberculosis* is an increasing problem in many countries. Rifampin and isoniazid are important components of effective multidrug therapy and the resistance to rifampin is generally associated to isoniazid resistance: Multidrug resistance (MDR). In the majority of resistant strains, mutations are located in a restricted area of 81bp of the rpoB gene encoding for the RNA polymerase. In contrast, the mutations causing isoniazid resistance are located in several genes and regions. However, 50% to 70% of the resistance is due to an alteration in katG gene. In our study, the drug susceptibility testing of 78 clinical *M. tuberculosis* isolates (40 MDR strains, 17 strains resistant to isoniazid, 6 strains resistant to rifampicin and 15 strains susceptible) is detected by a molecular method 'Genotype MTBDRplus, Hain Lifescience, Nehren, Germany' and compared to conventional proportion method in order to confirm multidrug resistance or to verify susceptibility to rifampin among already treated patients. The resistance to rifampin is detected in 43 cases (34 MDR). The *rpoB* S531L mutation is the most frequent (60.4%). Among 57 isolates resistant to isoniazid by the proportion method, 46 are detected by molecular method and 76.1% of strains have mutation in the *katG* gene (codon 315). The correlation between the two methods for drug resistance is about 80.7% for isoniazid and 93.4% for rifampicin. The molecular method permit the early detection of drug resistance (2 days) but the cost-effectiveness is three times the price of conventional method in Tunisia. In conclusion, the molecular method has the potential to provide rapid detection of resistance in MDR strains. It can be used by reference laboratory in middle income-country to prevent the spread of resistance and to take appropriate therapeutic decision.

PS-95032-06   Evaluation of molecular diagnosis of tuberculosis using urine

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Background: Nucleic acid amplification tests (NAATs) offer a feasible alternative to the current gold standards of TB diagnosis. NAATs require less infrastructure, safety containment and time to diagnosis than culture. Existing TB NAATs are mainly focused on sputum and culture samples. The identification of *Mycobacterium tuberculosis* trans-renal DNA (trDNA) offers an opportunity for diagnosing TB using urine, an abundant, easily obtainable clinical sample. TB trDNA is an EU funded consortium of six countries, including two from Africa, tasked with the characterisation and evaluation of *M. tuberculosis* DNA in the urine of TB patients.

Methods: The detection sensitivity of detecting *M. tuberculosis* in urine from tuberculosis patients using NAATs has been reported to be highly variable. We have used a paralleled approach to investigate optimal extraction, storage and choice of molecular target to develop a urinary NAAT diagnostic test for TB. We are currently investigating the diagnostic utility of detecting *M. tuberculosis* from the urine of 272 Tanzanian patients.

Results: We have investigated 8 extraction methods and identified 2 most suitable for DNA extraction of urine. Furthermore an assessment of storage for one month has demonstrated that DNA is considerably more stable in Italian than Zambian urine. Our approach has also provided a comprehensive assessment of the urinary DNA from 4 geographically distinct countries providing a valuable measurement for assessing the degradation status of existing urine biobanks. Current sensitivity and specificity of molecular analysis of *M. tuberculosis* trDNA in urine is ~66% and ~94% respectively.

Conclusion: The variation observed both in the extraction and DNA stability is likely to have contributed to the reported variability observed with this approach. We are currently working to improve our diagnostic sensitivity and to characterise TB trDNA in patients undergoing TB treatment.

PS-95177-06   Investigation of ethambutol resistance in a strain of *Mycobacterium tuberculosis*

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Emergent multidrug resistance in *Mycobacterium tuberculosis* has made rapid identification of strains resistant to 1st line antimicrobials of paramount importance. Gene sequencing can identify drug resistance mutations and putative mechanisms rapidly relative to traditional phenotypic testing. Ethambutol resistance (EmbR) is thought to be mediated by mutations within the *M. tuberculosis embB* gene target. However *embB* mutations are not always present in resistant strains and do not correlate with resistance levels, suggesting alternate resistance mechanisms are involved. To identify candidate loci responsible for ethambutol resistance, we performed (Roche GS FLX) pyrosequencing to sequence mono-EmbR *M. tuberculosis* strain EMB1, which lacks mutations in embB, for direct comparison with published genomes of 3 EmbS *M. tuberculosis* strains, including reference genome H37Rv. Raw sequence data was de novo assembled using Newbler Assembler. GS FLX sequence reads were mapped at 99% identity against H37Rv resulting in 244 contigs, predicted to represent approximately 98% of the EMB1 genome. GenDB v2.2 and Glimmer3 and Blast searches were used to annotate and analyze the sequences, respectively. Genes with candidate non-synonymous coding mutations in EMB1 were identified by comparing the concatenated EMB1 contig sequences to each representative EmbS strain and cross-referencing the MUMmer 3.0 alignments (SNP detection) results. The comparative analyses data sets suggest 665 putative coding mutations in EMB1 not found in EmbS strains. Confirmation and follow-up experiments are underway. Application of high throughput pyrosequencing has allowed us to sequence 98% of our target genome and generate a list of targets that potentially mediate drug resistance and warrant further investigation.

PS-95189-06   Molecular detection of mycobacteria in paraffin-embedded tissues from HIV patients

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Background: The diagnosis of mycobacterial infections by microbiological culture from fresh tissue can have a fairly low sensitivity. This diagnosis starting from paraffin embedded archived tissue specimens represents a bigger challenge due to DNA fragmenta-

tion because of formalin fixing. Therefore, an improvement in the diagnostic methods of mycobacteria infections becomes very important and necessary. Methods based in PCR could represent a good option for mycobacteria detection and future pathology studies.

Objective: To evaluate the usefulness of the polymerase chain reaction (PCR) in the detection of mycobacteria in paraffin embedded tissues from HIV patients.

Methods: Our samples consisted on formalin-fixed and paraffin-embedded (FFPE) lymph node tissue samples from 15 AIDS patients microscopically diagnosed as granulomatous lymphadenitis, with or without acid fast bacilli. A fragment from each sample was sent for microbiology culture. A PCR assay of the FFPE for the detection of mycobacterial DNA was performed using two targets (*M. tuberculosis* complex-specific insertion sequence (IS*6110*) and the genus-specific 65-kDa heat shock protein gene [hsp65]).

Results: All samples tested positive for Mycobacterial infection with PCR. Twelve tissue samples were positive with the IS*6110* target for *Mycobacterium tuberculosis*. Non tuberculous mycobacteria were detected in the other three cases. A concordance of 100% between microbiological culture assays and PCR results were obtained. Shorts sequences can be helpful in the molecular detection of mycobacteria in formalin fixed-paraffin embedded tissues.

Conclusions: PCR is an effective method of amplification that can be used for detecting small amounts of poor-quality target DNA. Using molecular methods based in PCR is possible to identify mycobacterial DNA and to differentiate tuberculosis from non tuberculous mycobacterial infections in formalin fixed-paraffin embedded tissues.

PS-95226-06   The use of LED Lumin attachment for conventional light microscope for diagnosis of AFB

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Aim: Microscopy remains one of the main methods for AFB diagnostics in most settings. Direct ZN stained microscopy (ZN) allows detecting AFB if smear contains 5000–10 000 germs in a 1ml sample. Conventional fluorescence microscopy (CFM) has superiority over ZN because it is faster and more sensitive, detecting AFB with as little as only 100 germs per 1 ml. CFM has become the routine method of AFB diagnosis in the penitentiary system of the Russian Federation A new fluorescent LED attachment to convert a conventional light microscope to FM for AFB diagnostics was evaluated in a Central laboratory of penitentiary system of RF.

Methods: Fluorescence microscopy AFB examinations with CFM and Lumin were performed for 600 TB suspects using Rodamin and Auramine-O fluorochromes in a blinded, prospective fashion Mikmed microscope (for CFM) and a LOMO conventional microscope (for Lumin attachment).

Results: There were 215 (35.8%) positive slides for AFB detected using both CFM and Lumin. Of these 80 (37.2%) were graded +1, 35 (16.2%) were +2, and 100 (46.5%) were +3 by CFM. Corresponding results for Lumin were 50 (23.2%) +1, 35 (16.2%) +2 and 130 (60.4%) +3. Microscopy with Lumin provided more bright fluorescing of the AFB compared to CFM making it much easier to see the bacteria.

Conclusion: Lumin has a significant advantage to CFM due to very bright fluorescence of the AFB making it easy to screen slides even in low bacillary samples.

PS-95228-06   The use of the Lumin fluorescent attachment in routine laboratory practice

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Aim: The Lumin fluorescent attachment was previously used in the laboratory for AFB detection as a pilot study almost a year. Lumin showed superior sensitivity an increment of 17.2% in comparison with ZN stained smears examined with conventional light microscopy. At the end of the pilot study, we wanted to evaluate the Lumin in routine laboratory use to assess whether it could replace our normal use of ZN.

Methods: We processed 275 sputum samples from 62 TB patients (22.5%) and 213 suspects (77.5%). Each sputum sample was stained by auramine O and rodamine and examined by the Lumin, and then restained for ZN and viewed with the same microscope (Olympus SX 31) on which the Lumin had been attached. Bactec was used as the gold standard on all samples.

Results: There were 130 (47.3%) positive culture results out of 275 sputum samples. Lumin detected 101 (77.7%) as positive for AFB and ZN staining and examination detected 61 (47%) positive. Lumin did not need a darkened room, generated no heat, and the AFB fluoresced brightly making their detection easy. The Lumin lamp and electronics has a lifetime warranty.

Conclusion: Lumin fluorescent attachment showed superior sensitivity to ZN stained slides in routine laboratory practice, confirming the results of the pilot study among our laboratory technicians. Because of its good performance and other positive features we have completely switched from CFM to Lumin as a convenient and reliable tool for our daily work load and intend that it will begin to replace ZN in routine screening.

PS-95236-06   Comparison of CFM and the Lumin fluorescent attachment for AFB diagnosis

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Aim: Microscopy plays important role for early detection of infectious patients. It is a quick, affordable, convenient and specific method of AFB diagnosis. Fluorescent microscopy (CFM) has been implemented in the bacteriological laboratory since 1984 and is recognized as more sensitive on average. However, the cost of using the CFM was quite high as staff had to change the expensive lamp 2–3 times a year. The laboratory thus evaluated the newly introduced inexpensive lifetime LED lamp of the Lumin in comparison to CFM for AFB diagnosis.

Methods: Three physicians examined 5112 slides from 2232 TB patients and suspects. The CFM was a Mikmed 2 and the Lumin was attached to a LOMO conventional microscope. Magnification of 400× (× 40 objective and × 10 ocular) were used for the prospective blinded comparison. Time was tracked for each slide examination and Lowenstein-Jensen culture was used as the gold standard for all samples.

Results: There was 100% concordance between CFM and Lumin results. There were 1048 (20.5%) positive slides out of 5112, which were graded as 21 (2%) scanty, 505 (48.1%) + 1, 301 (28.7%) + 2, and 221 (21%) + 3. There were 1548 positive cultures yielding sensitivity for CFM amd Lumin of 67.7%. Average time required for determination of a negative result was 5 minutes; for +1 grade slide 3.5 minutes; and, for +3 grade sample 3 minutes.

Conclusion: Lumin is a very convenient attachment that can be used with any conventional light microscope to provide the diagnostic performance equivalent of an expensive CFM but without the costs associated with maintenance and lamp replacement for the CFM.

PS-95428-06   Inter-laboratory comparative analysis of the performance of the TB Line Probe Assay in South Africa

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Introduction: An international external quality assurance (EQA) program for line probe assays (LPA) for tuberculosis identification and resistance determination has not been finalised. Following the recommendation by the World Health Organization in 2008 on the use of LPA in high burden TB countries, South African laboratories faced an accreditation dilemma. A prerequisite for accreditation to perform such an assay by the South African National Accredi-

tation Standards (SANAS) organization is participation in an acceptable EQA system. To comply with accreditation requirements an inter-laboratory comparative system was developed for EQA purposes and implemented.

Methods: Clinical isolates with different resistance mutations as represented in the GenoType®MTBDR-*plus* assay; (Hain Lifescience, GMBH, Nehren, Germany) were selected at the National TB Reference Laboratory in Johannesburg for inter-laboratory testing. Sub-cultures were prepared, DNA extracted and validated prior to distribution to 8 clinical laboratories performing LPA for tuberculosis. Two sets of 10 blinded DNA samples from susceptible, monoresistant and multiply-resistant *Mycobacterium tuberculosis* as well as non tuberculous mycobacteria were distributed for proficiency testing by LPA.

Results: All Genotype®MTBDR*plus* LPA returns from the 8 participating laboratories showed 100% concordance upon analysis.

Discussion: A quarterly inter-laboratory comparative quality system for LPA for tuberculosis proved successful as an interim measure until an EQA system is launched. SANAS subsequently assessed the testing system described above and accepted it for accreditation purposes. It is planned for similar inter-laboratory comparative analyses to be performed in future by all TB diagnostic laboratories in South Africa.

PS-95515-06   Relation of false-positive and negative slides to the burden of smear microscopy

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Introduction: In Bolivia the tuberculosis disease is a important public health problem, the tuberculosis control are implement in all the country, the diagnostic and the follow of treatment is carry through the direct smear examination in the National Tuberculosis Laboratories Network, they are 486 laboratories, all send the slides of smear microscopy, to departmental laboratories to make the quality assessment to identify discordances.

Objective: To identify the relation between the number of false positive and false negative slides of smear microscopy and the burden of direct smear examinations in the laboratories which have false+ and false−.

Method: In 2008 we according the information of Departmental Laboratories, the quality control in 2007, 279 081 direct smear examination performed in the laboratories, 130 000 (46.5%) slides were send to the departmental level, and in 37 050 (28.5%) was carry the quality assessment of the slides of smear microscopy.

Results: In the 37 050 slides of 2007, we find 123 false positives (0.33%) and 149 false negatives

(0.49%), they come from laboratories with low numbers of microscopy slides, 3 to 6 per day, and of laboratories with high numbers of microscopy slides per day 25 to 46.

Conclusion: We propose improve the reading of direct smear slides in the laboratories with low number of slides, to send slides from departmental level, to improve the reading of slides, and in the Laboratories with high burden of sputum samples to establish the minimal number of slides according with number of workers and the burden of the laboratories activities, no more of 20 slides for each laboratory technician.

DILEMMAS IN TB DIAGNOSIS

PS-94050-06   One year study of extra-pulmonary tuberculosis in children

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Background: Tuberculosis is an important health problem in developing countries, with varying clinical presentations depending on the organs/systems involved.

Objective: To study the spectrum of clinical and para clinical aspects of extra pulmonary TB in children suffering from pulmonary TB.

Method: This study has been carried out on 65 children with tuberculosis, admitted in TB wards of NRITLD during 2004–2005. All patients were investigated according to specific diagnostic criteria including; history of contact with TB patient, clinical manifestations, radiological findings, tuberculin test and bacteriologic or pathologic results and after confirmation, treatment was administered. Out of 65 cases, 12 had different types of extra pulmonary tuberculosis, and data concerning following factors were studied: age, gender, race, site of involvement, bacteriology, pathology, history of close contact, tuberculin test, radiological findings, and immunological studies (in disseminated TB).

Results: Of 12 cases, 7 were girls and 5 were boys with mean age of 8.75 ± 4.2 9 patients were Iranian and 3 were Afghan. History of close Contact was detected in 2 cases. Type of involvement was: 5 cervical adenitis, 3 osteoaticular disease, 2 peritonitis and 2 disseminated form of tuberculosis. Radiogical findings showed 4 pulmonary disease and 3 osteoarticular involvement. Tuberculin skin tests greater than 15 mm observed in 3 cases, 8 patients had 0–5 mm induration and in one patient PPD was 15 mm. 4 cases had concomitant pulmonary and extra pulmonary involvement. Positive AFB in gastric lavage were recognized in 4 cases. pathological examinations in 11 cases revealed granuloma with caseation compatible

with tuberculosis. According to this study, 18.4% had extra pulmonary involvement and TB lymphadenitis is the most common from of presentation.

PS-94538-06   Diagnostic accuracy of digital chest radiography for pulmonary tuberculosis

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Objectives: We assessed the factors associated with greater diagnostic accuracy of digital chest radiography for pulmonary TB and levels of agreement between readers.

Method: 13 TB physicians, chest physicians and radiologists in the UK and Netherlands agreed to independently identify the diagnosis on 56 digital chest radiographs using a radiology monitor and record their decision on a standard questionnaire. Patient and reader characteristics were used to assess the factors associated with greater diagnostic accuracy against a gold standard of culture confirmed disease. We used the kappa statistic (two outcomes, multiple raters) with 95% confidence intervals, to assess inter-reader agreement.

Results: More years in a speciality was associated with greater likelihood of identifying TB cases ($P = 0.033$). Similarly, participants with greater number of notifications per year were more likely to correctly identify TB cases ($P = 0.037$). Neither speciality nor country ($P > 0.05$) were associated with greater diagnostic accuracy. Chest X-rays from patients with smear positive disease were more likely to be identified as TB. The overall level of agreement for diagnosing TB was good with a kappa of 0.61 (95%CI 0.48–0.73) and slightly higher between physicians (0.64) compared to radiologists (0.54). In contrast, radiologists were significantly more likely to agree on a normal chest x ray with a very good level of agreement of 0.84 (95%CI 0.68–0.95) compared to physicians, kappa 0.46 (95%CI 0.32–0.55).

Conclusion: This study showed a good level of agreement between raters for the diagnosis of active TB. Greater experience, either measured as years of experience or number of notifications were associated with higher likelihood of correctly diagnosing TB.

PS-94644-06   Children with MDR-TB: close contact follow-up

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Introduction: In April 2008, to complete management of MDR-TB cases in Dominican Republic since 2006, which was initialized at the pneumology service of Hospital Dr Robert Reid Cabral in the MDR-TB pediatric unit for the follow up and diagnosis of children in close contact with MDR-TB patients.
Objectives: To establish the evolution of children in close contact with MDR-TB evaluated and in follow up in the MDR-TB unit of Hospital Dr Robert Reid Cabral in DR.
Methods: Revision of the clinical records of children in close contact with MDR-TB patient; the children were evaluated and followed up by the MDR-TB unit in the Hospital Dr Robert Reid Cabra.
Results: 18 close contact children of the the MDR-TB patients was evaluated, 67% (12) males, 55.5% (10) less than 4 years old and 20% (2) less than 1 year old. Until the following date, 2 cases (11%) have started the second line treatment with favorable results, while the other patients remains asymptomic and are in the follow up care.
Conclusion: Early assessment and monitoring of childdrens with close contact of MDR-TB, allowed for early intervention to decrease morbidity and mortality.

PS-94892-06   Unusual presentation of extra-pulmonary TB: TB mastitis

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Background: The incidence of extra pulmonary tuberculosis (EPTB) is increased with advanced human immunodeficiency virus (HIV) infection 1, 2. Mammary TB is a rare manifestation of EPTB, either as a primary lesion or secondary to a primary focus located elsewhere. It is commonly misdiagnosed as carcinoma of the breast or pyogenic abscess due to its physical presentation. This case report describes a case of TB mastitis demonstrating the need for a high index of suspicion of EPTB and TB-associated immune reconstitution syndrome (IRIS) with advanced HIV infection.
Case report: 34-year-old female with 2 month history of swelling on right breast. Fine needle aspirate isolated acid fast bacilli (AFB) on auramine stain with mycobacterial growth indicator tube culture positive at 3 weeks. Concurrent PTB was also diagnosed on a positive sputum AFB smear and anti TB treatment commenced. Subsequent clinical course was uneventful and the mass resolved completely. Sputum smear

reversion occurred at two months post TB diagnosis. Three months after TB treatment initiation, ART was commenced at baseline CD4 count of 163 cells/µl and viral load 932 553 copies/ml. Two weeks post ART initiation patient developed a sternal mass and recurrence of breast mass. Staphylococcus aureus was isolated from sternal lesion and the breast mass was smear AFB positive but culture negative. The patient completed TB treatment and has achieved virological suppression. Both the breast and sternal masses have resolved.
Conclusion and recommendations: Although TB mastitis is rare, in countries with HIV and TB epidemics, a high index of suspicion needs to be maintained. Fine needle aspirate remains the single most important diagnostic method. The development of the breast mass is possibly related to unmasking of TB associated IRIS from partially treated PTB. Future research priorities include the recognition of EPTB and IRIS and management thereof.

PS-94927-06   Comparison of adverse reactions and tuberculin response in infants after vaccination with one of BCG

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Background: We changed the type of BCG strain from Pasteur to Danish on October 2007. This study aims to compare the rates of adverse reaction between infants BCG vaccinated either of Pasteur or Danish strain and tuberculin responses between among infants vaccinated with one of three BCG vaccines (Pasteur, Tokyo and Danish strain).
Methods: A total of 29 540 infants vaccinated with one of BCG vaccines (Pasteur and Danish strain) from the PHC during the second half of 2007 were recruited to observe the occurrence of the lymphadenopathy until September 2008. Active palpation of lymph node swelling by the health workers were recommended whenever those infants visited PHC for other vaccinations. A total of 610 infants vaccinated with one of three BCG vaccines [Pasteur (PS), Tokyo (TS) and Danish strain (DS)] were prospectively tested with 2 TU of PPD RT23 with Tween 80. The maximum transverse diameter of induration was measured 72 hour later.
Results: The mean follow-up period was 253 ± 85 days with the 14 508 infants vaccinated with BCG-PS and 182 ± 50 days with 15 032 infants with BCG-DS. Adverse reactions were observed in 112 BCG-PS infants (0.77%) and 25 BCG-DS infants (0.17%), which showed significantly high rates in BCG-PS infants (Relative Ratio; 4.64, 95% confidence interval 3.01–7.16). Tuberculin testing was

done to the infants given by one of three BCG vaccines (203 PS, 205 DS and, 202 TS infants). The mean induration sizes were 8.0 ± 3.7 mm, 8.5 ± 4.1 mm, and 10.0 ± 3.4 mm respectively. TS vaccinees had significantly larger response (Pr > F; <0.0001) than others. The tuberculin positivity with an induration of 10 mm or were 36.9% (75), 40.5% (83), and 62.2% (125) respectively.

Conclusion: The rate of BCG adverse reaction was high in PS. Tuberculin reaction of infants percutaneously injected with BCG TS was significantly higher than others.

PS-95060-06   Tuberculin re-testing in people less than 15 years old responsible for increase of chemoprophylaxis

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Background: The effectiveness of tuberculosis chemoprophylaxis with isoniazide is based on well conducted clinical trials performed since 60s. It is a worldwide consensus that chemoprophylaxis, particularly in children less than 15 years old, should be a fundamental action for tuberculosis control.

Methods: Prospective study performed between mar08 and feb09 at the four cities of metropolitan area of Vitória, Espírito Santo State, Brazil.

Results: Among 112 children, household contact of cases of smear positive pulmonary tuberculosis, the mean age was 8 years old (range between 3 months and 14 years old); 55 (49.1%) and 57 (50.9%) belonged to male and female sex, respectively. BCG scar was present in 107 (95.5%) children. Among 44 (39.3%) with PPD reactions $\geqslant 10$ mm, 14 (31.8%) were less than 2 years old and had reactions $\geqslant 15$ mm. Isoniazid 10 mg/kg/day for 6 months, as chemoprophylaxis, was indicated for these 44 children. Tuberculin was re-administered in 59 (86.8%) among 68 children after 8 weeks. Tuberculin conversion was diagnosed in 14 (23.7%) children. Therefore, chemoprophylaxis was indicated for 58 (51.8%).

Conclusion: Tuberculin re-testing was responsible for an increase of 31.8% of chemoprophylaxis indications among children less than 15 years old. PPD re-testing should be a routine action in order to prevent tuberculosis cases in childhood.

PS-95149-06   Correlation between BCG immunization with prevalence of pulmonary tuberculosis in children

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Introduction: The incidence of pulmonary tuberculosis (TB) in children remains high. BCG immunization is recommended by WHO as extended program immunization to prevent the developing of the disease.

Objective: To study the correlation between BCG immunization with prevalence of pulmonary tuberculosis in children.

Methods: Cross sectional study in children with chronic cough who came to pediatric outpatient clinic at Soetomo Hospital. BCG status was positive if the BCG scar was present. Diagnosis of pulmonary tuberculosis based on clinical appearance supported by tuberculin test, radiological examination and scoring system. Statiscal analysis using χ^2.

Results: Eighty three children were enrolled in this study, 38 with positive BCG status. The prevalence of pulmonary TB among unvaccinated children was 67.7%. The correlation between BCG immunization with prevalence of pulmonary tuberculosis was borderline ($P = 0.058$).

Conclusion: BCG does not give special protection to the children from pulmonary TB.

PS-95249-06   A combined diagnostic algorithm-classification for the detection and management of TB in children

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Background: In Valle del Cauca, Colombia, there are communities with a tuberculosis (TB) incidence >100/100 000, in which children would be expected to make up 20–40% of the total caseload. However, until 2008, childhood cases comprised <7% of the total caseload receiving treatment for active TB. We found that neither local TB controllers nor clinicians had a working knowledge of standard criteria for the clinical diagnosis of probable TB in children, and believed that microbiological confirmation was required for the dispensing of treatment.

Intervention: A Combined Diagnostic Algorithm-Classification (CDAC), based on WHO criteria (2006) and on medical and exposure risk stratification, including the recommended management to take, was developed and piloted. It was implemented in Cali, in the follow-up of a cohort of household contacts of pulmonary TB cases that included 217 children, in the 2006–2008 period.

Results: Of 53 children who were assessed with the CDAC, 19 met criteria for probable TB (2 subsequently microbiologically confirmed). All of them received treatment. In addition, 19 were classified as

latent TB and 15 had other diagnoses. Clinicians found the CDAC instructive, useful and practicable. This CDAC could be applied in local TB control programs (LTCPs) and in clinical studies to diagnose and classify pediatric TB cases. The most effective measure in securing the approval of the LTCP to dispense anti-TB treatment for children clinically diagnosed with probable TB was referring them with the completed CDAC form. This required overcoming some barriers to access to microbiological confirmation, competent radiographical evaluation and correct interpretation of tuberculin skin testing.

Conclusions: The application of this CDAC facilitated the detection of both latent and active TB in children as well as the subsequent approval by the LTCP for appropriate treatment, and could be an efficient strategy to improve the TB control in children.

Table   Criteria for probable TB in 19 children (age 0–15 years) of 53 assessed

Type of criterion/specific criterion	Results
Risk stratification	
Exposure to person with pulmonary TB	19/19
Malnutrition	7/19
Less than 5 years of age	6/19
HIV infection	0/17 patients tested
Clinical symptoms	
Cough > 21 days	12/19
Weight loss/failure to thrive >3 mos.	10/19
Fever >38°C	3/19
Physical signs	
Weight loss/failure to thrive >3 mos.	10/19
Painless cervical lymphadenopathy >1.5 cm	2/19
Radiographic findings	
Normal	2/19
Infiltrates (any type)	8/19
Consolidation	3/19
Bronchial wall changes	2/19
Lymphadenopathies	4/19
Pleural effusion	1/19
Tuberculin skin test	
>15 mm	11/19
10–15 mm	5/19
5–10 mm	2/19
0 mm	1/19
Microbiological studies	
M. tuberculosis positive sputum culture	1/8 patients tested
M. tb-positive gastric aspirate/lavage	0/10 patients tested
Biochemical studies	
Elevated adenosine deaminase (ADA)	1/1 pleural effusion tested

PS-95356-06   Sputum collection centers as means to enhance diagnosis of tuberculosis

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Sahyog, a project of LEPRA Society to support the RNTCP of the state is being implemented in a hilly district. The population is mostly tribal and the accessibility to the health facilities is very poor. Detection of sputum positive cases is the mainstay of programme and this is being facilitated through 180 SSCs established in points between the distant hamlets and DMCs. The objectives were to increase detection of sputum positive cases and ensuring effective case holding by collection of sputum nearer to the residence and easy follow up of patients in unapproachable terrains. This paper reflects the experiences on this innovative approach. The SSCs were organized in peripheral health units. Sputum samples are collected by SCC holders, who are health functionaries and some responsible community members. The samples are transported to microscopic centers by 140 volunteers usually once in a week. Initiated in 1998 with 25, the number of SCCs over the years has gone up to 180. Similarly the number of chest symptomatics and positive cases detected amongst them rose to 687 and 130 respectively. The achievements are as follows: A total of 180 centers have been established so far and the sputum collection and transport are smoothly carried out. The positive cases were directed to the concerned DMCs, registration and DOTS supply to the enrolled cases. 285 SCC holders and 140 volunteers have been trained through 15 training sessions and all are carrying out their assigned jobs. A total of 156 sputum collection centers are fully functioning, 687 sputum samples were collected, out of which 130 (18.9%) samples were found positive and are put on DOTS. The total samples include 133 follow up sputa, out of which 125 (93.9%) are negative and 8 are positive. The final outcomes envisaged are increase of accessibility; early and increased case finding and treatment; increased cure rate due to better follow up through SCC holders and ownership of the programme by community.

PS-95473-06   Tuberculosis miliar que debuta con fistulas dorsolumbares y crisis convulsivas

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Introducción : La tuberculosis (TB) miliar tiene una incidencia del 8% en HIV negativos, la TB meningea tiene una incidencia menor al 1%, son las formas más graves de la TB por las secuelas neurologicas y mortalidad. En el Hospital General de México se han diagnosticado 18 casos por año de TB miliar, el 35% en pacientes inmunocomprometidos, y en el otro 65% no se han identificado causas de inmunosupresión.

Caso clínico : Masculino de 29 años, HIV negativo, combe negativo. Cursa con cuadro de 6 meses de evolución con crecimientos ganglionares submandibulares izquierdos, abscesos paravertebrales a nivel dorsolumbar, tos, expectoración, hipertermia y pér-

dida de peso de 10 kg, presenta una sola crisis convulsiva parcial simple motora. Exploración física funciones mentales superiores integras, fondo de ojo con papiledema, nervios craneanos sin alteraciones, signos meningeos negativos. Radiografía de tórax con infiltrado micronodular difuso. TAC de craneo con edema cerebral difuso. Resonancia magnética de columna con lesión osea en cuerpo vertebral con compresión radicular y absceso paravertebral. Se le realiza BAAR y cultivo de Lowestein en orina, en lavado bronquial y en liquido cefalorraquideo siendo negativos, con ADA de liquido cefalorraquideo de 29 y PCR IS*6110* para *M. tuberculosis* positivo. Se da tratamiento con esteroides, carbamacepina, rifampicina, isoniacida, pirazinamida y etambutol a 1 año con mejoría.

Discusión : Es un caso de TB diseminada con afección pulmonar, osea, ganglionar y meningea. Las crisis convulsivas son un síntoma descrito en la etapa III de la TB del Sistema Nervioso Central, en este caso fueron una manifestación incipiente. Se da tratamiento en etapa temprana y con esto se evitaron las secuelas neurológicas y la muerte. A pesar de encontrarse varios sitios afectados con TB en pacientes como este, con frecuencia no es posible identificar ni aislar al bacilo y la biología molecular es útil para confirmar el diagnóstico.

PS-95502-06   Tuberculosis pleural con afeccion cutànea diseminada

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Introducción : La tuberculosis (TB) cutánea, produce formas fijas (habitadas) y hematógenas hiperérgicas, con nódulos, úlceras, placas verrugosas y vegetantes. Ocurre primero la infección pulmonar y a partir de este foco original, mediante reinfección endógena se diseminan los bacilos a la piel. El diagnóstico se basa en el cuadro clínico, cultivo y hallazgos histopatológicos, la TB cutánea se considera paucibacilar.

Caso clínico : Masculino de 32 años, HIV negativo, combe positivo (hermano con TB pulmonar). **Inicia** hace 3 años con dolor en tórax posterior derecho, expectoración blanquecina, hipertermia, pérdida de peso y disnea. Radiografía de tórax con paquipleuritis apical, con dos opacidades basales externas. Exploración física con dermatosis que afecta tronco y abdomen, con úlceras de bordes eritematosos, con secreción purulenta y fístulas además de un absceso de 10 cm de diámetro en pared abdominal, el cual se punciona y se identifican micobacterias por Ziehl-Neelsen, se aisla *M. tubeculosis*, sin detectarse drogorresistencia. La TAC de tórax con engrosamiento pleural izquierdo y dos colecciones basales bilaterales que correspondían

a empiemas loculados, fue manejado con sondas pleurales, se da tratamiento con rifampicina, isoniacida, pirazinamida y etambutol, con mejoría y cierre de todas las úlceras y fístulas, al cumplir dos meses de fase intensiva y pasarlo a fase de sostén se presenta apertura de las fístulas por lo que continuamos en fase intensiva por 1 año, con desaparición de todas las úlceras, siendo dado de alta por curación.

Discusión : La TB cutánea corresponde al 1.5% de los casos de TB extrapulmonar. En México representa del 1 al 3% de las enfermedades de la piel. La comprobación del bacilo no es fácil, ya que menos del 1% presentan bacilos en el tejido de biopsia. En algunos casos es necesario contar con técnicas de biología molecular. Este caso se confirmó por BAAR y cultivo que siguen siendo los estándares de oro para el diagnóstico de la TB.

PS-95545-06   Increment of diagnosis of tuberculosis with routine culture in Curitiba, Southern Brazil

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Background: In Brazil, *M. tuberculosis* culture is not routinely requested for the diagnosis of tuberculosis (TB). Culture is requested at diagnosis when three AFB-staining sputum samples are negative, in retreatment cases and in contacts of patients with resistant TB. The aim of the present study was to estimate the increment resultant from routine sputum culture for TB diagnosis when requesting the first AFB.

Setting: Primary care clinics in Curitiba, a city with 1 800 000 inhabitants in Southern Brazil, with a TB incidence rate of 25/100 000 inhabitants/year (2008).

Methods: Patients with cough for more than 3 weeks attending these units from April 2007 to March 2008 were invited to answer a questionnaire applied by previously trained nurses, and to collect sputum for AFB and culture (LJ/MGIT).

Results: Among 250 patients, 5 (2%) were diagnosed with TB, 3 (1.2%) by sputum AFB-staining and 2 (0.8%) by sputum culture. This represented an increment of 67%.

Conclusion: Routine sputum culture adds substantially to the diagnosis of TB. Earlier and more precise diagnosis can result in morbi-mortality reduction and earlier interruption of the transmission chain. In addition, culture allows prompt access to the mycobacterial strain in case testing for resistance is indicated.

PS-95549-06 Osteo-articular tuberculosis in Serbia, 1993–2007

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Background: Serbia is an intermediate TB incidence country. Total TB incidence rate showed a slight decrease over the last 15 years while an increased trend of extra-pulmonary TB was registered in the same period.
Objectives: To examine epidemiological and clinical features of osteo-articular TB (OATB) in Serbia in the period 1993–2007.
Methods: Source of data: 1) Annual Reports of the Institute of Lung Diseases and TB in Belgrade, and 2) Central TB Register. Population estimates with extrapolations were based on 1991 and 2002 census data. Patients' files have been retrospectively reviewed for the clinical pattern of the patients diagnosed 1993–2004, and Central Register details were used for the cases 2005–2007.
Results: We found a total of 295 OATB cases in Serbia over the observed period. While the overall TB incidence rate showed a slight but not significant decreasing trend ($P = 0.535$), OATB rates slightly increased ($P > 0.05$) presenting a proportion of 8.1–20% of all extra-pulmonary TB cases over the observed period. OATB was more common in women, older patients, laborers and those unemployed, and 49% had the disease localized in the spine. 75% were treated with anti-tuberculosis drugs alone, following the directly observed treatment short-course. The 25% required additional surgery for deformity or worsening neurology. Favourable disease outcome was found in 94.6% patients and treatment failure in 4.7% while 0.7% died.
Conclusion: Despite the socio-economic crises during the 1990s, OATB incidence rate in Serbia has not significantly increased. The recommended standardized anti-tuberculosis treatment regimen was effective in the majority of the patients.

ABSTRACT PRESENTATIONS MONDAY 7 DECEMBER 2009

FEATURED ABSTRACT PRESENTATIONS

DRUG SUSCEPTIBILITY TESTING FOR TUBERCULOSIS

FA-94497-07 The use of wild-type MIC distributions to determine clinical breakpoints in *M. tuberculosis*

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The increased prevalence of multidrug-resistant and extensively drug-resistant (MDR and XDR) tuberculosis (TB) underscores the need for accurate drug susceptibility testing of first- and second line anti tuberculosis drugs. Unfortunately, the critical antibiotic concentrations (breakpoints) used for antimicrobial susceptibility testing (AST) today are mostly based on empiry and limited scientific evidence. This is especially true regarding second line drugs. The concept of utilizing wild-type minimal inhibitory concentration (MIC) distributions as one of several tools for establishing clinical breakpoints has been used successfully for most other bacterial pathogens and yeasts. A microorganism is defined as wild-type by the absence of acquired and mutational resistance mechanisms to the drug in question, and a clinical isolate with a MIC outside the wild-type disprioution is highly likely to harbour resistance mechanisms. These may be clinically relevant or not but need to be carefully evaluated. To date, data for *M. tuberculosis* are largely lacking, probably partly due to the complexity of AST. By using a 96-stick replicator method on Middlebrook 7H10 medium we were able to simultaneously determine the MICs of 95 clinical isolates for four first line drugs (isoniazide, rifampicine, ethambutol and streptomycin) and 15 second line drugs (including e.g. four quinolones, four injectables, ethionamide, prothionamide, thioacetazone, linezolide). Our data clearly show that wild-type MIC distributions can be used as one of several tools to determine clinical breakpoints in *M. tuberculosis*. Revised breakpoints including such data might in-

crease the the accuracy and clinical usefulness of AST against *M. tuberculosis*.

FA-94842-07   The role of biochip drug susceptibility testing in the treatment results of DR-TB patients

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Aim: To evaluate the effectiveness of chemotherapy of MDR- and XDR-TB patients based on rapid detection of *M. tuberculosis* resistance to isoniazid (H), rifampicin (R), and fluoroquinolone (FQ) using hybridization on biochips.
Methods: We observed 135 pulmonary TB patients, out of them 67 were newly-detected and 68 had previously received treatment. All the patients were sputum smear- and culture-positive. Besides, sputum samples from each patient were studied by molecular genetic methods using biochips. Mutations in genes responsible for isoniazid, rifampicin and fluoroquinolone resistance were determined. Data on drug resistance were obtained within 24 hours after sputum collection.
Results: Out of 67 new cases 25 (37.3%) were resistant to H, and 13 (19.4%) to H R. None of new cases was resistant to FQ. Out of 68 retreatment cases 49 (72%) were multidrug-resistant; out of them 31 were resistant to fluoroquinolone. Later, traditional microbiology drug susceptibility testing confirmed XDR-TB in all these cases (45.5%). Biochip testing determined monoresistance to H in 9 retreatment cases (13.2%). Initially chemotherapy regimens were prescribed based on biochip testing. Early administration of chemotherapy regimen 4 to new cases with MDR-TB resulted in culture conversion in 64.1% cases after 2 months, 87.0% cases after 6 months of treatment. In 13 (72.2%) retreatment cases with MDR-TB culture negativation was registered after 6 months of treatment. In 18 out of 31 cases (58.1%) with XDR-TB culture negativation was registered after 12 months of treatment.
Conclusion: Determination of *M. tuberculosis* resistance to H, R and FQ using biochips allows initial administration of adequate chemotherapy regimens, which results in early sputum conversion and high treatment efficacy. Determination of mutations in the gene responsible for FQ resistance is indirect evidence of XDR.

FA-95066-07   Validating the policy on culture and DST of all retreatment cases suspected for MDR-TB

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Background: Previously treated TB patients returning with symptoms are a high risk group for multidrug-resistant TB (MDR-TB). The Philippines adopted a policy to perform sputum culture and DST for all symptomatic retreatment TB cases.
Objective: To analyze MDR-TB detection among all symptomatic previously treated TB patients to validate the policy.
Methods: This is a retrospective review of MDR-TB detection among patients with positive or negative direct sputum smear microscopy (DSSM). Cost analysis was done. Risk factors for MDR-TB in DSSM negative patients were determined.
Results: Of 5100 MDR-TB suspects screened from 2003 to 2008, culture was positive in 2522 (54.7%). This included 2355 and 163 of suspects with positive and negative DSSM, respectively. MDR-TB was noted in 1845 (73%) culture-positive suspects of whom 1744 (96.1%) and and 71 (3.6%) were DSSM positive and negative suspects, respectively. The total cost was US$111 518 for cultures; 45% was spent for DSSM negative suspects; and US$228 616 for DST; 7.2% was for DSSM negative suspects. The unit cost per MDR-TB detected was US$154 for DSSM positive subjects compared to US$940 for DSSM negative subjects. (Table) The risk factors for MDR-TB in DSSM negative suspects were 1) two or more previous treatment and 2) treatment outside DOTS. These characteristics should be used to select among DSSM suspects, who should undergo culture and DST for MDR-TB detection.
Conclusion: With limited laboratory capacity and resources in countries with the highest burden of MDR-TB, sputum cultures and DST may be confined to DSSM positive suspects. To identify the few MDR-TB among DSSM negative subjects, those with two or more previous treatment and those not treated under DOTS should be studied. This modification of the policy will significantly reduce the cost and workload for cultures by 45% with minimal savings in DST.

Table   Cost and workload analysis in detection of MDR-TB patients among suspects with direct sputum smear microscopy positive and negative results

DSSM	Cultures done n	Culture @ US$22	DST n	DST @ US$83	MDR-TB detected n	Total MDR-TB detected %	Unit cost per MDR-TB	% Workload Cultures	% Workload DST
Positive	2819	61 336	2568	212 052	1774	96.1	154	55.3	93.0
Negative	2281	50 182	202	16 564	71	3.9	940	44.7	7.0
Total	5100	111 518	2788	228 616	1845	100	184	100	100

FA-95386-07   Drug resistance survey in hospital in-patients from KwaZulu-Natal, South Africa

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Background: Nosocomial transmission has been implicated as a key factor in the generation of the outbreak of XDR and MDR at Tugela Ferry in KwaZulu-Natal, Durban. There are over 40 hospitals in KwaZulu with similar infrastructural constraints to effective infection control. It is unknown if hospital transmission of XDR/MDR is also occurring at these sites.
Aims: To determine the prevalence of MDR-TB in hospital in-patients in KZN district hospitals.
Methods: All inpatients at 18 hospitals within KwaZulu-Natal capable of producing a sputum sample voluntarily or after saline nebulization were sampled after signing informed consent and completing a questionnaire. Sputum samples were subjected to microscopy and first and second-line drug susceptibility testing.
Results: To date results are available for a total of 701 patients from the 18 hospitals. *Mycobacterium tuberculosis* was isolated from 35.8% (251) of patients of which 13.9% (35) were found to be MDR and 2% (5) were XDR. MDR/XDR-TB was associated with previous tuberculosis therapy and admission to a tuberculosis ward. The majority of these MDR/XDR patients were undiagnosed at the time of sampling.
Conclusions: Although these levels of MDR/XDR-TB were substantially lower than the initial reports of similiar studies carried out at in the hospital at Tugela Ferry, the results indicate potential for nosocomial transmission and a need to intensify infection control measures. In the abscence of adequate facilities to isolate all TB suspects the hospital deployment of a rapid diagnostic test for drug resistance in conjunction with the rapid initiation of MDR treatment may be the most cost effective way of preventing ongoing hospital transmission of MDR/XDR-TB.

FA-95399-07   Evaluation of the line probe assay for routine diagnosis of multidrug-resistant tuberculosis

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A large-scale demonstration project was conducted in South Africa to evaluate performance of LPA with conventional procedures for diagnosis of MDR-TB. Patients were treated on the basis of the rapid LPA result. The aim is to report on LPA's overall and regional performance for diagnosing MDR-TB on smear-positive sputa. The 12 month period of the study was performed under the national tuberculosis control programme (NTCP) conditions. LPA performance was defined as accuracy (number of correctly diagnosed over the total number diagnosed) and sensitivity (number of correctly diagnosed MDR-TB over the total number MDR-TB diagnosed). 2859 LPAs were done with 2.9% (82/2859) unsatisfactory results and conventional was done on 3190 with 9.3% (295/3190) contaminated. In preliminary analysis 351 MDR-TB cases were diagnosed nationally, 309 by LPA and 326 by MGIT (Table). Total number of discrepant results was 51. LPA over diagnosed 5.5% (17/308) and under diagnosed 10.4% (34/326) of MDR-TB cases. Regional MDR-TB sensitivity was for Gauteng, Northern Cape, Western Cape and KwaZulu-Natal (KZN) were 78%, 82.4%, 98.8% and 90.8% respectively. Overall accuracy per region was 96.6% for Gauteng, 95.6% Northern Cape, 99.4% Western Cape and 96.5% for KZN. Differences in regional sensitivities may be attributed to differences in interlaboratory performance of the assay or due to different epidemiological strains circulating in the provinces. Overall accuracy was high (96.1%) supporting the utility of this molecular assay for correct diagnosis of patients. Optimal benefit of LPA in high MDR burden countries will be beneficial if diagnosis of MDR can be placed earlier in the case finding algorithm.

Table   LPA performance against conventional test—specimens with both assays performed

Province	Suspects enrolled	MDR-TB: LPA	MDR-TB: MGIT	Discrepant
Gauteng	4937	60	4	18
Northern Cape	6088	19	17	8
Western Cape	12500	86	83	5
KwaZulu-Natal	6101	144	152	20
Total	30800	309	326	51

FA-95417-07   Evaluation of GenoType-MTBDRplus assay in clinical isolates from six countries

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Background: Line probe assays (LPA) for rapid molecular detection of rifampicin (RIF) and isoniazid (INH) resistance in culture isolates and smear-positive sputum specimens were endorsed by WHO in 2008. This policy noted the need for additional data on assay performance in different epidemiological settings.

Multidrug-resistant tuberculosis (MDR-TB) isolates from the global study, 'Preserving Effective TB Treatment with Second-line drugs (PETTS)', provided a unique opportunity for evaluation of the GenoType® MTBDRplus LPA with strains from six geographically diverse countries.

Methods: Locally confirmed MDR-TB isolates from Estonia, Latvia, Peru, Philippines, South Africa, and Thailand collected prior to treatment with second-line drugs were sent to the Centers for Disease Control and Prevention (CDC). At CDC, phenotypic drug susceptibility testing (DST) was performed according to the modified proportion method on Middlebrook 7H10. DNA extracted from isolates was amplified and hybridized per manufacturer recommendations. Each MTBDRplus run contained >1 pan-susceptible strain and amplification/hybridization and strip reading steps were performed by different individuals in a blinded manner.

Results: Phenotypic and molecular DST results are available for 441 isolates. Overall, MTBDRplus identified mutations in 416/425 (97.9%) phenotypically RIF-R and 398/429 (92.8%) of INH-R isolates. MDR-TB was correctly identified in 389/420 (92.6%) isolates. These same results varied by country, ranging from 83.3 to 100% for RIF-R, 78.9 to 100% for INH-R, and 72.2 to 100% for MDR-TB.

Conclusions/recommendations: MTBDRplus demonstrates high sensitivity for detection of INH-R and RIF-R isolates tested from six countries. Repeat testing and DNA sequencing are underway to resolve discrepant results. Prior to routine use in any setting, laboratories should validate the LPA in parallel with conventional DST.

FA-95590-07   Multidrug-resistant tuberculosis acquisition during DOTS

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Background: The prevalence of multidrug-resistant (MDR) TB is increasing despite widespread use of directly-observed therapy short-course (DOTS). We studied MDR acquisition in patients receiving DOTS for non-MDR pulmonary TB at treatment centers in Lima, Peru.

Methods: We collected sequential sputum samples that were cultured for TB and MDR-TB, and typed for clonality using IS*6110* Restriction Fragment Length Polymorphism. TB clones were compared between diagnosis and follow-up.

Results: Of 423 patients with non-MDR-TB at the start of DOTS, 9% (37/423) changed to MDR-TB during treatment. For the 34 patients who converted to MDR-TB and had DNA fingerprinting, 82% (28/34) had baseline non-MDR-TB that was a different clonal type from their acquired MDR-TB. A subanalysis of patients at one treatment center revealed that all 19 patients who acquired MDR-TB changed to an identical MDR clone as another patient with MDR-TB receiving DOTS at the same treatment centre. Patients identified as potential infectors by their shared cluster clones of MDR-TB at the start of DOTS were more infectious during treatment as compared to patients infected with other MDR clones [Weighted Relative Risk (RR): 3.24 (95% CI: 2.0–5.4)]. In contrast, for the other 18% (6/34) of patients who changed from non-MDR to MDR-TB during treatment, this change was caused by mutation in the same TB clone. These patients were adherent to treatment and were more likely mono-resistant at the start of DOTS as compared to patients who acquired MDR-TB due to a different clone [RR: 23 (95% CI: 1.8–1133)].

Conclusions: MDR-TB acquisition during DOTS occurred in 1 in 11 patients with initially non-MDR-TB. Patients with mono-resistant TB were at greater risk of developing MDR-TB caused by mutation of the same bacterial clone. However, most acquired MDR was caused by re-infection with an MDR-TB strain. Therefore, MDR-TB patients should be cared for separately from non-MDR-TB patients with enhanced infection control measures.
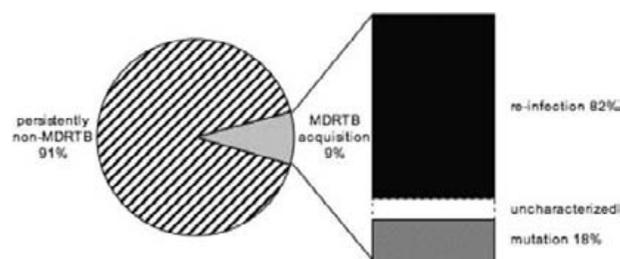
Figure   Most MDRTB acquisition during DOTS was caused by re-infection.

FA-95601-07   Rapid pyrazinamide susceptibility testing with the MODS technique directly from sputum

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Background: Pyrazinamide susceptibility testing is usually too slow to guide initial therapy. Consequently,

many patients with pyrazinamide-resistant TB receive inappropriate pyrazinamide therapy. We therefore optimized the microscopic-observation drug-susceptibility (MODS) assay as a test for TB drug susceptibility to pyrazinamide.

Methods and results: Pyrazinamide susceptibility testing is done in acid media (pH = 6.0) because pyrazinamide usually has no anti-tubercular activity at neutral pH and requires acid pH to prevent TB growth. All TB strains could be sub-cultured in this acid culture media, but when this acid media was used with decontaminated sputa in the MODS assay, 77% (158/204) of positive sputa failed to grow. However, pyrazinamide was found to be active against TB at neutral pH when testing freshly decontaminated sputa. For an OPTIMIZATION experiment, patients with suspected MDR-TB gave 204 sputa that underwent conventional NaOH decontamination and were cultured in MODS at neutral pH in 0, 50, 100, 400 and 800 ug/ml pyrazinamide. 100 and 400 ug/ml pyrazinamide prevented the growth of 85% and 91% of pyrazinamide-susceptible TB, respectively. A subsequent evaluation experiment involved 102 patients with suspected MDR-TB who had sputum tested with the MODS assay using pyrazinamide 300 ug/ml that was compared with subsequent testing of their TB isolates with Bactec-460, Wayne, sequencing and TEMA culture. MODS agreed with other tests as often as they agreed with each other (graph). The MODS assay took 1–3 weeks and cost $2US vs. 4–13 weeks for other assays that cost $5–50US.

Conclusions: The alkaline stress of conventional NaOH decontamination caused *M. tuberculosis* to become susceptible to pyrazinamide in subsequent broth culture at neutral pH. This discovery provides new insight into the mechanism of action of pyrazinamide and allows the MODS assay to be used for inexpensive pyrazinamide susceptibility testing sufficiently rapidly to guide initial therapy.
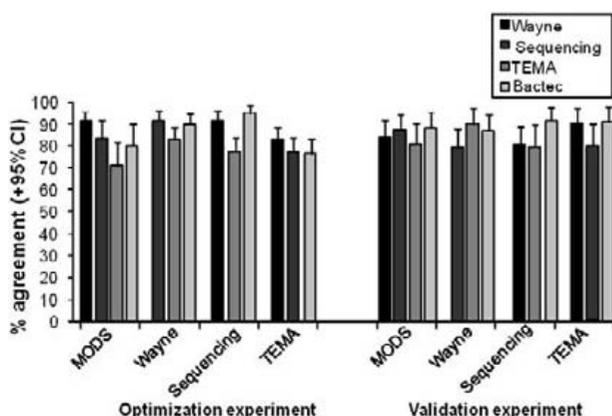
Figure　Accuracy of rapid, direct pyrazinamide susceptibility testing with MODS: agreement between tests.

POSTER DISCUSSION SESSIONS

SOCIAL DETERMINANTS IN TB CONTROL

PC-94200-07　Different intervention effect on improving arrival rate of TB patients at TB clinic in China

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Background: With this current tuberculosis (TB) patient and suspect referral-tracing system in Yunnan province of China, total arrival rate of TB patients and suspect was 56% in 2006, which meant that near 40% TB patient and suspects still did not go to CDC TB clinic for free diagnosis and treatment. It is very urgent to find an effective measure to improve the arrival rate in order to detect as many TB patients as possible and treat them according to the DOTS-strategy.

Methods: In order to compare intervention effect on improving TB patients and suspects arrival rate at TB clinic, an intervention study with three types of incentive measures aiming at general hospital staff, TB clinic staff, and TB patients was conducted in 2007 in 12 counties in Yunnan.

Results: Under different intervention, total arrival rate of four groups (intervention groups aiming to CDC staff, hospital staff, TB patients and control group) were 74.5%, 60.5%, 77.6% and 59.6% respectively. Compared with the control group during intervention, the arrival rate of 1st and 3rd group had been improved significantly ($P < 0.05$), whereas 2nd group had no significant change. The same pattern also was observed when comparing the pre-intervention period with during intervention period for each group.

Table　Comparison of the arrival rate before and during the intervention period in the control and intervention groups

| Group | Before intervention (Oct 2006–Jan 2007) | | | During intervention (Feb–May 2007) | | | *P* value before and during intervention | *P* value during intervention between different groups (control group as reference) |
	Reported cases (N1)	Arrived cases (*n*1)	Arrival rate (%)	Reported cases (N2)	Arrived cases (*n*2)	Arrival rate (%)		
Control group	203	123	60.6	309	184	59.6	0.81	—
1st group	105	65	61.9	145	108	74.5	<0.001	0.002
2nd group	279	175	62.7	337	204	60.5	0.58	0.80
3rd group	325	218	67.1	410	318	77.6	0.002	<0.001

Conclusion: Providing incentives toward TB patients and CDC doctors were significantly effective in improving total arrival rate and may increase case detection under the NTP. Giving TB patient transporta-

tion fees could be better than providing incentives to CDC doctors from a cost-effective perspective.

PC-94248-07   Food insecurity among tuberculosis patients

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Objective: To describe and evaluate food insecurity, daily food consumption and socioeconomic characteristics among tuberculosis (TB) patients.
Methods: A survey was conducted at Campinas State University Hospital in Campinas, São Paulo, Brazil in 2008. Fifty eight TB patients diagnosed as having pulmonary tuberculosis were interviewed about their daily intake of food groups. Information on socioeconomic condition was obtained using a structured questionnaire. Food insecurity was assessed by the Brazilian Food Insecurity Scale (EBIA) that is an adapted and validated version of HFSSM questionnaire used in the USA, which allows classifying the patients into food security, mild, moderate or severe food insecurity. Food insecurity rate was estimated and its association with daily food consumption variables and socioeconomic characteristics was assessed using the χ^2 test ($P < 0.05$).
Results: The rate of moderate/severe food insecurity was 15%. It was more common in non-white TB patients (33.3%) and was higher in those with low income (50%) compared with higher income. The proportion of respondents experiencing moderate or severe food insecurity that did not consume dairy products, fruits, vegetables, meats, on a daily basis is significantly higher than respondents who are food-secure or mild food insecurity ($P < 0.001$).
Conclusions: These findings suggest that ensuring access to food for TB patients is an essential element in achieving a healthier status and has influence to reduce poverty. The study highlights the need to integrate programmes addressing food insecurity and tuberculosis control.

PC-94315-07   Factors associated with delayed tuberculosis test-seeking behaviour

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Background: Early diagnosis of tuberculosis is important for minimising individual morbidity and mortality, and also at a public health level to reduce transmission and emergence of drug-resistance.
Objective: To determine factors associated with de-

lay in symptomatic individuals seeking diagnostic testing for tuberculosis in the setting of the Peruvian Amazon.
Methods: The duration of symptoms prior to seeking medical care was assessed by interview for 108 newly-diagnosed pulmonary tuberculosis patients in the city of Iquitos, Peru, which has high tuberculosis incidence. Beliefs associated with tuberculosis and socio-demographic factors were assessed in these 108 patients and 335 randomly-selected healthy community controls.
Results: Median delay from symptom onset to diagnostic testing was 61 days (inter-quartile range 30–91 days). Factors associated with prolonged delay are detailed in the table: male gender, lower educational level, the perception that tuberculosis is curable and the belief that tuberculosis prevalence is high (all $P < 0.05$). Compared with healthy controls, patients reported these beliefs more frequently, described more stigmatizing beliefs about tuberculosis, had received less education, had lower socio-economic indices, and lived in more crowded conditions (all $P \leqslant 0.01$).

Table Factors associated with delay in tuberculosis test-seeking behaviour

	Association with patient delay in test-seeking behaviour			
	Univariate regression		Multiple regression	
	Coefficient	P value	Coefficient	P value
Socio-demographic factors				
Female gender	−0.267	0.2	−0.483	0.02
Age (in years)	0.012	0.05	—	—
Education (by grade level completed)	−0.330	0.1	−0.441	0.03
Ownership asset-based wealth index	−0.105	0.1	—	—
Perceived risk factors				
Belief that TB is curable	0.642	0.08	1.002	0.01
Perception of high TB prevalence in the local community	0.462	0.03	0.568	<0.01
Risk of tuberculosis exposure				
History of contact with TB patient	0.486	0.02	—	—

Conclusions: There was frequently prolonged delay in seeking medical care for tuberculosis symptoms, which is likely to increase transmission and morbidity. Patients with more delayed test-seeking were usually male and less-educated individuals, implying that case-finding activities should prioritize these groups. Current health promotion activities emphasize tuberculosis curability and high tuberculosis prevalence. However, these beliefs were associated with delayed test-seeking behaviour and therefore interventions promoting these beliefs require prospective evaluation because they may paradoxically increase diagnostic delay.

PC-94442-07   Improving TB patient compliance among the socially disadvantaged in a low-burden, high-income country

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Since 2006, the BELTA-TBnet project provides free TB diagnosis and treatment in Belgium to patients without health insurance or social coverage. Around 12% of all TB patients require assistance from the project. The treatment success rate of the patients assisted by the project (83%) is higher than that of the other TB patients (73%) in the 2006 cohort. This is mainly due to differences in the case fatality rate (2% against 13%). The low death rate in the BELTA-TBnet group is consistent with its composition: 94% of the patients are of non-Belgian origin. The death rate among all TB patients of non-Belgian origin 2001–2006 has been fluctuating around 3%, against 19% among those of Belgian origin. The default rate among all TB patients 2001–2006 is much higher among non-Belgians (17%) than among Belgians (7%). But among the BELTA-TBnet patients in the 2006 cohort, the default rate is similar in both groups (9%). This suggests that free access to TB drugs may help to improve patient compliance. But in spite of this encouraging observation, patient compliance remains a problem especially among socially disadvantaged groups such as illegal immigrants, homeless, IV drug users etc. where extra efforts to intensify DOT prove ineffective. Observations in the field show that standardised approaches to improve patient compliance are ineffective. Each case requires a careful and individualised analysis of the underlying causes of non-compliance. The BELTA-TBnet project is providing a framework that allows to assess the problem quantitatively and qualitatively. Due to its flexibility, the project is able to propose customized solutions such as translator services, use of an intercultural mediator, educator or psychologist, non-monetary incentives, social mobilisation etc. Although a certain financial input is required, it is clear that money alone is not the answer.

PC-94481-07   Tuberculosis awareness and access to treatment among Uzbek labor migrants in Kazakhstan

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Background: Kazakhstan has become an important destination for labor migration from neighboring Central Asian republics. Many of these migrants come from Uzbekistan and most are undocumented seasonal workers. Kazakhstan has a high incidence of TB and migration poses a risk both for increased transmission and treatment default. Residents of Kazakhstan are entitled to free TB treatment; however, anecdotal evidence suggests that migrants are reluctant to seek care. This study was conducted in Kazakhstan and Uzbekistan in summer 2008 to understand Uzbek migrants' barriers in accessing health care in Kazakhstan.
Methods: Qualitative methods were used and consisted of 12 focus group discussions with Uzbek labor migrants, 10 in-depth interviews with migrants who were on treatment for TB, and 18 in-depth interviews with health providers in Kazakhstan. Textual data were analyzed using a Grounded Theory approach and entered into MAXQDA 2007 software.
Results: Migrants experience multiple levels of barriers in their access to health care in Kazakhstan. Migrants' lack of legal status makes them vulnerable to exploitative work conditions and lack of registration impedes their access to primary health care services. Poverty acts as an obstacle because migrants cannot afford the formal and informal fees or other indirect costs associated with treatment. A lack of awareness of the symptoms of TB, and especially of the availability of TB treatment, makes migrants less likely to seek care for TB. Health system barriers include administrative problems that arise from treating unregistered patients. Barriers to access at the primary health care level impede migrants' access to TB treatment at the TB dispensary level.
Conclusion: The results of the study will contribute to the development of information campaigns to raise awareness of TB among migrants and provide empirical evidence for policy to improve migrants' access to health services in Kazakhstan.

PC-94576-07   Social determinants of tuberculosis: experiences from tuberculosis research centre, Chennai, India

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Background: Poverty is not only lack of money but also a lack of material well-being, infrastructure and access to services.
Objective: To assess the relationship between social capital [literacy, income, housing type, gender and socially underprivileged] and tuberculosis.
Methods: Data from TB prevalence surveys and other operational research studies were correlated with social capitals.
Results: Of the 90 815 persons screened in the community for smear positive tuberculosis 151 cases were diagnosed. The TB prevalence was significantly higher

among people living below the poverty line (242 vs 149/100 000 population), 1.5 times higher among socially under privileged (265 vs 162), 2.5 times higher among people living in poorly constructed houses, and 3.3 times higher among the landless. Significantly more females felt inhibited discussing their illness with family (21% vs.14%). The most common reason for delay in seeking care was poor socio-economic conditions in 36% (56 of 156) and illiteracy was significantly associated with non adherence to treatment. Positive trend was observed between poverty rate and annual risk of TB infection in India.

Conclusion: Poverty and tuberculosis were closely linked. There is a need for policies and actions for reducing health inequalities in different social capitals.

PC-94661-07   Mobile digital radiographic screening for tuberculosis in hard to reach groups is cost-effective

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Background: Homeless people, prisoners and problem drug users (hard to reach groups) are at high risk of tuberculosis, often have delayed diagnosis and have a disproportionate impact on transmission. We aimed to investigate whether Mobile X-ray screening targeting these groups reduces infectivity at diagnosis; to model potential to avert future cases and to determine cost effectiveness.

Methods: We compared 35 cases of pulmonary tuberculosis identified through screening with 245 comparable passively identified controls from hard to reach groups in London. We used a dynamic meta population model to estimate the numbers of future cases averted and calculated the Incremental Cost Effectiveness Ratios to prevent one case through screening.

Results: 14 602 people in hard to reach groups were screened. The prevalence of active tuberculosis was 267/100 000. 15/35 (44.1%) cases identified through screening were smear positive on diagnosis compared to 155/245 (63.3%) of passively identified controls (adjusted odds ratio 0.35, 95%CI 0.15–0.81). The model indicates that the intervention prevented 11 cases of active tuberculosis in 2004 with projected estimates of cases prevented increasing to 87 cases per year by 2013. The intervention costs £2810 on average to prevent one case of active TB among the target populations over a ten year period (Incremental Cost Effectiveness Ratio = £2180) assuming TB treatment costs of £5000 per case. The estimated cost per Quality Adjusted Life Year over the ten year period is £3206 (min £1397 max £15572).

Conclusions: Radiographic screening for tuberculosis of hard to reach groups is highly cost effective.

PC-94775-07   Determinant of TB suspects' decisions when following-up on referrals from private to public sectors

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Background: Under its PPM initiative, in 2005 the Cambodian NTP and partners instituted a linkage system whereby TB suspects identified at pharmacies would be referred to designated DOTS facilities for care. One year into the project 834 suspects were referred, of which, 438 were unaccounted for. Further investigation revealed that 120 went to the referral site, but were not recorded as referrals. This study focuses on 67 of the remaining unaccounted for suspects who did not follow-up care at all or sought care in a different facility, and which we were able to trace. The specific aim is to understand factors that affect their decision-making when accessing follow-up care.

Methods: Cross-sectional study.

Results: Patients who did not follow-up care at all ($N = 11$), reported not doing so due to lack of money, time and the expectation that symptoms would improve. Among the respondent that sought care in facilities different than that recommended by the pharmacies ($N = 56$), reasons for doing so included the friendliness of staff at the facility of their choice (other health centre, pharmacy, private clinic, traditional healer) (56%), less time spent (46%), less transportation cost (37%), and the availability of attending after work (35%). The far distance to their homes (6%), and the anonymity that this option provided (2%) prompted some suspects to visit a different site.

Conclusion: For referred suspects who did not follow-up care and those, who did so at a different venue, cost, convenience and stigma influenced their choice. These factors should be considered when planning and expanding similar projects.

PC-94829-07   TB control in prisons in Davao Region, Philippines, 2008

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Aim: Directly Observed Treatment, Short-course was implemented in the Philippines for more than 10 years now but its implementation confronts challenges among high risk population including prisoners, reservoirs of TB. TB outbreaks in prisons continue to occur and there is limited concrete local data as basis

to implement a TB infection control program in prison. The study was conducted to determine the prevalence of smear positive tuberculosis, describe the TB control interventions and assess demographic and socio-economic risk factors of TB in prisons.

Methods: A cross-sectional study on the prevalence of sputum positive, a focus group discussion (FGD) among treated TB inmates and case control study were done in 6 prisons.

Results: Of 7282 eligible prison inmates, 7157 (98%) were interviewed and screened, 62% (1264) submitted 3 sputum specimen, 22% (455) and 12% (252) with 2 and 1 sputum specimen respectively. Only 63 sputum smear positive inmates were identified giving a prevalence rate of 865 per 100 000 inmate population. In FGD, it revealed that case detection were late, access to health services is difficult, inmate were ashamed/stigma of the disease. Also, there was no treatment partner to supervise, co-inmates were administering the injections and adverse drug reactions were not properly managed. Analytical study included 63 cases and 252 controls. Univariate analysis identified the following risk factors: body mass index of less than 20 (OR 7.95 95%CI = 4.06–15.74), with co-morbid illness (OR 6.25 95%CI = 2.57–15.33), with co inmates who had TB (OR 3.07 95%CI = 1.68–5.62) and with exposure to TB household member (OR 3.47 95%CI = 1.33–9.015).

Conclusion: The prevalence rate of bacillary tuberculosis in prison is 3 times more than the prevalence in the community and TB control interventions in prison in Davao Region, Philippines are not in placed. Policy/guidelines of TB in Prison to include advocacy and screening upon entry should be formulated.

PC-95171-07 Adherence to treatment and support for TB patients in a TB control project in Belgorod oblast, Russian Federation

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Introduction: The International Federation of Red Cross and Red Crescent Societies (IFRC) in collaboration with the Russian Red Cross organization (RRC) and financial support from USAID, regional government and TB services are implementing comprehensive TB programme in Belgorod oblast. A critical component of the programme has been the provision of social support during the continuation phase of TB treatment.

Methods: For the provision of DOT during the continuation phase, the TB dispensary staff identifies socially vulnerable groups in need of social support based on pre-determined social criteria: average income per capita in the family below the minimum income level in the region; people not working; pensioners living alone; ex-prisoners; migrants; members of multi-children families; homeless. The social support interventions include food parcels ('protein kits' given daily/three times a week and for an accumulated protein kit given once a week, food parcels given twice a month) and hygiene kits (given monthly or quarterly), which act as incentives by their direct link to attendance of DOT visits, and enablers such as transport reimbursements, legal and psychological counseling (especially for ex-prisoners and the unemployed), home care by a visiting nurse for very sick patients, and personalized care through organizing convenient DOT.

Results: Defaults decreased from 11.5% to 7.5% among patients without social support and from 1.7% to 0.0% among patients with social support during the 4th quarter of 2004–the 4th quarter of 2006. On average the risk of default is 5 times higher among those not receiving social support, as compared to those receiving social support (OR 5.34, 95%CI 3.55–8.29, $P < 0.0001$).

Conclusions: Social support measures improve adherence to treatment and decrease defaults. Experience gained in Belgorod may be used in TB programme in other regions of the Russian Federation as well as in other countries.

PC-95567-07 Assessment of care-seeking behaviour of TB and TB-HIV co-infected patients attending DOTS clinic

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Background: Early detection and treatment of infectious cases reduces the spread of Tuberculosis. Adequate tuberculosis awareness and proper health care-seeking behavoiurs among TB patients enhances TB case detection.

Objectives: To identify beliefs, perceptions, awareness at the onset of illness and the behavioral patterns of TB and TB-HIV co-infected patients.

Methods: Direct interviews using a structured questionnaire were administered to 170 sputum smear positive patients undergoing treatment at a DOTS Clinic in Lagos, Nigeria.

Result: A total of 170 patients within the age range of 18–62 years were interviewed. The respondents had always lived in the urban area of Lagos but had to spend between N300–N1000 on transportation to get to the DOTS Clinic. Of the 170 patients interviewed 97% were literate as follows: 25%, 48% and 22.9% for primary, secondary and post secondary respectively. At the onset of the illness, 80% of the patients did not know it was TB so sought treatment

from patent medicine dealers, churches, traditional healers, health centres and ART Clinics before presenting at the DOTS Clinic. Their beliefs and perceptions ranged from ordinary cough, cold weather, spiritual attack, stress, malaria etc. Eighty five percent of patients had no idea of the cause of TB. After registration at the DOTS Clinic, 50.5% of the patients still have no idea of the cause of TB. Relatives, friends, colleagues at work and mainly health personnel were involved in the final decision for patients going for TB treatment. Eighty percent of the respondents believed that public enlightenment on signs, symptoms of TB via health talks on TV, Radio, newspapers, schools, market places and churches will get people with TB to visit DOTS centes and start treatment as soon as possible.

Conclusion: Results suggest a need for continuous mobilization of the people through mass media both print and electronic in campaign for TB eradication in Nigeria.

PC-95653-07   Evidence that TB defaulter tracing influences behaviour of patients and health care provider

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Aim: Although DOTS coverage in SA is reported as 94%, TB default rate is high at 10%. A National defaulter tracing project was piloted with the objective of reducing TB default rate in the country.
Methods: Tracing teams were allocated to 21 districts with the worst TB default rates and attached to health facilities with the highest TB burden. Home visits were done using dedicated vehicles for tracing.
Results: Tracing teams covered 21 (40%) of the 53 districts, 66 (26%) of the 253 sub districts and 352 (10%) of the 3535 health facilities. Of 45 033 TB defaulters traced, 29 097 (65%) were put back on treatment, 4899 (11%) had relocated, 3219 (7%) had died, 2696 (6%) had given incorrect address, 2372 (5%) were at work, 1416 (3%) refused treatment, while 1194 (3%) had not interrupted treatment. Proportion of the following reduced: Relocated, Wrong address, Died. Although cost is not the focus of this project, Cost per TB defaulter traced = R459.53. Cost per TB defaulter put back on treatment = R682.87 NB: The default rate for 2008 cohort of TB patients will only become available in 2009 3rd Quarter.
Conclusions: TB defaulter tracing has not only filled an existing gap in TB control, but has also resulted in change in behavior of both TB health care worker and patient. Cost information will be useful in guiding

the expansion of TB defaulter tracing to the rest of the country.
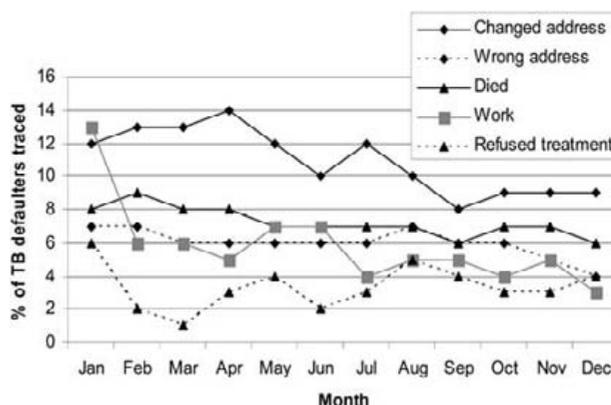
Figure   Outcomes of TB defaulter tracing, 2008.

LUNG HEALTH BURDEN, TREATMENT AND CARE

PC-94053-07   Global voices: a status report on smokefree policies around the world

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Background: This session will discuss the GSP Global Voices 2009 report, including: 1) a map presenting the progress towards Smokefree worldwide; 2) a brief summary of the arguments used to plead the case for Smokefree policies, 3) an outline of tobacco industry tactics in opposition to Smokefree policies; 4) an explanation of civil society efforts to combat the tobacco industry's influence and actions; and 5) an overview highlighting those countries currently taking action.
Objectives: To make the case for Smokefree policies worldwide. By presenting and examining the findings of this global status report on smokefree policies, presenters will address the following questions: What do we mean by smokefree policies? How does the tobacco industry try to undermine smokefree policy implementatioh? How are countries resisting the industry's influence and taking action?
Methods: Oral presentation.
Results: Over thirty countries have adopted comprehensive smokefree policies, including at the national and local level. More than 200 million people are now effectively protected from the dangers of secondhand smoke. The success of existing smoke-free places confirms that the momentum towards comprehensive smokefree laws is now unstoppable, even in the face of strong opposition from the tobacco industry and its allies.
Conclusions: Evidence from the implementation of

comprehensive smokefree laws shows that these policies improve public health, are cost effective, and popular. In addition, new smokefree policy initiatives worldwide demonstrate that governments around the world are continuing to become engaged in supporting smokefree air policies.

PC-94201-07   Lung resection and pulmonectomy for drug-resistant pulmonary tuberculosis

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Lung resections and pulmonectomies were performed in 76 patients (males 48, females 28) with drug-resistant pulmonary tuberculosis in age between 19 and 45. The patients were sick with tuberculosis for over 2 years. The preceding chemotherapy was ineffective. *Mycobacterium tuberculosis* with multiresistance to chemo-preparations (isoniazid + rifampicin + streptomycin + etambutol) were found in all patients' sputum. Prior to operations, chemotherapy was performed with basic (H, R, E, Z, S) and reserve chemo-medications (Pr, Cp, Ofl, Mox) in combination with general treatment and pneumoperitoneum. Partial lung resection was performed in 38 patients (segmental in 4, lobectomy in 32, combined in 2), and pulmonectomy in 38. After operations, bronchial fistula and pleural empyema developed in 12 patients, pleural empyema without fistula in 2 patients, reactivation of tuberculosis in 13 patients, of them in the operated lung in 10. These complications were eliminated by conservative therapeutic treatment and repeated operations in 19 patients out of 27. Good clinical effect after operations was established in 68 patients (89.5%), unsatisfactory in 2 (2.6%). A total of 6 patients (7.9%) died from the progress of pleural empyema and cardiopulmonary insufficiency. **Conclusion:** At fibrous-cavernous pulmonary tuberculosis with multidrug resistance of mycobacteria, the potential and effectiveness of anti-tubercular chemotherapy are significantly restricted. Partial lung resections and pulmonectomies performed against the background of drug-resistant tuberculosis are highly effective methods of treatment, they make healthier and improve the quality of life in 89.5% of operated patients.

PC-94247-07   Exposure to wood smoke is a risk factor for chronic respiratory diseases

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Aim: To identify an association between use of biomass fuels and chronic respiratory diseases.

Methods: These are ten retrospective case-control, hospital-based studies performed at the National Institute of Respiratory Diseases (INER), Mexico. We evaluated the clinical records of 10 groups of consecutive patients (without HIV infection) assisted at INER from 2000 through 2007: [(group 1: 1206 patients with bacterial pneumonia); (group 2: 501 patients with TB confirmed bacteriologically); (group 3: 110 patients with asthma); (group 4: 122 patients with COPD); (group 5: 96 patients with idiopathic pulmonary fibrosis (IPF)); (group 6: 161 patients with spontaneous pneumothorax); (group 7: 68 patients with small-cell lung cancer); (group 8: 51 patients with large cell lung cancer); (group 9: 115 patients with squamous cell carcinoma); and (group 10: 461 patients with lung adenocarcinoma)]. The control group was conformed by 1316 patients with ear nose and throat problems. The protocol was accepted by the institutional committee. Environmental exposures were obtained from a standardized questionnaire applied by the Social Worker Department.
Results: After adjusting by potencial confunders, multivariate analysis shown that the exposure to wood smoke was associated with TB [OR = 2.7 (95%CI 2.1–3.6) $P < 0.0001$]; COPD; [OR = 2.8 (95%CI 1.5–5.4) $P = 0.001$]; large cell lung cancer [OR = 2.2 (95%CI 1.1–4.3) $P = 0.02$] and lung adenocarcinoma [OR = 1.6 (95%CI 1.2–2.3) $P = 0.004$]. In the same models tobacco smoking was asociated to COPD [OR = 2.7 (95%CI 1.4–5.4) $P = 0.004$]; small-cell lung cancer [OR = 3.2 (95%CI 1.6–6.6) $P = 0.001$]; squamous cell carcinoma [OR = 3.2 (95%CI 1.6–6.4) $P = 0.001$] and to spontaneous pneumothorax [OR = 1.7 (95%CI 1.1–2.6) $P = 0.02$].
Conclusion: Exposure of wood smoke is associated with chronic respiratory diseases. The risk of respiratory disease associated to exposure of wood smoke is similar to observed for tobacco smoking.

PC-94476-07   Molecular diagnosis of pneumocystis pneumonia using induced sputum and bronchoalveolar lavage

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Introduction: The prevalence of *Pneumocystis pneumoniae* (PcP), the most common western HIV associated opportunistic infection, is unknown in sub Saharan Africa. This is because diagnosis is difficult with a differential including community acquired pneumonia and TB. Confirmed diagnosis is necessary for better patient management and reduced risk of treatment toxicity and resistance. Bronchoalveolar lavage

(BAL) is the favoured diagnostic sample for microscopic analysis, but the invasive nature of this procedure precludes its use in most of the developing world. Induced sputum (IS) is a more suitable alternative, but microscopic diagnosis requires considerable skill. Here we investigate the use of molecular methods, previously used on BAL for PcP diagnosis, with IS samples.

Methods: 6 BAL and 8 IS samples were obtained from 14 suspected PcP patients in Cape Town and split for microscopic investigation for the causative organisms, *Pneumocystis jirovecii* (formerly *P. carinii*), using indirect fluorescent antibody (IFA) or DNA extraction. *P. jirovecii* genetic targets (heat shock protein 70, HSP70, and mitochondrial large subunit, mtLSU) were assayed by quantitative PCR (qPCR).

Results: 7 patients were positive for HSP70 while 8 where positive for mtLSU by qPCR. Only one BAL was positive by microscopy. Only ~ 1% of the volume of IS was needed to achieve the comparable qPCR results to BAL (Figure). qPCR targeting the mtLSU resulted in a higher copy number than the hsp70. The improved mtLSU analytical sensitivity also resulted in detection in an additional patient sample.
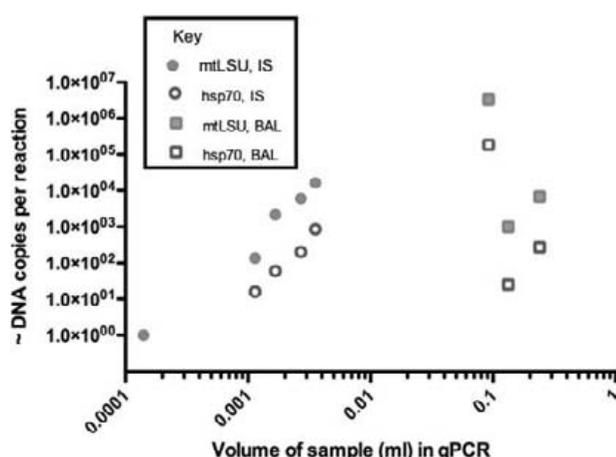
Figure Comparison of detection of two *P. jirovecii* DNA sequences in different volumes of IS and BAL.

Conclusions: Additional work is required to evaluate the diagnostic efficacy using IS but the results were comparable to our previously described BAL study. As molecular methods become more affordable and integrated into developing world laboratories for TB diagnosis, using the easily obtainable IS sample and qPCR could be a viable alternative to conventional methods for the diagnosis of PcP.

PC-94487-07   Factors related to adult-onset asthma: BRFSS and asthma callback survey 2006

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Background: Adult-onset asthma (AOA) often presents as a clinically different phenotype than childhood-onset asthma (COA). It has been suggested that while atopy, family history, and environmental exposures all have a role in the development of childhood asthma, potentially modifiable lifestyle factors and occupational exposure may play a larger role in AOA. Although primary prevention of asthma remains elusive, understanding factors associated with AOA may inform preventive interventions.

Methods: The Behavioral Risk Factor Surveillance System (BRFSS) is an annual state-based telephone survey of the non-institutionalized adult population ($\geq$18) living in the United States. We analyzed adult and childhood asthma onset data from 25 states that completed the Asthma Callback Survey in addition to the core BRFSS in 2006. Descriptive statistics were calculated using SUDAAN for weighted estimates for complex sample design.

Results: Among 6778 adults with current asthma, 57.0% had AOA, and 42.1% had COA. Among persons with AOA there were more females (70.2%) than among those with COA (54.2%). The prevalence of persons who did not graduate high school was higher among those with AOA (10.5%) than with COA (5.7%). Household income <$35 000 was more prevalent among persons with AOA (46.4%) than COA (36.3%). 42.5% of persons with AOA were obese, compared to 31.2% with COA. Persons who had AOA were more likely to have ever smoked cigarettes or have poor/fair general health status, than those with COA ($P < 0.001$).

Conclusions: Female sex, lower socio-economic status (SES), smoking and obesity are factors related to AOA. Smoking and obesity are potentially modifiable factors, and lower SES is associated with known risk factors such as substandard housing and increased asthma-related occupational exposures. Further research should determine the temporality of these factors, their role in the development of AOA, and possible interventions to prevent AOA incidence.

PC-94621-07   The effects of environmental tobacco smoke and biomass fuel exposure on lung health in children

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Background: Indoor air pollution is associated with decreased respiratory health in children. We assessed the effect of environmental tobacco smoke (ETS) and biomass fuel exposure (BMF) on respiratory disease patterns in children.

Design/methods: We conducted a cross sectional study nested in an ongoing tuberculosis household contact study during Nov 2007–Feb 2009 in Cape Town, South Africa. We included children, aged 3 months to 15 years without diagnosed TB or acute illness, from households in poor urban communities. Data was collected on TB exposure, household ETS, BMF and respiratory infections (RTI). Tuberculin skin testing (TST), HIV testing and standard blinded review of chest radiography (CXR) was completed. Reported outcomes were current RTI ⩽ 3 months, CXR abnormalities and a positive TST.

Results: 243 children were eligible and 222 included; 65.3% had ETS exposure; 11.2% had BMF exposure; 27.9% had current RTI; 28.9% had an abnormal CXR; 46.2% had a positive TST and 30.7% were HIV-infected. There was a significant association between ETS exposure and current RTI (33.1% vs. 18.2%; $P = 0.016$) and between ETS and a positive TST (52.8% vs. 34.2%; $P = 0.008$). The effect of ETS on TST remained after controlling for TB exposure ($P = 0.011$). The most common CXR abnormalities were perihilar streakiness (54%). parenchymal fibrosis (16.4%) and alveolar consolidation (8.2%); 3/222 CXRs (1.4%) were classified as TB. There was no association between CXR abnormalities and ETS exposure. Children of mixed-race ethnicity had more ETS exposure than those of black ethnicity (81% vs. 42%; $P \leqslant 0.001$).

Conclusions: There is a high prevalence of ETS in the study population, which is associated with a higher risk of RTI and TST positivity. ETS exposure is more common amongst certain ethnic groups. Public health interventions to reduce smoking may be an important intervention to improve lung health in children in high-burden tuberculosis settings.

PC-94755-07 Randomised comparison of ultrasound-assisted Abrams and Tru-cut needle biopsies for pleural TB

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Background: Histological and/or microbiological confirmation of tuberculous pleuritis remains the gold standard for the diagnosis of pleural tuberculosis (TB). Uncertainty remains regarding the choice of closed pleural biopsy needles.

Objectives: This randomised controlled study compared ultrasound-assisted Abrams needle biopsies to ultrasound-assisted Tru-cut needle biopsies with regards to their diagnostic yield for pleural TB.

Methods: We enrolled 89 patients (age 38.7 ± 16.7 years; 54 males) with pleural effusions and a clinical suspicion of TB. Transthoracic ultrasound was performed on all, where after patients were randomly assigned to undergo either four or more Abrams needle biopsies followed by four or more Tru-cut needle biopsies or visa versa. Medical thoracoscopy was performed on all cases with nondiagnostic closed biopsies. Histological and/or microbiological proof of TB on specimens obtained by means of any biopsy technique was the gold standard for pleural TB.

Results: Pleural TB was diagnosed in 66 patients (age 35.1 ± 15.5 years; 35 males) and excluded in 23 (age 49.1 ± 15.9 years; 19 males). Abrams needle biopsies were diagnostic in 54 patients (sensitivity = 81.8%), whereas Tru-cut needle biopsies were diagnostic in only 43 patients (sensitivity = 65.2%, $P = 0.02$). Both needles had a specificity of 100% and no serious adverse events were reported.

Conclusions: US-assisted Abrams needle biopsy has a significantly higher diagnostic sensitivity for pleural TB and should be the needle of choice for closed pleural biopsies in the setting of probable TB effusions.

PC-95204-07 Health care costs of lung cancer related to smoking in a Brazilian public hospital

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Aim: To estimate the smoking attributable medical expenditures of lung cancer under a hospital perspective.

Methods: A longitudinal retrospective study was performed based on medical files from Brazilian National Cancer Institute. Data from 127 newly diagnosed lung cancer patients (smokers and former smokers) were collected. Selected comorbidities (diabetes, hypertension, AMI, and COPD) and cancer stage were considered as prognostic factors of cost variations. Two groups based on cancer stages were created (group 1–stages I and II; group 2–stages III and IV). The patients were grouped in subpopulations according to the prognostic factors. All resources were valued in 2006 dollar.

Results: 93% of patients were diagnosed in group II. More than 80% of patients were illiteracy and/or had 1–4 years of schooling. The average cost per lung cancer patient was US$ 13 258. The costs of patients with lung cancer, diabetes and hypertension was US$ 23 000 during 8 months of treatment (group 1) and US$ 22 000 during 15 months (group 2). The costs for patients at group 2 who suffered an AMI was US$ 24 000 (17 months) and those who were diagnosed with hypertension and COPD was 17 800 (15 months). If we consider that all newly lung cancer cases related to smoking in Brazil in 2006 could be treated by public health system the health care costs reached US$ 390 million.

Conclusion: It is time to address the issue of evaluating the smoking costs in Brazil, and contributed to

measure the full economic burden of tobacco in public health system.

PC-95478-07   Neopterin in pulmonary tuberculosis and lung cancer patients

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Background: Neopterin is produced and released by human macrophages in response to stimulation with interferon-gamma, and changes in neopterin concentrations indicate cellular immune activation.
Objectives: To assess the usefulness of serum, urine and pleural fluid neopterin levels as an index of disease activity in patients with pulmonary tuberculosis and lung cancer.
Subjects and methods: Serum, urine and pleural fluid neopterin levels were evaluated in 30 patients with pulmonary tuberculosis and 30 patients with lung cancer while serum and urine neopterin levels were evaluated in 20 healthy controls by enzyme linked immunosorbent assay (ELISA) technique.
Results: The neopterin levels (mean ± SD) in the serum and urine of 30 tuberculous patients (54 ± 13.9 n mol/L, 675 ± 230.7 u mol/mol criatinine respectively) were significantly higher when compared with those in lung cancer patients (29 ± 5 n mol/L, 312 ± 74.5 u mol/mol criatinine respectively, $P < 0.001$) and when compared with those in control subjects (6 ± 2 n mol/L, 128 ± 39.8 u mol/mol criatinine respectively). In tuberculosis patients with far-advanced disease pleural fluid, serum and urine neopterin levels were significantly higher when compared with those in patients with moderately and minimally advanced disease ($P < 0.001$). In lung cancer group serum and urine neopterin levels were significantly higher ($P < 0.001$) in adenocarcinoma, squamous cell carcinoma, and small cell carcinoma than that in the control group. But there was no significant difference between the serum, urine and pleural fluid neopterin from one cell type to another.
Conclusion: Serum, urine and pleural fluid neopterin levels may reflect the degree of activity in pulmonary tuberculosis before exact diagnosis of the disease by culture results. In addition serum, urine and pleural fluid neopterin levels are elevated in patients with lung cancer whatever the cell type.

PC-95628-07   Why we must care about the effects of diabetes and smoking on TB and what else we most need to learn

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Background: In several developing countries, TB has been found to kill more smokers than all types of cancer combined. In a meta-analysis, we estimated that ever-smokers are 1.7 (95%CI 1.3–2.0), 2.7 (2.0–3.9), and 2.4 (1.3–4.2) times more likely to be infected with *M. tuberculosis*, to develop TB, and to die from TB, respectively, than never-smokers. In previous work, we developed simulation models to translate such individual-level effects to population-level outcomes in a typical developing country setting, taking into account both the direct and indirect effects of smoking. When 29% of adults smoke, an estimated 60% of all incident TB disease and 57% of TB deaths are attributable to smoking. Similarly, a growing body of evidence suggests diabetes is another important and prevalent TB risk factor. This presentation seeks to summarize key lessons learned about the population-level impact of smoking on TB and to discuss our application of similar methods to explore the impact of diabetes.
Methods: We integrated models representing transmission and progression of TB and the development of diabetes and renal disease to investigate effects on TB burden within Saskatchewan's Aboriginal population, where TB, tobacco and diabetes epidemics are colliding.
Results: Preliminary results suggest rising rates of diabetes could significantly raise TB incidence, but highlight need for improved understanding of the impact of diabetes on the likelihood of TB reactivation and transmission, and the degree to which the elevated risk of TB amongst diabetics is driven specifically by end-stage renal disease.
Conclusions: While smoking and diabetes both impose modest elevations of individual risk for TB, the high prevalence and rapid growth of these conditions in many regions could impose a heavy TB burden. While we believe these effects are likely to have important implications for policy, additional study on key uncertainties is required before policy priorities can be identified.

EDUCATION, TRAINING AND TUBERCULOSIS

PC-94127-07   Reaching a global audience: evaluating and improving the TB education and training resources website

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Background: Launched in 2003, the *TB Education and Training Resources Website* (www.findtbresources. org) provides a central, comprehensive searchable

database of US and international tuberculosis (TB) related education and training materials for health professionals, persons with or at risk for TB, and communities or the general public. Evaluation is essential to ensure the site is accessible and determine how frequently it is being used. Additionally, an assessment of the site's usability and effectiveness will be conducted to identify potential improvements and enhancements to better meet the changing needs of users.

Methods: The evaluation involved monitoring web usage statistics from the last five years and gathering qualitative feedback on the site. To further supplement this evaluation data, structured usability testing will be conducted in April 2009. Objectives of the usability test are to assess the ease and efficiency of navigating the site, as well as users' expectations and satisfaction with site content and function. Usability participants will be recruited from international and U.S. partner organizations.

Results: The website database contains over 2100 TB education and training materials. Since 2003, the site has received approximately 589 234 visits from users in over 100 different countries. Qualitative user feedback received via e-mail has been primarily positive. Results of the usability test, available in Spring 2009, will inform site enhancements and redesign.

Conclusion: Evaluation data show that the website is being accessed by both US and international target audiences. The database of materials continues to grow. Findings and recommendations from the usability test will further improve the website and identify modifications to enhance global users' ability to easily and successfully search the databases to locate needed TB education and training materials.

PC-94175-07   Evaluation of human resources for TB control in Henan and needs analysis

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Objectives: To evaluate the quantity and quality of human resource for TB control in Henan, to evaluate the rationality and analyze the needs.

Methods: The data of Mid-term Evaluation on TB Control Program in China 2001–2010, Annual Evaluation on TB Control in Henan in 2006 and routine data for monitoring and evaluating were collected and analysed.

Results: By 2006, there was 1801 full-time and 554 part-time staff in TB institutes in Henan. From 2001 to 2006, the annual average increasing rate of full-time staff was 4.69%. It is forecasted that by 2010, the full-time stuff will reach 2154, but the need number only for clinic doctor is 2170. By 2006, 70.90% of the full-time staff owned degrees of junior college and technical school. The full-time staff owing the

primary titles accounted for 49.86%. The TB control staff per thousand people was 0.018.

Conclusions: The quantity of human resource for TB control in Henan can not meet the need and the quality is needed to improve. The Bidirectional Referral and PPM DOTS policies should be insisted. We should also make human resource plan and strengthen the education and training.

PC-94264-07   Participatory quality improvement on local health system for TB control

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Aim: Empowerment of health workers (managers and operative personnel), using different quality tolls for data analysis and decision making to improve the control of TB on local health system.

Methods: Using Evidence-based Participatory Quality Improvement (EPQI) methodology on 14 local health systems to improve the control of TB in Mexico. The National TB Program, select the local heath system, using the criteria of number of TB cases per year. A workshop is conducing by the advisor, with 35 or 45 health workers involved on the process (physicians, nurses, chemistry, social workers, managers and responsible of TB program) on the local health system. The planning design for each local team includes: 2 days of workshop during three times, to analyze: actual situation and identification of critical activities; quick survey focusing on process; cause analysis and strategies selection; goals and action plan development. After the workshop the local team spend 3 or 6 weeks to prepare the implementation, and the follow up includes electronic and presence assistance.

Results: After six months and one year of follow up we have results on: detection of bad cough on waiting room; improvement of contact investigation (from 16% at the beginning to 73% of improvement); educational program for patients and contacts at home; quality improvement of patient follow-up.

PC-94309-07   The development of competence-based global MDR-TB training modules

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Background and challenges to implementation: The Global Plan to Stop TB 2006–2015 urges a dramatic scale-up of multidrug-resistant tuberculosis (MDR-TB) diagnosis and treatment. A 2007 addendum calls for the treatment of 1.6 million MDR-TB patients by 2015. Currently, less than 20 000 MDR-TB patients per year (>5% of the estimated incident MDR-TB cases) are being treated within national TB programmes (NTP). To effectively manage and treat

1.6 million MDR-TB patients by 2015, a staggering amount of skilled staff will be needed.

Response: The World Health Organization (WHO) developed a set of generic competence based training modules for the management of MDR-TB at the health facility level. These generic modules can be adapted to local settings in country. Task analysis was used to define the training objectives for health staff at health facilities and TB experts provided review and guidance. The set of 9 modules includes a facilitator guide and an adaption guide. These modules are based on the WHO Guidelines for the programmatic management of drug-resistant tuberculosis and have been distributed to NTPs for use.

Results and lessons learnt: As countries embark upon the scale up of MDR-TB services, human resource development will play a critical role in project success. A trained, motivated and supported workforce is necessary for MDR-TB treatment scale-up and these global generic training modules will provide NTPs with an important resource to implement successful programs.

Conclusions and key recommendations: The development of competence based training material for MDR-TB case management fills a critical need to successfully scale-up MDR-TB diagnosis and treatment. These generic training modules provide a complementary resource to the WHO Guidelines and will greatly assist in program implementation.

PC-94479-07   The effect of four day TB-HIV training on the knowledge of general health workers on TB and TB-HIV

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Objective: To assess the improvement in the knowledge of the general health workers on TB and HIV/AIDS following general health care workers training on DOTS and TB-HIV collaborative activities.

Design: Systematic randomised sampling.

Setting: In all the 14 states in Nigeria ear marked for TB-HIV collaborative services implementation, 4 Local Government Areas were selected in each state, and 4 health facilities per LGA. All the staff trained were selected from DOTS centers in the LGAs where collaborative TB-HIV activities are to be implemented.

Subjects: A total of 264 general health workers were trained, of whom 46 were medical officers, 46 local government TB supervisors, and 172 were nurses and community health extension workers.

Intervention: The assessment exercise was structured to assess the knowledge of our DOTS workers on TB, TB-HIV collaboration and HIV counselling.

Results: From the results no state had an average score of up to 25% in the pre-test but in the post-test

all the states had an average score above 50%. From the paired sample analysis, $P = 0.00000$ which showed that there was a significant difference between the pre-test and post-test scores.

Conclusion: It is of importance that General Health Worker are trained at least yearly to improve on there knowledge on DOTS and TB-HIV collaborative services to ensure improved services to TB, and TB-HIV patients. Over the years, general health care workers training has been an important part in the human resources development package at the national TB programme which had ensured effective service delivery at the over 2000 DOTS in the TB programme.

S/N	State	Av. score pre-test (%)	Av. score post-test (%)	Percentage improvement (%)
1	Abia	19.4	73.5	278.9
2	Adamawa	9.5	60.6	537.9
3	Anambra	17.6	54.0	206.8
4	Bauchi	17.0	59.0	247.1
5	Borno	16.8	74.9	345.8
6	Enugu	15.1	64.0	323.8
7	1mo	23.1	77.6	235.9
8	Kwara	21.4	78.0	264.5
9	Nassarawa	17.8	59.7	235.4
10	Osun	20.0	70.9	254.5
11	Oyo	15.5	63.8	311.6
12	Sokoto	13.1	62.0	373.3
13	Taraba	11.1	52.9	376.6
14	Yobe	14.2	59.8	321.1
	Total	231.6	910.7	293.2
	Average mean	16.5	65.5	

PC-94509-07   Can interactive health education at the initiation of TB treatment reduce default?

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Setting: After the involvement of several tertiary care hospitals in Lahore, Punjab Province, Pakistan, in 2007 CDR NSS +ve patients was 101% while Default Rate was 9%. High default rate could be source of infection and drug-resistant strain.

Objectives: To evaluate the effectiveness of health education for improving patients knowledge and awareness regarding TB on reducing the default from TB treatment and to determine the characteristics of defaulters of TB treatment by in depth interviews

Methods: A randomized controlled study was designed in the Gulab Devi Chest Hospital Lahore (a private sector tertiary care hospital), Pakistan. Study was done to assess the efficacy of high-quality health education by using a standardized booklet and structured questionnaire, developed by JICA TB Control Project for health education and awareness of the se-

lected patients. This health education material was used at the initiation of treatment. All the sputum positive pulmonary TB cases registered in outdoor (TB03) were randomized into two groups, one as an intervention group (interactive health education) and other as control group (conventional health education). The effects will be measured by comparing the outcome of interventional group with that of control group when the final outcome of patients is declared (TB 03).

Results: At the end of two months (initial intensive phase) there was no significant difference between intervention and control group regarding default rate. (20.6% vs 22.9%, OR: 0.90, 95%CI: 0.60–1.34, $P = 0.624$). Regarding the characteristics of defaulters, there were no significant relationships between sociodemographic factors and default rate as well as accessibility and attitude toward TB.

Conclusion: There might be the other related factors regarding treatment outcome. The final outcome will be investigated further and accessible defaulters will be contacted at the end of the treatment for in-depth interviews to see the reasons for default.

PC-94691-07   Involving school students in tuberculosis control in a hilltribe community, Chiang Rai, Thailand

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Background: About 13% of Chiang Rai provincial population are hilltribe minorities. Tuberculosis (TB) data show high TB incidence, high treatment default and longer patient delay among hilltribe patients. Nong-Kaew is a hilltribe village with exceptional high TB incidence, i.e. 12.8 per 1,000. Poverty and language barriers fuel TB control failure in most hilltribe villages. It is unknown whether hilltribe children who attend the school and study Thai language can contribute to TB control for hilltribe community.

Intervention: We developed and organized an interactive problem-based TB education for 80 junior-high-school hilltribe students. By the end of the training, 16 selected students received several sets of questionnaire and sputum collection boxes. These students performed interview with hilltribe people and collected sputum from the interviewees who coughed for more than 2 weeks.

Results: The hilltribe students actively participated in TB education session. Their TB knowledge significantly increased (posttest > pretest, $P = 0.0001$). They interviewed 186 hilltribe people and found 16.7% people coughed more than 2 weeks and detected one person

with smear positive sputum and started TB treatment. About 75% of villagers believed TB is transmitted by sharing eating utensil with TB patients and 37% still believed that TB is a family disease. Based on the survey result, the students will design TB education to improve TB knowledge for hilltribe people living in their community.

Conclusion: The hilltribe students contributed to TB case finding in the community. Product and process of TB education of this project may be applied to other hilltribe communities with active participation of school students.

PC-94847-07   Job aids to facilitate TB-HIV management in Tanzania: evaluation after field testing

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Background: During assessments carried out at ICAP and PharmAccess-supported HFs, respectively in 3 regions and within the Army, Police and Prison medical services of Tanzania, high demand for on-site tools was reported, to facilitate TB diagnosis and treatment, to enhance TB suspects' self-referral and to educate patients on cough hygiene. TB-HIV job aids (posters on cough hygiene, TB intensified case finding [ICF], TB-HIV co-management, TB diagnosis among children and TB infection control, and pocket manuals on TB-HIV and TB infection control) were developed by ICAP and PharmAccess in collaboration with the National TB and Leprosy Programme (NTLP) and the National AIDS Control Programme (NACP) of MOH Tanzania.

Methods: From October 2008 to January 2009, job aids were field tested in 2 district and 1 army hospital. Sites were selected by geographic location, high HIV prevalence and heavy TB-HIV workload. In October 2008, HCWs received one day orientation on-site. Focus Group discussions and individual interviews were used to gather opinions on the materials from the target audience (HCWs and clients/patients) along with on-site observation where the posters were displayed and on-site observation of patients' behavior/interest on the displayed posters. Understanding, attractiveness, inclusiveness and action of the aids were evaluated.

Results: On January 2009, an evaluation team composed of MOH, the national Association of Former TB patients and USG partners visited the sites for the evaluation. Overall the job aids were being displayed incorrectly. Posters for patients were not self-

explanatory and there was not a health educator in the waiting areas at all times to explain posters to patients. Patient posters contained multiple messages and were not always clear.

Conclusions: TB-HIV job aides should be formally revised and disseminated along with an explanatory guide and on site orientation of HCWs on usage.

PC-95005-07   Improvement of healthcare workers on DOTS training of TCP, Sao Paulo State, Brazil, 2007–2008

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Introduction: The Project 'Strengthening of DOTS Strategy in high burden areas of tuberculosis in Brazil' supported by Global Fund aim supporting and qualifying TB control initiatives in the country.

Objective: To sensitize and to train healthcare workers (HCWs) on DOTS Strategy to strengthen actions on TB control in the State of Sao Paulo, Brazil.

Method: The study design is descriptive where HCWs from high burden municipalities for TB control from three metropolitan areas were trained according to a training program of 28 hours. Trainings were evaluated by pre and post-tests about subject concerned. The metropolitan areas studied were (I) Sao Paulo; (II) Mata da Costa Atlantica–'Shore of Atlantic Forest' (Sao Paulo State); and (III) municipality of Sao Gonçalo (Rio de Janeiro State). Concerning training program it includes the theme of DOTS Strategy such as TB diagnosis, Active Case Finding, TB Treatment, Vulnerability, TB-HIV, Chemotherapy, and TB Information System (registration forms and cohort of closing cases).

Results: From November 2007 to December 2008 were trained 2137 healthcare workers of 18 municipalities with an improvement rate of 23.03% (Figure).

Figure 1: Improvement of _DOTS Strategy_ Training

Number	Healthcare Workers	City of Training	High burden municipalities attended	Medium by training	Medium by Region	General Medium
I	100	Osasco	Barueri, Carapicuiba, Itapevi, Osasco, and Taboao da Serra	12.45	21.63	23.03
II	151			13.15		
VII	158			40.50		
IX	173	Embu		20.40		
IV	207	Mogi das Cruzes	Itaquaquecetuba and Mogi das Cruzes	25.80	26.23	
XI	131			26.65		
VI	156	Guarulhos	Guarulhos	27.60	27.60	
V	225	Santo Andre	Diadema, Maua, Sao Bernardo do Campo, and Santo Andre	26.70	23.50	
XII	217			20.30		
III	184	Santos	Cubatao, Guaruja, Santos, and Sao Vicente.	14.05	19.70	
X	110			25.35		
VIII	325	Niteroi	Sao Gonçalo (Rio de Janeiro State)	19.50	19.50	

2,137   TOTAL OF HEALTH CARE WORKERS TRAINED

Conclusions: The training of human resources in surveillance activities comprehend evaluation and disease control to sensitize HCWs to intensify the active case finding; amplifying capacity for diagnosis by acid fast bacilli; promoting cure of patients and follow-up of their contacts is essential on DOTS strategy in the strengthening of actions on TB control.

PC-95029-07   Current status and needs survey in TB control training in some areas of Yunnan Province, China

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Aim: To investigate the current training status and training needs in tuberculosis prevention and control system in provincial, municipal, and county levels of Chinese mainland, and to provide a basis for improving the training.

Methods: To carry out investigation with qualitative and quantitative methods in Yunnan provincial CDC, three prefecture CDC and seven county level CDC in Yunnan Province in March 2008. A total of 75 staff of different levels and positions including director (deputy director) of CDC was investigated and interviewed. Collected 71 questionnaires.

Results: (1) 88.73% of respondents was trained in near 2-year; (2) Some of the CDC have training needs analysis before training; (3) There is no uniform training materials at all levels. 76.19% of respondents consider the operability of current training materials should be increased; (4) Respondents think to improve the current TB training effects, the following aspects in training should mainly be concerned about: the increase in training time (50.7%), increase the number of training frequency (22.5%), increased use of discussion and practical training methods (21.1%), etc.

Discussions: The TB system has a higher coverage of training in Chinese mainland in recent years than in before. To improve the quality and capacity of TB human resources in China in the future, the following methods should be considered: (1) the training should be more targeted; (2) unified training materials should be developed and promoted; (3) more interactive training methods should be used to solve practical problems at the basic levels, for example: group discussion, field investigation, etc.

PC-95143-07   Creating and distributing accessible evidence-based HIV-TB prevention and treatment information

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Background: Treatment literacy (TL) is knowledge about the prevention, management and care of

HIV/AIDS, including familiarity with opportunistic infections and the biomedical mechanisms of HIV and ARVs. The Treatment Action Campaign (TAC) has long focused on improving TL in communities by directly working in clinics and also by producing evidence-based HIV and TB information. Equal Treatment (ET) is an evidence-based community periodical that covers HIV and related health issues. It is used primarily in TAC TL programmes and distributed by members in clinical and community settings. In late 2008, TAC printed and distributed an ET on issues related specifically to HIV and TB co-infection (Figure). This included the basic science of TB, treatment guidelines for HIV-TB co-infection, best practices for community infection control, and articles related to policy transformations required to halt the spread of TB and encourage widespread access to comprehensive treatment for HIV and TB in Southern Africa. 70 000 copies of the magazine were distributed in 4 languages.

Method: Data has been compiled from Equal Treatment distribution reports, focus groups and questionnaires.
Results: Our findings show that improving the accessibility of the magazine through language and design improved overall understanding of the information within the magazine. In addition, translations strengthened the perception of the magazine as a culturally relevant and factual source of information. Initial findings suggest improvements in facilitated distribution significantly improved understanding of the magazine's content. Systematic planning of the magazine's distribution resulted in widespread and more reliable distribution.
Conclusion: Translated, accessible and trusted information is essential in preventing new infections and scaling up HIV and TB treatment. To improve treatment literacy, print media must be made acces-

sible through design and translation and distributed systematically.

PC-95455-07   Development of competency-based training modules for MDR-TB, Philippines

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Background and objective: As the Philippines begins to scale up the programmatic management of drug-resistant TB (PMDT), a focus on human resource development is essential. With WHO technical assistance and joint funding from Lilly, the first competency-based MDR-TB training modules in English were developed.
Methods: The content of the modules was based on the Philippine PMDT experience and the PMDT WHO Guidelines. The target population for the modules were DOTS facility doctors and nurses. Task analysis was used to develop the material and extensive formative evaluation and field testing were used to ensure a targeted and comprehensive product. The development of the modules took place over 18 months starting in August 2006.
Results: Eight modules were completed on MDR-TB Introduction, Detection, Treatment, Informing patients, Ensuring continuation of treatment, Managing drugs and supplies, Monitoring, and Field Exercise together with a Facilitator's Guide and a Reference Booklet of PMDT forms. Final editing was conducted in collaboration with the National TB Control Program and partners in January 2008.

Competency-based MDR-TB Training Modules, Philippines (Development: 2006-2008)

Conclusions: The development of this comprehensive, standardized training material has allowed the PMDT program to clarify, simplify and systematize the complex procedures for trainees with no MDR-TB background to easily understand. The modules

have facilitated the mainstreaming of human resource development in PMDT into the NTP while the scale up of services expands from Metro Manila to the rest of the country.

PC-95483-07   Educación para mejorar la adherencia terapéutica a pacientes con tuberculosis en Tonala, Jalisco

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Introducción : La adherencia terapéutica es un factor crucial para curación de la tuberculosis. La información y sensibilización de los pacientes en las causas de la enfermedad, es además, un derecho de los pacientes para evitar las consecuencias del abandono y beneficiarse con la curación.

Intervención : Utilizando como estrategia de educación en el entendimiento de la enfermedad, los beneficios del apego al tratamiento y los riesgos del abandono, se seleccionaron casos nuevos de tuberculosis pulmonar de ≥15 años de edad en la Región Sanitaria N° XI Centro Tonalá del estado de Jalisco diagnosticados del 1 de Agosto del 2008 al 31 de Diciembre de 2008, y se les dio seguimiento durante su tratamiento.

Resultado : Se captaron 9 casos nuevos; después de la capacitación, se les aplico una valoración para demostrar el total entendimiento de la enfermedad y se re-ajustaron los conocimientos adquiridos ; se les incorporo al sistema tradicional de tratamiento, y una vez concluido el tratamiento según la Norma Nacional, se encontró que los 9 casos concluyeron su tratamiento satisfactoriamente logrando por consiguiente su salud.

Conclusión : El conocimiento de la enfermedad, el beneficio del apego al tratamiento y de los riesgos por abandono, ocasionan adherencia terapéutica y por consiguiente curación, cortando con esto las complicaciones de la enfermedad y la cadena de transmisión. Además, los pacientes y su entorno se empoderan para combatir la enfermedad.

Ejemplos de preguntas

1 Como se adquiere la tuberculosis
2 Que parte del cuerpo se afecta
3 Cual es el síntoma principal
4 Que sucede si no se trata bien
5 Se cura
6 En la primera parte del tratamiento que días de la semana se toma
7 En la segunda parte del tratamiento que días de la semana se toma
8 Cuantas tomas en total corresponden a la primera parte
9 Cuantas dosis en total corresponden a la segunda parte
10 Que puede suceder si no se termina el tratamiento

PC-95561-07   Usefulness of Global Fund Project in laboratory network of tuberculosis of Bolivia

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Introduction: The Laboratory Network has been established in Bolivia in 1986, has 486 laboratories performing direct smear and 11 laboratories performing culture. The direction is by level, one national level and department level, all of them have standard procedures and activities.

Objective: To determine the benefits of financing the Global Fund project in the TB laboratory network in Bolivia.

Method: An analysis of the results obtained before and after implementation of the project on: Quality control of smear quality, timeliness of information. Supervision and training.

Results: The Laboratory Network Bolivia with Global Fund resources have been conducting surveillance at 100% of the laboratories in the country, has trained technicians on a quarterly basis of 486 laboratories, has been implemented in the culture in five rural provinces with high incidence of tuberculosis was carried out, at 100% quality of the laboratories and 75% of the slides has been reduced false positive and false negative of 2% to 0.31%, which is has been achieved by the incorporation of human resources to each department laboratory that have cooperated with the work of each laboratory.

POLICY AND PROGRAMME IMPLEMENTATION

PC-94317-07   Laboratory strengthening for better management of multidrug-resistant tuberculosis

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Objective: Taiwan CDC inaugurated a DOTS-plus program for the management of multidrug-resistant tuberculosis (MDR-TB) patients in May 2007. To establish an accurate and timely diagnostic and surveillance program, MDR *Mycobacterium tuberculosis* isolates were sent to the reference laboratory of mycobacteriology for confirmation.

Methods: An algorithm for MDR *M. tuberculosis* verification and external quality assessment, including identification and drug susceptibility testing (DST), was established. From January to October 2008, a total of 339 isolates obtained from individual patients before enrolling in the DOTS-plus program were rechecked with polymerase chain reaction, GenoType®MTBDRplus test, and gene sequencing. Isolates

with discordant results were rechecked with a liquid system (BACTEC™ MGIT™ 960 SIRE) and/or an agar proportion method.

Results: Ten (2.9%, 10/339) isolates, eight non-tuberculous mycobacteria and two other pathogens-infected cases, were excluded by species rechecking. There were 38 (11.2%) MDR-TB cases misclassified by molecular methods initially and verified later by conventional DST. Of the 329 MDR-TB cases rechecked, 291 (88.4%) were MDR and 38 (11.6%) non-MDR. Discordant cases were re-evaluated by an expert panel to decide on further treatment and management.

Conclusion: A strengthened laboratory program for MDR *M. tuberculosis* diagnosis, which includes molecular technique application and quality assessment, could ensure the best care and management of MDR-TB.

PC-94340-07 Analysis of referral and tracing of tuberculosis suspects reported in Shanxi network system

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Objective: To analyze the referral of tuberculosis suspects in general hospital and tracing in TB prevention and control departments of the last two years.

Methods: According to the Chinese disease prevention control information system and the Tuberculosis management information system in the last two years, the related data of pulmonary tuberculosis suspects was analyzed and evaluated.

Results: In the 119 counties of whole province, there are 22 408 TB suspects were actually reported from general hospital, among them, 8139 (36.3%) were transferred to local TB prevention and control departments and 8248 (69.1%) were traced to there by TB prevention and control departments. A total of 16 387 TB suspects arrived at and were checked by local TB prevention and control departments, among them, 4448 (27.1%) were diagnosed as smear positive TB. If strengthen the transfer and trace of the two departments, there are 1632 smear positive patients could be detected, the patient detection rates could be raised 5.5%.

Conclusions: It is the effective way to increase case detection level by strengthening referral of general hospital and the tracing of TB prevention and control departments.

PC-94402-07 Capacity of external quality assurance laboratory technicians to detect tuberculosis bacilli

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Background: According to national guideline, technicians of the external quality assurance laboratories do a random microscope recheck of slides from peripheral laboratories routinely till date. No study was done to explore the capacity of EQA technicians in detecting tuberculosis bacilli under the microscope.

Objective: The study aimed to explore the capacity of technicians in detecting tuberculosis bacilli by microscopy in BRAC TB programme areas in Bangladesh.

Methods: Capacity of technicians in detecting acid fast bacilli was explored in two ways: Comparison of duplicate smear readings (EQA vs research laboratory) and reading capability test by using 1+, 2+ and negative AFB slides. About 317 slides (81 positive and 136 negative for AFB) were collected from 20 EQA laboratories in BRAC programme areas and sent to a research laboratory for cross-checking.

Results: The concordance rates for positive and negative tuberculosis bacilli were 98% and 95% respectively after checking the slides at research laboratory. Only 5% of positive slides (1+ AFB) were identified as negative and 5% of negative slides were identified as scanty through reading capability test. Majority of technicians were involved in EQA laboratories for more than three years (65%). About 80% of them had certificate obtained from government institutions on laboratory and had also 10-day long training on TB (95%). Mean years of education was 13 years.

Conclusion: Capacity of technicians in detecting acid fast bacilli under microscope was impressive. Long years of working experience, intensive training, and higher education could have made the technicians capable in detecting AFB under microscope.

PC-94473-07 Establishing laboratory proficiency to conduct the line probe assay for MDR-TB diagnosis

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Background: Global response to MDR-TB requires a dramatic increase in diagnostic capacity. Line probe assay (LPA) based on nucleic-acid amplification offers great promise to countries to scale up rapid MDR-TB diagnosis. A key constraint in uptake of this new technology is lack of standard methodology for LPA proficiency testing (PT) or quality assurance. To enable LPA scale-up, we developed PT procedures for our LPA demonstration project sites in India.

Methods: After initial LPA training, each site collected remnant sputum specimens from 50 smear-

positive patients for anonymous LPA testing. Results were assessed for negative control validity, successful amplification, internal reproducibility within same laboratory, and external reproducibility by blind retesting of 20 randomly selected DNA extracts at a more experience laboratory. Any site failing PT benchmarks reviewed for their practices and made to participate in another PT round till required benchmarks were achieved.

Results: 4 labs underwent LPA PT and 1 lab passed PT in the first round, while 3 required additional rounds to meet benchmarks. Immediate recognition of serious errors (such as failed negative control, suggesting contamination) led to early termination of rounds. PT revealed several unexpected procedural weaknesses, including errors in DNA extraction practices, reagent contamination, variability in hybridization time between sites, and inter-observer variability in test strip interpretation. After corrective action remaining 3 laboratories subsequently passed and began validation of LPA results against isolates with known susceptibility patterns.

Table Proficiency results for line probe assay

	Negative control	Invalid results (number invalid/total number, %)	Internal concordance (same patient, same laboratory)*	External concordance (same specimen, different laboratory)*
Lab performance benchmark	Clean	<10%	≥95%	≥95%
Proficiency testing round				
Lab A				
1st	Failed	14/48 (29%)	—	—
2nd	Clean	15/22 (70%)	—	—
3rd	Clean	5/118 (4%)	54/54 (100%)	19/19 (100%)
Lab B				
1st	Clean	15/100 (15%)	36/37 (97%)	17/17 (100%)
2nd	Clean	2/30 (6%)	14/14 (100%)	—
Lab C				
1st	Clean	7/102 (7%)	44/44 (100%)	18/20 (90%)
Lab D				
1st	Failed	24/96 (25%)	48/48 (100%)	19/20 (95%)

* For analysis purposes the invalid LPA results were subtracted from the denominator.

Conclusions: LPA PT proven to be a useful methodology to detect serious procedural weaknesses in laboratories that were newly implementing the LPA. We propose that this PT methodology, along with validation against a panel of culture isolates with known DST results, become the prerequisite of introduction of LPA in routine diagnostics.

PC-94541-07 Corruption and access to Global Fund resources

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Objective: This study investigates whether the Transparency International (TI) measure of corruption will be significantly correlated with the number of successful TB grant applications to the Global Fund to fight AIDS, Tuberculosis and Malaria taking into account country characteristics.

Method: Data were obtained from various sources for the years 2002 to 2007 for the 22 high TB burden countries. These included TI corruption scores which measures the frequency and size of bribes, TB prevalence from the World Health Organisation, number of successful grants from the Global Fund website, Gross National Income (GNI) per capita from the World Bank and population estimates from the United Nations. Univariate and multivariable multiple linear regression models were fitted with number of grants as the dependent variable to investigate the effects of the TI corruption score and covariates.

Results: The average number of grants was 2.5 (range 1–5). Countries that are more likely to be corrupt had a greater significantly fewer successful applications (Figure, $P = 0.036$). No significant association ($P > 0.05$) was observed with GNI per capita, TB prevalence or population. There was no association ($P > 0.05$) with total number of applications suggesting that these countries are interested in accessing the funds but not writing good applications.
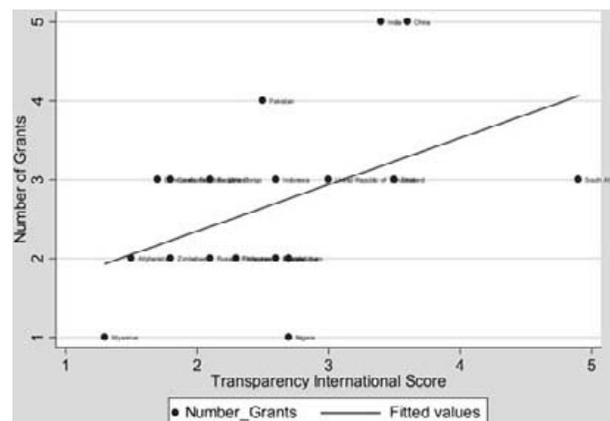
Figure Correlation between the number of successful grants and Transparency International corruption score in 22 high-burden countries.

Conclusion: High TB burden countries with high levels of corruption appear to be less successful at obtaining funding. The recent reduction in commitment from donor countries to the Global Fund will make funding more competitive. International agencies should assist countries with high corruption scores in preparing grant applications and managing funded projects.

PC-94589-07 Stopping a neglected disease: pneumonia treatment through a social franchise network in Myanmar

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Background: In Myanmar, Pneumonia is the second largest killer of under 5 children yet little attention is given to this disease. Fake, inappropriate or costly drugs coupled with a lack of skills and knowledge among providers hamper treatment success, particularly through the private sector where most of the poor receive health care. Even medically correct treatment schemes use unpalatable adult medicines which may reduce treatment adherence. PSI Myanmar used a 'Social Franchising' (SF) strategy to address these issues.

Intervention: Starting in 2007 PSI provided comprehensive training on ARI diagnosis and treatment to PSI's SF 'Sun Quality Health' physicians and 'Sun Primary Health' village-based community workers. A complete-course of flavored, dispersible tablets, packaged and branded as 'Trimox' 1 and 2, (cotrimoxazol for non-severe, '1' for infants, '2' for under-5s) 3 and 4 (amoxicillin for severe) is provided. Packaging was carefully designed to increase usability and compliance. Prices were subsidized to offer an affordable consultation and treatment cost of US$ 0.16 to 0.66. Follow-up and monitoring of franchisees is provided by PSI staff doctors.

Results: Currently 654 SQH and 238 SPH providers provide this service in 107 townships. More than 99 000 treatments have been provided with an average case load of 16/month/provider. Of these 27% are Non-Pneumonia, 56% Pneumonia, 16% Severe and <%1 Very severe. Reports indicate reduced morbidity and mortality due to better compliance and quality and reduced cost of treatment.

Conclusions: Initial evidence suggests large-scale provision of correct ARI treatment to the poor is possible through SF. Palatable, well priced and packaged therapy may increase effectiveness of treatment. Careful drug channel management and quality monitoring of physicians may also contribute to this. Further study of issues of equity, adherence and outcomes are needed.

PC-94605-07 Evaluation of a focused strengthening intervention on key TB indicators in high TB burden districts

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Background: The MRC conducted a focused strengthening intervention as part of a broader management of the Provincial TB Crisis Plan in 4 high burden districts in KwaZulu-Natal (KZN), South Africa. KZN is the province with the highest TB burden in South Africa. During January–July 2008, an MRC team of 3 project managers and 8 field staff visited 79 highburden TB facilities on a regular basis. During these visits, the MRC team identified weaknesses at each facility and conducted appropriate strengthening activities. Strengthening activities included recording of detailed contact information for follow-up/tracing, better quality sputa samples collection, shorter turn-around-times (TAT), follow up of results, tracing patients and proper use of treatment calendars.

Aim: To evaluate the impact of the focused strengthening activities on key TB programme indicators.

Method: Data for new TB patients that started treatment during January–March 2008 (Q1/2008) were obtained from TB registers at facilities. The data for the baseline period (January–March 2006: Q2/2006) was obtained from each district Electronic TB register. The sputum conversion rate at 2 months, cure rate and defaulter rate for Q1/2008 was compared to the baseline for each district.

Results: There was an increase between 18–45% from baseline in the sputum conversion rate in Q1/2008 in all 4 districts ($P < 0.001$). The cure rate in Q1/2008 showed increases between 2% and 23% from baseline amongst all districts, though the difference was only significant ($P < 0.001$) in 2 districts. Only one district met the programme target of reducing defaulter rates by 5% for Q1/2008 compared to baseline.

Conclusion: The improvement in the indicators from baseline clearly suggests that a dedicated team to visit facilities frequently to do quality checks and conduct the relevant strengthening activities would no doubt contribute to strengthening the TB programme.

PC-94806-07 External quality assurance for ensuring quality: diagnostic services in TB

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Introduction: BRAC, one of the largest NGO, implementing TB control program covering 88.5 million populations in Bangladesh. In collaboration with national TB control program, BRAC has expanded the laboratory network and ongoing quality assurance system to 42 districts. For laboratory performance and quality control, the organization is following the National guideline of EQA.

Objectives: To ensure quality of AFB microscopy at peripheral level through providing EQA services at EQA laboratories.

Methods: A total of 21 EQA laboratories have been established to check the quality of 593 peripheral laboratories at BRAC supported area. To increase accessibility to TB diagnostics, outreach cough collec-

tion centers are arranged below sub-district level. Training of laboratory workers on AFB microscopy has been conducted. An Internal Quality Control team is working to maintain the quality of these laboratory services and quality of DOT. Regular feedback is provided subsequently that help to develop technical competency of laboratory staff.

Result: Up to September 2008, 1.87 million slides were examined for diagnosis and follow up at BRAC supported EQA laboratories, 0.61% of which were found to be discordant slides by first controller up to September 2008, which was previously 0.61%, 1% and 2% in 2007, 2006 and 2005 respectively.

Conclusion: EQA system helps to monitor the quality of laboratory activities. Corrective measures taken following the feedback are helpful for programme performance.

PC-94814-07   Role of cured TB patients in a TB control program

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Introduction: Tuberculosis is considered as a major public health problem in Bangladesh. BRAC, an NGO is providing community based TB Control services in two-third of the country in collaboration with the NTP. Community participation is an important element of the program. Cured TB patients are involved to empower themselves for improving program outcomes.

Objective: To involve cured TB patients in TB control to enhance referral linkage to increase case detection and achieve better treatment outcome.

Methodology: BRAC has been conducting advocacy, communication and social mobilization activities at community level. Cured TB patients orientations are being conducted at sub-districts and urban areas. BRAC field staffs make a list of cured TB patients who could be involved in the program. They are invited to attend in a one day orientation program on TB. After orientation these cured TB patients refer TB symptomatic for testing and counsel diagnosed TB patients for treatment compliance. In some cases they also ensure DOT and become health volunteers.

Result: In 2008, total 17207 cured TB patients were oriented in BRAC supported areas. In urban areas of 5 city corporations, BRAC provides support to cover 4.3 million populations. Out of total 3629 new smear positive patients identified in these areas, 328 (9%) of them were referred by the cured TB patient.

Conclusion: Cured TB patients are effective potential partner of TB control program. So, their active involvement and responses have led to increased referral of suspects and thereby better adherence to treatment.

PC-94832-07   Quality assurance of essential medicines: the Asthma Drug Facility response

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Background: The Union has created ADF (Asthma Drug Facility) to make affordable quality-assured essential medicines available in low- and middle-income countries and facilitate implementation of standard case management of asthma. The challenge was to establish a quality assurance system to guarantee the quality of inhalers.

Response: In 2007, ADF decided to review its quality assurance system with the support of pharmacists and WHO's new guidelines 'Model Quality Assurance System for Procurement Agencies' (2007). WHO recommendations had to be adapted to the nature of the ADF mechanism and the products it wanted to procure. Defining ADF quality requirements for HFA (CFC-free) inhalers presented challenges, since WHO does not prequalify inhalers and markets are still transitioning between CFC and HFA formulations, and regulatory requirements are not fully defined, even in highly regulated countries.

Results: Standard Operating Procedures were developed to assess the quality of medicines offered by manufacturers and assure quality during procurement. Product qualification has two steps:
 — Assessment of manufacturer and manufacturing site
 — Assessment of product

Where both assessments were positive, a 'product-manufacturing site' pair was qualified (specified product manufactured at specific site according to accepted specifications). ADF then invited manufacturers to bid for their qualified 'product-manufacturing site' pairs. From beginning the system review to signing manufacturer contracts, it took almost 2 years.

Conclusions: The development of any quality assurance system requires time, careful planning and qualified pharmaceutical experts to develop and monitor the implementation of the system. WHO should consider prequalifying chronic diseases essential medicines.

PC-94872-07   Can preschool teachers monitor asthma symptoms and use action plans in daily classroom activities?

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Background: In Chile, respiratory illness accounts for 90% of winter pediatric clinic visits and obstructive

respiratory disease (SBOR) is most prevalent pediatric disease. SBOR affects poor children disproportionately and causes higher rates of absenteeism which contribute to school failure and economic vulnerability. Preschool interventions can improve long-term educational achievement and economic income. This study introduces respiratory health intervention into professional development program for preschool teachers aiming to reduce respiratory illness, asthma and absenteeism. Study question: can preschool teachers adopt health interventions provided by local public health clinics into daily classroom activities?

Design: Un Buen Comienzo (UBC) is 2-year, cluster randomized controlled trial of professional development for preschool teachers to improve literacy and health of low-income Chilean children. UBC offers monthly content-focused modules (workshops, in-classroom coaching, and feedback). Respiratory intervention introduces alcohol-based hand gel to reduce respiratory infections and written asthma action plans (AAP) to reduce asthma flares.

Results: Teachers identified 66 asthmatic children with Balanced Score Card, confirmed by chart review. Public clinic doctors wrote 66 individualized AAPs. UBC team trained 40 teachers to monitor daily symptoms and use AAPs. Initially, 20% of teachers monitored symptoms. UBC retrained teacher coaches and provided follow-up records and in-classroom protocol, after which 88% of teachers monitored symptoms to apply AAPs appropriately.

Conclusion: Preschool teachers successfully implemented balanced score card, daily screening and use of AAPs in the classroom with explicit protocols and in-classroom coaching. Final impact evaluation will assess if health intervention implemented by preschool teachers reduces respiratory illness, asthma, and absenteeism.

PC-94969-07   The cost-effectiveness of two strategies of directly observed treatment of tuberculosis in Brazil

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Introduction: Developing new approaches to the directly observed treatment (DOTS) strategy that maintain effectiveness and utilize fewer resources is a priority. One such approach is training home supervisors to provide directly observed treatment.

Objective: To compare the cost-effectiveness of community health care worker (CHCW) and guardian-supervised DOT in Vitória city, Brazil.

Design: The patients were selected from the Vitória TB treatment registers. All new cases of smear-positive

or culture-positive pulmonary TB treated between January 2005 and December 2006 were included in the study. The patients were interviewed and informed about both treatment strategies. Upon consent, patients were allowed to choose their preferred treatment strategy. Costs were assessed from a societal perspective, as advocated by current standards for cost-effectiveness analysis. Cost-effectiveness was calculated as the cost per patient successfully treated.

Results: A total of 130 patients were included in the study. 84 patients chose the CHCW while 46 received the intervention guardian-supervised DOT. 45 of 46 (98%) of patients treated with guardian-supervised DOT were cured or completed treatment. By contrast, only 70 of 84 (83%) of the CHCW-supervised patients ($P = 0.01$). The cost per patient of CHCW DOT was US$ 523 compared to US$ 355 for guardian-supervised DOT. When analyzed the cost-effectiveness the Guardian-supervised cost, on average, US$ 363.49 per patient cured while the CHCW DOT was US$ 657.40. The Guardian-supervised DOT maintained programme effectiveness and improved cost-effectiveness by 55.30%. The main reason for the substantial reduction of cost under guardian-supervised DOT was the time of CHCW dedicated to a single patient.

Conclusion: Our findings suggest that the strategy guardian-supervised DOT is an economically attractive option to complement community health care worker DOT mainly in developing countries.

POSTER DISPLAY SESSIONS

TB CONTROL IN SPECIAL POPULATIONS

PS-94111-07   Substance abuse and TB: what have we learned and what is needed?

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Background: Alcohol abuse or illicit drug use (substance abuse) is a barrier to TB control. Persons who abuse substances are more likely to delay seeking care and less likely to get screened and if infected initiate, adhere to, and complete treatment for TB infection or disease. Persons struggling with addiction face multiple barriers to accessing TB services such as stigmatization and a lack of basic needs (e.g. proper nutrition, transportation, and housing). Strategies are needed that integrate substance abuse treatment services, TB control, and take into account the social determinants of addiction and TB disease.

Response: In 2008, WHO published policy guide-

lines for collaborative TB-HIV services for persons using injection and other drugs. The U.S. Centers for Disease Control and Prevention is working on guidance for providing persons who use illicit drugs with integrated services for the control and prevention of HIV, Hepatitis, STDs, and TB.

Lessons learned: Programmatic activities including outreach and use of incentives and enablers can improve rates of screening and anti-TB treatment initiation, adherence, and completion. Programmatic interventions targeting substance abuse related barriers are cost effective relative to treating cases of MDR/XDR-TB resulting from substance abuse related treatment failure. For persons abusing substances, undergoing anti-TB treatment affords 6–9 months of time to incorporate substance abuse treatment and other public health services.

Recommendations: Studies are needed to evaluate the dissemination, implementation, and impact of integrated guidelines and approaches to addressing TB and substance abuse. We need to direct more attention and resources to 1) focusing on substance abuse related barriers that complicate efforts to control and prevent transmission of TB, 2) involving substance abuse treatment service partners, and 3) addressing the social determinants of substance and TB disease.

PS-94202-07 Active tuberculosis case finding in 11 impoverished communities in Rio de Janeiro, Brazil

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Background: Active case finding (ACF) for tuberculosis (TB) is currently being investigated as a strategy to increase case detection worldwide. ACF has long been recognized as an effective method for finding undiagnosed TB, however, the economic and personnel costs have limited its sustainability. We report preliminary results from an ACF program imbedded within in an already established community healthcare worker (CHW) program designed to routinely monitor populations door-to-door for a wide variety of health care issues in Rio de Janeiro.

Methods: A cluster randomized trial of a 9-month ACF campaign was initiated in 22 impoverished urban communities, 6 in western (W) and 16 in the northeast (NE) Rio de Janeiro. Case detection during the 9-month campaign and TB incidence over the 18-months following the campaign are the primary outcomes. We report preliminary results of household coverage and TB cases detected in the ACF arm (3 W; 8 NE communities), though the NE campaign has

not been completed. In addition, the NE campaign has included *Mycobacterium tuberculosis* culture for all respiratory symptomatics, while W communities are limited to AFB smear.

Results: A census of households assigned to each CHW in these communities reported 32 646 families (9902 in W and 22 744 in NE). A total of 22 081 (68%) households were visited and recorded results at least once during the campaign, 7991 (81%) in W and 14 090 (62%) in NE. Thus far, 618 respiratory symptomatics have been detected, among which 360 (58%) have had a complete investigation; 9 (2.5%) TB cases have been detected. Proportion of TB cases detected among respiratory symptomatics is double in the NE (3.8%) vs W (1.9%) communities

Conclusions: Household coverage of the ACF campaign was lower than expected. Impact on community TB incidence cannot yet be calculated until follow-up period has elapsed. Introduction of culture appears to have had a significant impact on case detection, though results are preliminary.

PS-94233-07 Overseas tuberculosis control among refugees resettling to the United States

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Background: More than 50 000 refugees resettle to the United States yearly. The Division of Global Migration and Quarantine (DGMQ), Centers for Disease Control and Prevention (CDC), provides technical instructions to overseas physicians to screen for tuberculosis (TB) among U.S.-bound refugees. To better detect and treat TB disease overseas, including multidrug-resistant TB, these instructions were updated in 2007 to include TB cultures, drug-susceptibility testing (DST), and directly observed therapy (DOT) prior to resettlement.

Methods: As refugee populations are designated for resettlement, DGMQ teams perform on-site visits using standardized evaluation tools to identify and/or help develop TB laboratories and DOT facilities.

Results: During 2009, the majority of U.S.-bound refugees are expected to be Bhutanese from Nepal (15 000), Burmese from Thailand (12 000) and Malaysia (7 000), Eritreans from Ethiopia (10 000), and Iraqis from Syria (13 000) and Jordan (7500). All these refugee groups, except Iraqis in Syria, are expected to have access to cultures and DST overseas. TB and MDR-TB cases will receive DOT to completion of therapy prior to resettlement.

Conclusion: Developing culture and DOT capacity for refugee populations designated for third-country resettlement is achievable. Overseas TB control among refugee populations is important to reduce

burden in source populations and reduce importation of infectious TB into receiving populations.

PS-94235-07   Linking immigration screening to tuberculosis control efforts

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Background: Approximately 450 000 immigrants and 50 000 refugees arrive in the United States yearly after completing a medical examination overseas, including screening for tuberculosis (TB) disease. In 2007, the Division of Global Migration and Quarantine (DGMQ), Centers for Disease Control and Prevention (CDC), began implementing new requirements (http://www.cdc.gov/ncidod/dq/panel_2007.htm) for use of cultures and drug susceptibility testing (DST) for diagnosis and directly observed therapy (DOT) for TB treatment prior to immigration.
Methods: When implementing the new TB requirements, DGMQ is working to collaborate with national TB programs (NTP) so U.S. immigration and refugee TB activities may benefit non U.S.-bound populations.
Results: Globally, collaborations have occurred and range from sharing programmatic information with NTP and external experts (in Mexico, Philippines, Thailand, Vietnam), utilization of NTP laboratory or DOT facilities (in the Dominican Republic, Hong Kong SAR, Turkey), and a DOT facility established for refugees serving as a NTP DOT site (in Kenya). These activities strengthen local TB control programs by improving their technical expertise and infrastructure.
Conclusion: Although immigration and refugee re-settlement TB programs often exist parallel to NTP, these resources should be used to benefit broader control efforts. CDC encourages countries with overseas pre-departure TB programs to collaborate with NTP to strengthen global TB control efforts.

PS-94410-07   Evaluation of the effect of incentive measures on migrant tuberculosis cases in China

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Background: There are more than 230 million migrants in China. The migrant TB Control Project from the 5th Round China Global Fund TB Program has been implemented in 7 provinces since October 2006. The traffic and food subsidies have been provided for migrant TB patients to enhance their treatment adherence.
Objective: To evaluate the effect of the subsidy measures for migrant tuberculosis (TB) cases, and to provide the scientific evidence for making relevant policies for migrant TB cases.
Methods: Four hundred fifty migrant TB cases from Fujian, Guangdong and Shandong provinces were divided 3 groups (Group 1: who received both traffic and food subsidies; Group 2: who only received the traffic subsidy; Group 3: who received neither the traffic nor the food subsidies). The information on sputum examination and treatment adherence were collected from County TB Register Book in 2008. χ^2 test were used to compare the differences among three groups.
Results: The average rates of sputum examination in the end of second and fifth month were 95.6% and 86.7%, respectively. There were no differences among three groups. The sputum examination rate of Group 3 at the end of treatment (79.9%) was lower than those of the other two groups (Group 1 92.0%, Group 2 85.9%; $P < 0.05$). The treatment success rate of Group 3 (78.0%) was lower than those of the other two groups (Group 1 92.0%, Group 2 90.7%; $P < 0.01$).
Conclusions: It was effective to improve the treatment adherence through providing traffic and food subsidies for migrant TB cases.

PS-94543-07   TB control for minority population in China

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Objective: To summarized the experiences of TB control for minority areas in China.
Methods: To use the data from national TB information system to analyse the progress of TB control in Chin. Minority population share equally the nationwide TB control strategy: Free diagnosis and Free anti-TB drugs,Treatment management is implemented by the doctors of county, township and village.
Results: There are 55 minority, 190 autonomy county in China. Minority population is 123.3 million—holds 9.44% of total China mainland population in 2005—The cure rates of new SS+ cases for the minority PTB was 87.2%,87.6% and 87.5% in 2005, 2006 and 2007 respectively. TB prevalence survey including the minority population was conducted in 1979 and 1990 in China. In this survey, the prevalence of active pulmonary tuberculosis were 1049/100 000, and 700/100 000, prevalence of smear positive pulmonary tuberculosis were 206/100 000, and 165/100 000 respectively in 1979 and 1990. All kinds of prevalence were gradually declined. The minority prevalence is higher than nationwide.
Conclusions: Although the epidemic of TB among minority population is high than nationwide, but TB epidemic have been decreased year by year for the minority population. The PTB patients of minority

population share same strategy as general population. Characters of patient of sex and age are same as general population. Cure rate is more than 85% and reached the global target.

PS-94662-07 Test characteristics of symptom-based screening for tuberculosis in homeless people in London

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Background: Symptom based screening for tuberculosis has been proposed in high risk populations. We aimed to estimate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) Likelihood Ratio positive (LR+) and Likelihood Ratio negative (LR−) of symptomatic screening in homeless people in London.
Methods: We used data on symptoms at diagnosis from 72 hostel or street dwelling tuberculosis patients from a previous pan London survey to estimate sensitivity of different symptoms (Sensitivity is the proportion of those with disease who have the symptom of interest). We used data on symptoms at screening from 849 homeless people who attended mobile X-ray screening for tuberculosis but were not subsequently diagnosed with tuberculosis to estimate specificity (specificity is the proportion of those without disease who do not have the symptom of interest). We calculated the LR+ as sensitivity/(1 − specificity) and the LR− ve as (1 − sensitivity)/specificity. We reconstructed two by two tables (cross tabulating symptom vs no symptom with active TB vs no active TB) in an imaginary population of homeless people with a prevalence of tuberculosis of 800/100 000 to estimate positive and negative predictive values of symptoms for the diagnosis of active tuberculosis (PPV = Proportion of those with the symptom who have active tuberculosis, NPV = Proportion of those without the symptom who do not have active tuberculosis).
Results: Amongst those screened 28% had cough, 28% night sweats, 14% fever, 14% weight loss, 7% haemoptysis and 18% had cough and one other symptom. The estimated test characteristics of symptom screening for active tuberculosis in homeless people in London are shown in the Table.

	Sensitivity	Specificity	PPV	NPV	LR+	LR−
Cough	0.75 (0.65–0.85)	0.72 (0.69–0.75)	2.12	99.66	2.69	0.35
Weight loss	0.61 (0.50–0.72)	0.86 (0.83–0.88)	3.34	99.64	4.29	0.45
Fever	0.47 (0.36–0.59)	0.86 (0.83–0.88)	2.60	99.51	3.31	0.62
Night sweats	0.58 (0.47–0.70)	0.72 (0.69–0.75)	1.68	99.54	2.12	0.58
Haemoptysis	0.17 (0.08–0.25)	0.93 (0.91–0.95)	1.90	99.28	2.40	0.90
Cough + 1 other	0.65 (0.54–0.76)	0.82 (0.80–0.85)	2.89	99.66	3.69	0.42

Conclusions: The very high prevalence of symptoms compatible with tuberculosis amongst homeless populations makes symptom based screening impractical. Alternative strategies such as radiographic screening are needed in this very high risk group.

PS-94683-07 Puentes de Esperanza: toward sustainability

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Background: Multidrug-resistant TB is challenging to treat, especially in regions with limited access to second-line medications, diagnostic and monitoring tests, and fully supervised therapy. The region along the Baja California–California border has been identified as such an area. Cooperation between the two countries is important because of their shared burden of disease.
Intervention: The Puentes de Esperanza partnership has been working since late 2006 to strengthen capacity to treat MDR-TB in this border region. Shared case presentations and expert conferencing, bridging of medication supplies and outreach staffing, supplementation of patient enablers, and infection control training have been part of the interventions. Qualitative and quantitative outcomes are reviewed quarterly. Step-wise development of sustainable interventions are being identified and implemented.
Results/lessons learned: To date, 20 patients have been enrolled. Most have a history of multiple failed therapies and despite 'acquired skepticism', adherence in Puentes has been excellent. Two patients have completed therapy, and all patients, except one, who have been on treatment for at least six months have converted sputum cultures. Sustainable MDR treatment has relied on broad-based committment of funders, health institutions, individual providers, and patients.
Conclusion/recommendations: Treatment with individualized therapy is well-accepted by patients and providers. Patients centered-care is critically important to successful outcomes in treating MDR/XDR-TB. Strengthening of MDR treatment programs requires strict oversight by individuals well-versed in TB care and case management.

PS-94685-07   Red TAES de Enfermer: a con enfoque de familia aplicado a la poblacion de Coyoacan

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Objetivo general : Desarrollar acciones para mejorar el control de los pacientes con tuberculosis pulmonar y favorecer la detección oportuna de casos de la población de Coyoacan.

Específicos : Proporcionar la atención de enfermería a los pacientes que presentan tuberculosis utilizando la estrategia TAES y el enfoque de familia en los Centros de Salud.

Metodologia : Mediante un estudio observacional y descriptivo.

Material y métodos : Humanos. 1 Subdirector de Epidemiología, 1 Coordinador de la Red TAES de Enfermería, la Red TAES de Enfermería 21 integrantes, 7 Directores y Epidemiologos de los Centros de Salud. Dos Médicos Familiares. Pacientes con diagnóstico de Tuberculosis y usuarios de los Centros de Salud de Coyoacan.

Resultados : Se incrementaron las actividades de promoción a la salud, se formaron promotores voluntarios para la salud, se realizaron 4 estudios de salud familiar, se incrementaron las detecciones de tosedores intramuros y extramuros. Se fortaleció la Red TAES de Enfermería, así como el apego al tratamiento de los pacientes en control durante el 2008. Encontrando un impacto positivo en comparación a las actividades realizadas durante el 2007.

PS-94855-07   Alcohol use and tuberculosis recurrence in Kampala, Uganda, 1993–2004

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Background: Alcohol use relates to TB transmission, TB disease progression, TB treatment outcomes, and mortality. Sparse research exists looking at alcohol and TB recurrence. Given dual high alcohol consumption and TB incidence rates in Uganda, we considered alcohol use as a risk factor for prolonged time-to-treatment completion and TB recurrence.

Methods: A retrospective cohort study design included TB patient characteristics in the Makerere University–Case Western Reserve University TB database, 1993–2004. Analyses included number and proportion of TB patients characterized by alcohol use, HIV status, sputum smear and culture, and extent of disease. The number and proportion of patients reporting alcohol use was compared between those with and without recurrent TB. Time-to-TB recur-

rence was compared between those reporting alcohol use or not.

Results: Of 1398 TB cases, 7.9% (110/1398) culture-confirmed recurrent TB cases were identified. Of 108 patients reporting alcohol use, 33.3% (32/108) of patients reported alcohol use. In 1139 TB patients with alcohol use data and no recurrence, 37.1% (423/ 1139) reported alcohol use. Among those with alcohol use data (1247), alcohol use was not significantly associated with TB recurrence (RR = 0.84, 95%CI = 0.56–1.29; P = 0.43). Mean time-to-recurrence in alcohol users was 595 days (SD = 411) versus 471 days (SD = 340) for non-users (P = 0.13). Mean time-to-completion of anti-tuberculosis therapy (1022) in alcohol users (369) was 244 days (SD = 50) versus 247 days (SD = 50) for non-users (653) (P = 0.58).

Conclusions: A large percentage of recurrent TB patients report alcohol use. Delayed time-to-recurrence in alcohol users may be partially due to delayed patient reporting to health facilities for care. Using one dichotomous question on alcohol use does not detect an association between alcohol use and TB recurrence. Improved alcohol screening in TB patients is needed for further elucidating the alcohol-TB recurrence relationship.

PS-94868-07   Do financial incentives contribute to compliance with tuberculosis treatment among migrants? A qualitative study

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Background: With rapid urban development and economic progress, many areas face a challenge of TB among poor migrant populations. The round 5 China TB program funded by the Global Fund was launched in 2006 to address the challenge in selected counties. The program, implemented in 7 counties of China from 2006 to 2007, provided RMB 576 ($ 82.3) nutrition and RMB 96 ($ 13.7) travel incentives to the TB patients with financial constrains during six months treatment.

Objective: To understand how nutrition and travel incentives were distributed to and perceived by TB patients and health care providers.

Methods: Qualitative in-depth interviews were conducted in the 7 counties involving 16 TB patients, 14 TB health care providers/program managers.

Results: Many TB patients and health care providers reported nutrition and travel incentives were good. It helped patients to complete treatment. However, most of them commented that the incentives were not enough, particularly the nutrition incentives. Some health care providers perceived the process of distribution of the incentives as complicated so that TB patients could not receive it on time. It was also diffi-

cult to know patient's financial status due to shortage of operational tools.

Conclusions: The findings suggest that the incentives did not relieve much of the patient's financial burden. Policy makers may consider developing operational details and tools to the program, and extend the scope of the incentives to all TB patients.

PS-94886-07   Characteristics of TB burden in Rohingya refugee camp in Bangladesh

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Setting: Two refugee camps in Cox's Bazar district with 10 370 and 16 279 people each, of them 52% women and 57% children (below 18). Population is fairly stable. Shelters are small, congested and ill ventilated.

Objective: To determine characteristics of the TB burden in refugee camps.

Methodology: Rapid assessment with review of DOTS forms, cards, registers and reports.

Results: Annualized suspect notification rate of 104 and 148 per 10 000 in 2007; trend in case detection increased significantly in one camp (from 100 to more than 250 per 100 000 per year) while it fluctuated in the other camp. There are twice as many female patients notified than male patients (while it is the opposite in the neighbouring area and rest of country). Diagnostic delays are due to intermittent access to laboratory services. Very few smear-negative and extra-pulmonary cases are diagnosed due to lack of access to proper diagnostic facilities. Treatment results appear to be excellent though no separate data available since included in upazila (sub-district) TB register. All patients under strict DOT at the camp health centre (all patients live within vicinity). Extra food rations for TB patients has therapeutic benefit and is incentive for complying with treatment.

Conclusions: TB transmission in the camps appears high particularly among women, resulting in high notification rates. Transmission may be favoured by housing conditions. Good treatment results can be achieved.

PS-95048-07   Addressing delivery challenges through case studies: the example of BRAC's TB programme

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Problem statement: To combat TB effectively, it is crucial to develop curriculum that promotes decision-making skills and analytical processing around key issues to delivering health services in resource-poor settings. A group at Harvard University, the Global Health Delivery (GHD) Project, is documenting and analyzing the numerous challenges of delivering health services in resource-poor settings, in particular capturing efforts to implement large-scale tuberculosis programs. As part of this education project, we developed two teaching cases on BRAC's TB Programme: one looking at the development and implementation of the rural program, and the other exploring the distinct challenges that BRAC has faced in providing TB care in Bangladesh's urban areas.

Methods: Case development included interviews with key informants from the organization and other significant stakeholders. Authors reviewed published literature and conducted on-site interviews and research. Cases have been taught to graduate students and implementers, at Harvard, MIT, and in Bangladesh, India, and Peru.

Major findings: Our cases are being used to expose students to various strategies for delivering effective health care in resource-poor settings, as well as the experiences of different programs while expanding and facing new challenges. The BRAC cases were used to teach about program design, management, sustainability, and adapting rural-based TB models for urban settings.

Lessons learned: Cases allow students to understand a program at the operational level, and the participatory teaching style draws on the experience and insight of the entire class. Our experience teaching the cases to international audiences with varying levels of experience and education suggests that these cases can form the basis of curriculum for a wide set of practitioners and facilitate dialog between different groups.

PS-95173-07   TB control in tribal area: GO-NGO Partnership

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Background: TB control activities in a hilly, tribal and inaccessible area with scattered population and lack of communication facilities is a complicated task. The variation of cultural heritage and behavioural pattern towards disease and remedy of tribal population invites specially designed interventions.

Intervention: GMLF Balarampur Unit (A NGO Supported by GLRA) covers a population of around 346 800 in the tribal belt of Balarampur, Bagmundi and Barabazar blocks in Purulia district (India) in collaboration with the district RNTCP administration and jointly delivers the DoTs services through 68 sub-health centres, 11 primary healthcare centres and 5 Microscopic Centres. The NGO conducts community awareness program employing cultural inputs, folk media and undertakes family counselling,

motivation and follow-up program involving local community and leadership.

Result: The collaborative activities for five years (2004–2008) has resulted into new case detection (NSP) to 90%, conversion rate 91%, cure rate 89%, reduction of defaulter rate to 2.4%, substantial detection of child cases and involvement of local volunteers and community leadership in the total process including socio-economic rehabilitation of persons in need. The Government System had adequate infrastructure and logistics and NGO sector showed higher motivation, incorporation of socio-cultural inputs and committed management.

Conclusion: For effective coverage of tribal and inaccessible area under RNTCP, the collaboration and partnership with the capable NGOs and development of strategy with cultural inputs and behavioural change communication are suggested.

PS-95240-07   Results of active case finding among minority groups in Kosovo during 2006–2008

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Objective: To determine the added value of active case finding conducted among minority groups in Kosova.

Methods: Household surveys were conducted in Kosovo, were Roma, Egyptian and Ashkali minority groups reside, by outreach nurses during three years period (2006–2008). The survey contains questions for each adult household member about their TB history, symptoms and risk factors. Those that had at least one symptom, and either history of TB contact and at least one risk factor were considered TB suspects and referred for further evaluation.

Results: Among 2766 adults interviewed, 114 (4.1%) met the criteria for a TB suspect, of which 50 (43.8%) presented for evaluation. Of those evaluated, newly diagnosed cases were in total 4 (8%), out of them 3 were with smear positive TB, and 1 with smear negative TB. Other 7 (14%) of the cases identified through active case finding had been reported previously to the National TB Programme (NTP).

Conclusion: Although during active case finding were identified few newly diagnosed cases, the majority were previously diagnosed by NTP. Passive case finding through routine NTP activities appears to have comprehensive capture of TB cases in Kosova.

PS-95295-07   Clinical guideline on TB in primary health care: a strategy to control in high-burden coummunities

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Background: The dissemination of tuberculosis (TB) is closely linked to the living conditions of the population. It is estimated that around 100 000 cases per year occur in Brazil. The average incidence coefficient of TB in Porto Alegre/RS is 100/100 000. The aim was to provide a Primary Health Care tool to the Serviço de Saúde Comunitária of Conceição Hospital (Community Health Service–CHS) to accomplish surveillance, early diagnosis, improve management at front line, follow up, and prompt referral to specialist to discuss difficult cases.

Intervention: In order to control TB there was an expansion to 12 Health Care Units (HCU) of the CHS. The annual goal was to identify and follow up 90% of the expected cases of TB. Definition of indicators for evaluation, surveillance and monitoring, permanent education practice and discussion of difficult cases with a respiratory specialist were some of the strategies to implement the guideline.

Results: In 2006, 67% of TB cases living in areas covered by CHS were identified, in which 60% were reported by the hospital. In 2007, there was an expansion to all HCU to control TB and 82% of cases were identified, in which 50% were reported by the hospital. In 2008, 95% of cases were identified, in which 35% were reported by the hospital. After the implementation of the guideline there was an improvement in the indicators. In the first year there was a decrease of 10% and in the second year, there was 25% decrease on diagnosis of TB cases by the hospital among people living in that area.

Conclusion and key recommendation: There was a remarkable health care improvement, which was linked to the implementation of guideline, as permanent education of the staff and surveillance of TB in PH were effective strategies. An increase in the identification of cases through the HCU was a good indicator as it provides a comprehensive care.

PS-95434-07   TB case outcomes at a large public sector hospital in KZN, South Africa

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Background: South Africa has one of the highest incidence rates of TB combined with one of the lowest cure rates. This along with high HIV co-infection rates has resulted in TB becoming the leading cause of death in South Africa. Likely contributing factors include inadequate systems with poor integration of HIV and TB services and lack of continuity of care between public sector hospitals and community clinics, resulting in 'leakage' of patients, high default rates and poor outcomes.

Methods: A cross-sectional study of patients started

on TB treatment during admission at a large regional hospital in KwaZulu-Natal, South Africa was conducted over a 4-week period to assess HIV co-infection, mortality and percentage of patients who were successfully transferred to continue TB treatment after discharge. Data was obtained from in-patient files, laboratory results and the hospital TB register. TB registers were reviewed at a subset of three down-referral clinics.

Results: Of 78 TB cases, 63 (81%) received VCT and 53 (68%) tested HIV positive with a mean CD4 count of 112. 13 (25%) HIV positive TB cases were on antiretroviral therapy on admission. Twenty-five patients (32%) died during admission of which 18 (72%) were HIV positive. 47 patients (60%) were transferred to their local clinics, 4 (5%) were transferred to 3 other hospitals and 2 (3%) left against medical advice. Of the 47 patients discharged, initial results for 9 patients that have been tracked indicate that 4 (44%) have presented to their local clinic within 30 days from discharge for continuation of TB therapy.

Conclusions: Transfer of TB patients to down-referral facilities after hospital admission represents an ongoing source of patient 'leakage' and presumed treatment default, though recognition of the importance of HIV testing of new TB cases during hospitalization may be improving.

PS-95578-07 Building trust between tuberculosis control staff and Chiapan day laborers in San Francisco

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Background: Using real-time genotyping of *M. tuberculosis*, we detected a cluster with demographic similarities among unrelated patients from Chiapas, which revealed missed opportunities in contact investigation (CI). We integrated social factors to overcome language and healthcare access barriers.

Intervention: One point person served as the cultural ambassador to the day laborer community and provided assistance for insurance, healthcare access, and tuberculosis (TB) education. We started a coalition to reach out to the indigenous communities. Partners included public and private health and legal clinics catering to day laborers, and community organizations representing indigenous groups.

Results: CI of the first TB case in June 2006 yielded 33 contacts and 4 cases. The marginalized status and cultural isolation of this community hampered CI. Genotyping from a sixth case in September 2007

revealed ongoing transmission, which led us to discover links to previous cases. The point person improved rapport with the community, which led to the diagnosis of 3 cases from the additional 30 contacts screened. Previous patients now refer newly arrived day laborers for TB screening. The coalition developed radio public service announcements and a *telenovela* video in Spanish and two indigenous languages.

Conclusions: Real-time genotyping revealed gaps in the CI, which uncovered the specific needs of a marginalized community. Engaging the Chiapan day laborers and building a community coalition reduced barriers to healthcare access and greatly improved our CI outcomes.

PS-95627-07 Tuberculosis control actions in the indigenous population of Paraiba, Brazil

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Introduction: Tuberculosis (TB) represents a prominent cause of morbidity and mortality among the indigenous people, contributing to the expressive population decline in this group.

Objectives: It was sought to analyze the organizational arrangements that guide the TB control actions directed to the indigenous population of Paraíba.

Methodology: Comparative study involving the indigenous health teams of Paraíba-Brazil, totalizing twenty-three health professionals, among doctors, nurses, nurse assistants and Indigenous Health Agents. The data collection was made by means of three focal groups. The data was treated and analyzed according to the critical approach of Speech Analysis.

Results: We verified that the actions of search for respiratory symptomatic, diagnosis and treatment of TB and accompanying of the communicants are permeated by limitations that difficult the decentralization of these activities for the basic health units. The lack of involvement of the teams in the TB control actions and the unpreparedness of the professional to deal with tuberculosis in a culturally differentiated context was also observed, considering the insufficient training of human resources to attend to the cultural specificity of the local indigenous population. The centralization of the treatments in the reference units and insufficient implementation of counter-reference point to the deficiencies of the local service in promoting sharing of information in regard to patients, generated in different levels of the system.

Conclusion and recommendations: The referred findings suggest debilities in the local health system for

the control of TB, making it a threat to the health conditions of this specific group. This fact implies in the need to expand the role and function of the local management, that should be understood as an important instrument for the execution of the TB control actions in the Special Potiguara Indigenous Sanitary District.

PS-95630-07   Cultural barriers in tuberculosis control in the indigenous population of Paraiba-Brazil

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Introduction: Tuberculosis (TB) is an important morbidity and mortality factor among the indigenous populations of Brazil, reaching incidence rates superior to those found among the white population of the country.
Objectives: It was sought to identify the cultural barriers for the control of TB in the indigenous population of Paraíba-Brasil.
Methodology: Qualitative study that used the Focal Group technique with three indigenous health teams of the Special Potiguara Indigenous Sanitary District of the state of Paraíba-Brazil. The empiric material obtained was analyzed by the critical approach of the Speech Analysis technique.
Results: Difficulties found by the indigenous health teams were evidenced in regard to the work for adhesion of the patient to the treatment of tuberculosis due to the beliefs perpetuated by past generations about this disease, as well as the phytotherapic practices of the Potiguaras, seen as many opt for drinking teas and bottled mixtures, as well as those who prefer to cure themselves with prayers and baths, specially the elderly. The stigma of the disease also made difficult the adhesion to the Supervised Treatment, due to the alarming manifestation of the team in view of a suspect case, leading the patient to become exposed to the community and to prefer the anonymity foreseen by the reference service, being a question that surpasses the social-cultural context of the Potiguaras: the unpreparedness of the team in approaching this patient.
Conclusion: The valorization of the phytotherapic practices by the Potiguaras and the marginalization suffered by this population due to the stigma of TB are characterized as the main cultural barriers for the control of TB, falling to the health professionals the difficult task of creating mechanisms capable of involving the patients in the control actions diffused by the occidental medicine, without disregarding the cultural questions that guide the context of TB in this specific group.

TB-HIV DIAGNOSIS AND CLINICAL MANAGEMENT II

PS-94032-07   Mycobacterial species in HIV co-infected patients at Dr George Mukhari hospital, Pretoria, South Africa

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Background: Tuberculosis (TB) is a major health problem in South Africa and is currently the leading cause of death in HIV co-infected patients. Mycobacteria other than tuberculosis (MOTT) is also known to cause infections among HIV co infected patients especially when their CD4 count drops below a hundred.
Objective: To determine the most prevalent mycobacterial species amongst HIV co-infected patients at the Dr George Mukhari (DGM) hospital, Pretoria, South Africa.
Methods: A pilot study was conducted which included 40 consecutive mycobacterial isolates collected from HIV co infected patients at the DGM hospital. Mycobacterial speciation was performed using the GenoType® Mycobacterium CM and GenoType® Mycobacterium MTBC assays (Hain Lifesciences, Germany). GenoType® Mycobacterium CM allows the identification of *M. avium*, *M. chelonae*, *M. abscessus*, *M. fortuitum*, *M. gordonae*, *M. intracellulare*, *M. scrofulacium*, *M. interjectum*, *M. kansasii*, *M. malmoense*, *M. marinum*, *M. tuberculosis* complex, *M. peregrinum, M. xenopi*. The GenoType® Mycobacterium MTBC allows the identification of mycobacteria species within the *Mycobacterium tuberculosis* complex (MTBC). The mean age of the study population was 35.6 and the mean CD4 count was 92 cells/ml.
Results: MTBC was the most prevalent species, found in 28/40 (70%), followed by *M. intracellulare* 4/40 (10%), *M. malmoense* 3/40 (7.5%), *M. scrofulaceum* 3/40 (7.5%), *M. avium* 1/40 (2.5%) and *M. abscessus* 1/40 (2.5%). Within the MTBC all the isolates were identified as *Mycobacterium tuberculosis*.
Conclusion: The study showed a high prevalence of *M. tuberculosis* in HIV co-infected patients. The predominant MOTT isolated in this study differs from those found in previous studies. These finding indicates the importance of mycobacterial genotyping to species level since a standard treatment is not available for the different mycobacterial infections.

PS-94067-07   The impact of HIV syndromes on the treatment outcome of TB cases: results from a state TB programme in Nigeria

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Introduction: Tuberculosis is the leading cause of death among people leaving with HIV/AIDS worldwide. To address the enormous challenges posed by the dual TB-HIV infection, the National Tuberculosis and Leprosy Control Programme (NTBLCP) started collaborative TB-HIV services in Gombe State and some other selected states in Nigeria in 2006.

Method: The study looked at all new sputum smear positive AFB patients (300) that tested positive to HIV screening between diagnosis and second month of follow up and were treated between January 2006 and December 2006 in Gombe State TB Control programme. The cohort analysis looked at the HIV seroprevalence and the treatment outcomes; cure rate, failure rate, death rate, default rate and transfer out rate among new smear PTB patients that are dually infected with HIV and TB as compared to those not dually infected.

Results: Majority of HIV positive and HIV negative pulmonary tuberculosis patients studied were aged 39 years and bellow. There was no statistical significant difference ($P = 0.506$) in the mean age of patients with co-infection (34.6 ± 10.0 years) and those without co-infection (33.9 ± 16.8 years).Out of the 300 TB-HIV co-infected patients in the study population, males accounted for 58.3% compared to 41.7% that were females. This was not statistically significant at a $P = 0.333$. The Table shows the treatment outcomes.

Table Treatment outcome of pulmonary tuberculosis patients with and without HIV co-infection

Treatment outcome	HIV positive frequency (%)	HIV negative frequency (%)	χ^2	P value
Treatment completed	84 (28.0)	228 (38.2)	9.353	0.002
Transferred out	81 (27.0)	68 (11.4)	34.849	0.000
Died	77 (25.7)	92 (15.5)	13.559	0.000
Cured	38 (12.7)	189 (31.8)	30.427	0.000
Default	20 (6.6)	17 (2.9)	7.303	0.007
Failed	0 (0.0)	1 (0.2)	0.000	1.000
Total	300 (100.0)	595 (100.0)		

Conclusion: This study clearly shows that HIV co-infection impacts negatively on the TB treatment outcome. The result of this research calls for strengthening of TB-HIV collaborative services that will ensure effective HIV prevention and treatment in the population and especially among TB patients.This supports the fact that 'two diseases, one patient, one response integrated approach to TB-HIV care and treatment can avoid unnecessary death from TB'. Scaling up TB-HIV collaborative services currently on-going in the TB & HIV/AIDS Division, will lead to improved TB treatment.

PS-94242-07 Innovative digital chest X-ray solutions accelerate TB case detection and enable mass screening

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To provide information on innovations in digital Chest X-ray. Digital images are instantly available so shorten the time to diagnose and eliminate films. Remote reading of images and Computer Aided Diagnosis for TB revolutionises case detection in low resource areas with few radiologists. More TB cases found also in false smear negative TB patients; improved accuracy of image reading, image cost reductions and detection of other lung diseases common among people living with HIV/AIDS. Speed and accuracy of case detection are critical success factors in the fight against TB. As 40% of TB cases are not found, the Global Fund encourages innovative actions to accelerate case detection. Recent innovations in direct digital radiology speed up TB case finding also in areas coping with high co-infection with HIV/AIDS. CheckTB! aims to facilitate access to this cost effective up-scaling of case detection by connecting stakeholders, designing and financing projects and creating breakthrough services. On scientific and healthcare projects CheckTB! advises Delft Imaging Systems. Information on CheckTB! can be found at www.checktb.com. Innovations in digital radiology and image compressing are welcomed by WHO and IUATLD. Digital radiology simplifies the creation of a quality image to 2 mouse clicks provided staff is correctly trained. Images are instantly available on the diagnostic viewer and can also be read on distance using internet or mobile phone networks. Cost of digital images are only a fraction of film bases CXR. In addition, experts from leading Universities and Zambart developing Computer Aided Diagnosis of CXR (CAD4TB) together with Delft Imaging Systems expect sensitivity of digital CXR to surpass 90% and specificity to reach more than 80%.

Sputum–Direct Digital Radiology–Culture
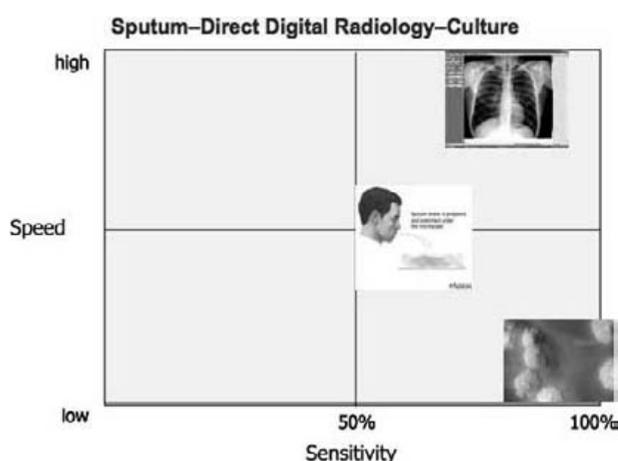
PS-94524-07   Integrating TB and HIV care services: experience from a rural district hospital in Kenya

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Background: ART uptake amongst TB-HIV co-infected patients remains a challenge for health care providers especially in remote areas. The National TB Program and HIV/ART programs have traditionally developed separately with little regard to integration of services for the benefit of patients who are dually infected. This results in missed management opportunities with resultant suffering by the patients and increased cost of seeking health care.

Methods: TB-HIV integrated services were started in Karatina District Hospital in June 2008 following multiple multidisplinary meetings, which focused on how the process of integration would be implemented. Staff, (a medical assistant and a nurse) to work in the TB clinic were identified and trained in all aspects of TB and HIV management. From June 2008, all new TB patients who tested HIV positive were referred to the Comprehensive Care Centre (CCC) for registration and then all investigations, counselling and initiation of ART were done in the TB clinic. On completion of TB treatment, these patients who are HIV positive are referred to the CCC for continuation of care.

Results: Between June and December 2008, 165 patients, (including 107 (65%) males) were registered in the TB clinic. All of them were offered and accepted a HIV test. Thirty four (21%) turned HIV positive and were enrolled to care at the TB clinic after registration at the CCC. Fifty percent of these patients (17) qualified for initiation of ART (WHO criteria and CD4 count of below 350 cells/mm³) which was offered at the TB clinic. The proportion of TB patients who were enrolled on ART increased by 45% after integration of services. The median CD4 Count for patients starting ART was 135 cells/mm³.

Conclusion: Integration of HIV services in TB care settings increases ART uptake by dually infected patients.

PS-94603-07   Fréquence et impact de l'infection à VIH sur l'évolution de la tuberculose pulmonaire au Togo

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Objectif : Déterminer d'une part la fréquence du VIH chez les patients soufrant de tuberculose pulmonaire à microscopie positive et d'autre part évaluer l'impact du VIH sur le traitement de la tuberculose.

Matériel et méthodes : L'étude a concerné 569 patients tuberculeux pulmonaires chez qui l'infection à VIH a été recherchée par tests rapides (Determine et Tridot). Le comptage du nombre de lymphocytes TCD4+ (LTCD4+) a été réalisé par FACSCALIBUR (BD, Sciences) chez les patients séropositifs. Tous les patients avaient reçu le même traitement antituberculeux.

Résultats : Parmi les 569 patients 135 (23,7%) étaient infectés par le VIH. Le taux de guérison globale était de 82,2%. Ce taux de guérison était de 64,3% chez les séropositifs au VIH contre 87,5% chez les séronégatifs avec une différence statistiquement significative ($P < 0,001$). Parmi les patients TB-VIH+, 55,8% avaient un taux de LTCD4+ $< 200/\mu l$. Le taux de guérison dans ce groupe était de 47,8% contre 85,9% dans le groupe de patients séropositifs ayant un taux de LTCD4+ $> 200/\mu l$. Il n'y avait pas de différence statistiquement significative entre les taux de guérison chez les patients TB-VIH− et les patients TB-VIH+ ayant un taux de LTCD4+ $> 200/\mu l$.

Conclusion : Compte tenu de l'impact négatif du VIH sur la tuberculose, le programme national de lutte contre la tuberculose doit prendre en compte la prise en charge simultanée de la co-infection TB-VIH pour améliorer sa performance.

PS-94686-07   Guidelines to practice: implementing IGRA in routine HIV care in Mississippi, USA

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Background: Mississippi (MS) located in southeastern United States has increasing rates of HIV especially in African Americans. MS had declining TB rates until 2005 with later increase in 2006 and 2007 (137 cases, 4.7/100 000) with subsequent decline to 118 cases (4.0/100 000) in 2008. TB-HIV co-infection occurs frequently, thus underscoring the need for screening for latent TB infections and treatment. The Adult Special Care Clinic (ASCC) at Univ. of MS Med. Center (UMMC) provides care for >1600 HIV patients. Although recommended in treatment guidelines, rates of annual screening with Tuberculin Skin test (TST) have been low in this population due to requirement for TST reading visit (Fig 1).

Goal: Implement and determine feasibility of interferon gamma release assay (Quantiferon® Gold In-Tube- QFT-GIT) screening for LTBI in HIV clinic in UMMC.

Methods: Initial evaluation of percent screened by TST, discussions on obtaining QFT-GIT testing at hospital lab, addressing key factors for sample pro-

cessing and transportation to reference lab and completing evaluation of those with positive QFT-GIT.

Figure:1
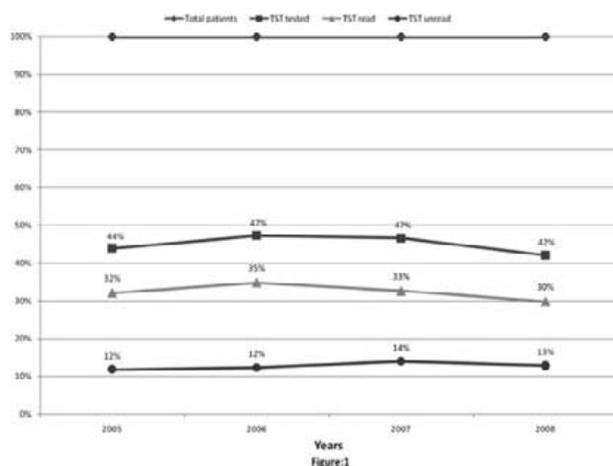
Results: QFT-GIT screening was implemented in the ASCC on 12/1/08. For the 3-month period 12/1/08–2/28/09, 40% of the clinic population completed screening for LTBI. This compares with historical averages of 32.5% with TST for comparable 3-month periods during 2005–2008 (Fig 2).

TST read Vs QFT-GIT

Three months average
* Extrapolation of annual averages of sucessful TST reading
Figure:2
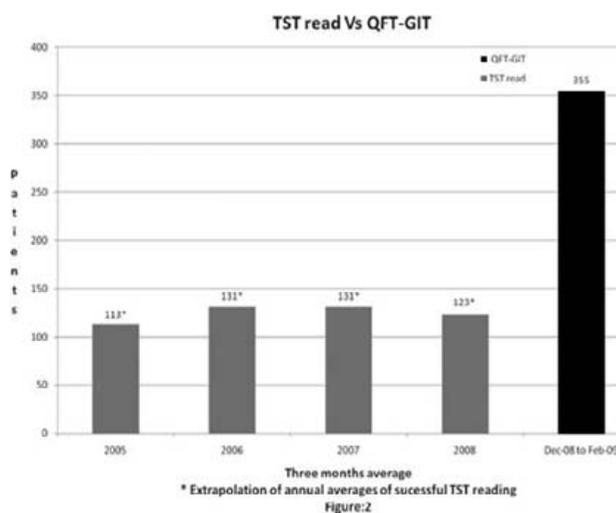
Challenges: Lack of finances and transportation means for CXR and clinical evaluation was the major limitation for patients with positive QFT-GIT, delaying LTBI treatment initiation. Lack of 100% patient screening is reflected by providers needing reminders of availability of new test and limitation of sample processing of Friday clinic patients.

Conclusions: The greater convenience of QFT-GIT as a screening tool for LTBI in HIV clinic in MS has significantly increased the rate of successful screening in this high risk population.

PS-94845-07   Improving TB diagnostic practice in Tanzania using the chest X-ray

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Background: In Tanzania, where 60% of TB patients are infected with HIV, TB Intensive Case Finding (ICF) is a core activity at HIV Care and Treatment Clinics to identify TB suspects. Furthermore, knowing that 50% of patients admitted in the hospital are HIV positive, ICF has been expanded to general wards also in the context of TB infection control. In the TB diagnostic process the Chest X-ray (CXR) is an indispensable tool in PLHIV, for whom sputum is often negative. Physicians dealing with PLHIV may have limited experience in CXR interpretation. Therefore, an increasing number of clinical staff needs to be trained in CXR diagnosis of TB and HIV-related conditions.
Methods: Between January and March 2009, the first phase of the learning programme 'CXR Interpretation in TB-HIV settings' was launched by PharmAccess and ICAP-Columbia University in collaboration with the Radiology, TB and HIV programmes of the Ministry of Health and Social Welfare (MOHSW) Tanzania. National experts from the public and private sector were identified: senior radiologists, physicians with extensive clinical HIV-TB experience and paediatricians.
Results: A pool of 15 national facilitators was established. A highly illustrated and interactive training curriculum for chest X-ray reading was adapted to the Tanzania context and targeted 60 (assistant) medical officers who engage in reading CXRs during daily practice. Two 5 day training courses confirmed attractiveness an effectiveness of the curriculum. A pre and post test was conducted showing 30% score improvement in the diagnostic capacity of the trainees.
Conclusion: the Chest X-ray learning Programme facilitates further peripheral training courses, evaluates the capacity of the clinicians and serves as an X-ray quality assurance plan in public-private partnership.

PS-95206-07   Antiretroviral treatment outcomes in HIV-positive TB patients in 2004–2007 in Bulawayo, Zimbabwe

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Introduction: Family-oriented HIV care, including antiretroviral treatment (ART), was introduced in

Zimbabwe in 2004 and a national policy on collaborative HIV-TB services was adopted in 2006. This study presents an evaluation of treatment outcomes for HIV-infected TB patients at a primary health care clinic in Zimbabwe.

Setting: The first urban primary health care clinic accredited to prescribe ART in Bulawayo.

Method: Information about patients who commenced ART during the period from September 2004 to December 2007 was abstracted from the clinic's ART register and analysed.

Findings: A total of 865 HIV-positive TB patients (57% female, 43% male) commenced ART during the study period. Among them, 73% were pulmonary TB cases (including 33% with sputum smear positive TB). New cases comprised 93% of the cohort. The median CD4 count at baseline was 88 cells/mm³; it increased to 221 cells/mm³ and 286 cells/mm³ at 6 and 12 months of ART, respectively. As of December 2007, 80% of the patients were alive and taking treatment, 13% had died, 5% were lost to follow-up, and 2% had stopped treatment. Among the patients who died, 42% of them did so in the first 3 months of ART. Eighty-seven percent of deaths occurred within the first 12 months of ART.

Conclusion: Despite limited experience in HIV care the health providers achieved satisfactory case holding. In view of high early mortality it is important to encourage early health seeking behaviors and strengthen prompt initiation of ART. These otherwise encouraging results suggest that primary health care clinics, largely staffed by nurses, can make a meaningful contribution to HIV-TB services in the country.

PS-95267-07   Isoniazid-associated hepatitis, antiretroviral therapy: alcohol during TB prophylaxis in HIV+

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Objectives: To assess the rate of and risk factors associated with isoniazid (INH)-associated hepatitis in persons living with HIV (PLWH) during isoniazid preventive therapy (IPT).

Design: A clinical trial in which PLWH received 6 months of daily self-administered INH with pyridoxine supplementation at public health clinics.

Methods: INH-associated hepatitis (INH-hepatitis) was defined as having either alanine or aspartate aminotransferase >5.0-times the upper limit of normal with or without symptoms and not attributable to other known causes. Screened PLWH were excluded if they were ill (including cough or fever), or had a history of clinical hepatitis or laboratory evidence of hepatitis. Alcohol abuse was assessed with CAGE criteria.

Results: Of 1995 PLWH enrolled between 2004–2006, 1794 adhered to at least 4 months of IPT and were analyzed. Those not analyzed had no hepatitis. At enrolment 31% had a CD4 lymphocyte counts <200 cells/mm³ (CD4 < 200). Nineteen (1.1%) developed INH-hepatitis including one death from hepatic encephalopathy at month 6; 14/19 (74%) occurred by month 3. INH-hepatitis was associated with having a CD4 < 200 (relative risk [RR] 2.8, 95% confidence intervals [CI] 1.1–6.8), increased in PLWH reporting ≥1 CAGE criterion (RR 2.4, 95%CI 1.0–5.8) but not significantly associated with anti-retroviral therapy (RR 1.6, 95%CI 0.6–4.0). Among 480 co-administered IPT and anti-retroviral therapy, 7 (1.5%) had INH-hepatitis. PLWH receiving nevirapine (222/480) had a higher rate of INH-hepatitis than those receiving efavirenz (257/480) but this was not significantly different (2.0% vs. 0.9%, $P = 0.46$). Neither age >35 years nor presence of hepatitis B virus core antibody was associated with INH-hepatitis.

Conclusions: Rates of INH-hepatitis and hepatic encephalopathy in this cohort are similar to published data. Six months of IPT—which is the recommendation of the WHO—was relatively safe in this, the largest cohort of PLWH described in Africa.

PS-95279-07   Early implementation of TB and HIV collaborative activities at Mabvuku Polyclinic, Harare, IHC2

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Introduction: Mabvuku Polyclinic IHC 2 pilot site started initiating ART to co-infected TB patients and their partners on 24/09/08. Services offered at the site include Provider Initiated Testing and Counselling, TB investigations and Treatment including partners.

Objective: To describe the characteristics of co-infected TB Patients and their spouses.

Study design: Descriptive Study.

Setting: Mabvuku Polyclinic, Harare.

Methodology: Records of the participants who visited Mabvuku Polyclinic for TB services from January 2008 to February 2009 were retrieved and reviewed. The ART and TB registers were used to extract information on HIV/AIDS and TB respectively. Data was analysed manually.

Findings: A total of 317 TB patients were registered. Of the 168 who consented to HIV testing 81% were positive. Thirty four percent of the registered TB patients declined HIV testing. ART initiation for co-infected patients and spouses was started on 24/09/08. One hundred and forty two patients were commenced on Antiretroviral treatment as of end of February

2009. This figure includes 14 spouses (12 females and 2 males.) Seven deaths were recorded on the cases under review.

Conclusion: HIV infection is high among TB patients. There is need to intensify PITC to improve the uptake of HIV testing both among the TB patients and spouses/partners.

PS-95410-07   Can computers help to diagnose TB in Zambia?

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Background: Chest radiography (CXR) is becoming increasingly important in the diagnosis of TB in high HIV settings such as Zambia. Interpreting CXR is not easy, particularly for non experts who are responsible for most of diagnoses especially in low resource settings, where specialized radiologists are not available. The advent of digital radiography, computer-aided detection (CAD) systems can be developed that could facilitate the diagnosis of TB. This preliminary study compares the performance of a prototype CAD system with human readers.

Methods: A database containing 157 digital CXR was presented blinded to 6 clinicians and the CAD system. Gold standard was determined by two expert lung radiologists who classified the CXR as normal or abnormal. The CAD system was initially trained with another set of images and assigned a probability of being abnormal based on the textural appearance of the image. No additional patient information was given and the readers indicated for each image whether it was normal or abnormal. Sensitivity, specificity of the readers and the CAD-system were determined and agreement between the readers (Kappa-statistic) was assessed.

Results: See Table. Agreement between 6 readers was poor (Kappa 0.0946).

	Sensitivity % (95%CI)	Specificity % (95%CI)
CAD	87 (78–93)	49 (35–62)
Reader 1	31 (22–41)	87 (75–94)
Reader 2	80 (70–87)	27 (16–40)
Reader 3	79 (69–86)	13 (6–25)
Reader 4	64 (54–74)	78 (66–88)
Reader 5	77 (67–85)	63 (50–75)
Reader 6	79 (69–86)	25 (15–38)

Discussion: This early version of a CAD system for TB showed higher or similar sensitivity than non-specialized human readers in classifying radiographs as being normal or abnormal. The agreement between the human readers was poor. The performance of both human readers and the CAD system is expected to improve with training. Further studies are under-

way to develop a larger database for training of the CAD in high HIV prevalence areas.

PS-95496-07   Sensitivity of culture over direct smear microscopy for TB diagnosis in HIV-seropositive patients

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Introduction: HIV infection is a great challenge in TB diagnosis and treatment. Diagnosis of tuberculosis in HIV-positive persons is hampered by increased frequency of sputum smear negative results. There is a high possibility that a good number of TB patients co-infected with HIV would be missed out by direct smear microscopy during TB diagnosis.

Objective: To compare the sensitivity of direct smear microscopy method over culture on solid medium for the diagnosis of TB in HIV-positive patients.

Method: Diagnosis of TB in HIV positive patients was done using direct smear microscopy with Ziehl-Neelsen staining technique. Modified Petroff method with 4% NaOH was used for the decontamination of sputum samples. 2–3 drops of the sediments from each sample was inoculated unto LJ medium.

Result: A total of 673 HIV positive and negative patients were seen. 515 were HIV-positive while 158 were HIV negative. Among the HIV-positive patients, 45 (8%) were TB positive by microscopy while 131 (25%) were TB positive by culture. 33 (21%) of the HIV-negative population were TB positive by microscopy and 51 (32%) were TB positive by culture. There was a high significant difference between the two methods among the two populations. At 95% confidence interval P for HIV-positive population was <0.0001, while that for HIV-negative population was <0.02.

Conclusion: The result above suggests that approximately 88 HIV-positive patients with tuberculosis would have been missed by using only direct smear microscopy for TB diagnosis. Hence culture is recommended to augment direct smear microscopy for TB diagnosis in high HIV prevalence setting.

TOBACCO AND LUNG HEALTH II

PS-94070-07   Health facilities smoking control policies, implementation, barriers and challenges

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Introduction: In Egypt there are laws against tobacco, lack of enforcement of regulations exists.

Objective: To determine knowledge attitudes of health care facility staff and employees of the existing tobacco control regulations, articles of FCTC barriers towards its implementation.

Methodology: 24 PHC facilities, were included in study. Interview questionnaire was administered to convenient sample of administrative staff physicians, nurses, employees and service workers.

Results: Adjusting for sex, smoking prevalence was among employees (39%), nurses (30%), (12%) physicians. 90% of participants know that laws banning smoking in workplaces are enacted in Egypt; 56% were knowledgeable about law that limits the nicotine and tar contents of cigarettes. Participants (98%) never heard about FCTC among 2% who heard none knew that treaty was negotiated under auspices of WHO and that Egypt has ratified FCTC. 80% of participants think that because of the publicity about harmful tobacco use, anyone who starts using tobacco is fully aware of risks and those graphic warnings messages on tobacco packages, are not effective in motivating users to quit. 97% mentioned that health care institutions should be smoke-free. Suggestions: Provision of cessation programs. Smoking control committee Necessary material, logistical support.

Barriers: Lack of existence of enforcement strategies lack of cessation programs, lack of smoking cessation treatment, presence of physicians who are smokers (91%), smoking is not perceived as a priority problem.

Conclusions: Effective strategies for implementing smoke-free work are needed.

PS-94268-07   Evaluation of second-hand smoke on women patients

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Objective: To evaluate passive smoking on women patients.

Method: Analytical cross-sectional study.

Result: From 6/2006 to 6/2008, there were 138 cases of second-hand smoke on women patients. The average age was 48.3 (range, 22–77). 84.06% among them were over 35 years old and 87.68% were got married. There were 44.2% cases of involuntary smoking at home, 22.47% at workplaces and 33.33% at both. Passive smoking at home and at workplaces was 1.63 times higher than at one ($P = 0.037$). Group of women patients whose relatives have smoked ≥10 pack/year (74.64%) was easy to suffer from lung diseases 2.47 times higher than another ($P = 0.014$). Clinical symptoms were often mild breathless (88.41%), cough (71.01%), sputum productive (35.51%), chest tight (34.06%), sore throat (31.88%), trouble in sleep (59.42%) and anxious, exhausted, forgetful (65.94%). On the chest X-rays, there were mainly interstial lession (68.12%), emphysema (11.6%), tumor (2.17%). Simultaneously, 75.75% cases had normal lung function or mild limitation syndrome. Besides, 126 cases (91.3%) of passive smoking were respiratory diseases, including bronchitis (58.7%), pharyngitis (21.01%), next to 11 cases of asthma, 5 lung fibrosis and 3 lung cancer. On the other hand, there was 65.94% cases of mental disorders.

Conclusion: In our study, passive smoking women patients were easy to get many diseases but the most common was respiratory diseases and mental disorders.

PS-94349-07   Smoke free homes in Leeds and Lahore: an experience of shared learning

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Background: Children's exposure to second-hand smoke (SHS) leads to poor health outcomes, increased health care costs, lower educational attainment, higher uptake of smoking and widening health inequalities.

Methods: We carried out two linked demonstration projects in a deprived locality of Leeds, UK with a sizeable population of Pakistani origin, and in Lahore, Pakistan. The aim was to:
- Reduce the exposure of children to SHS in their homes.
- Share learning between the two communities with common ancestral origin.

Smoke Free Homes is designed to encourage people to formally sign a 'contract' to keep their homes smoke free. It consists of a) school-based educational activities; b) training health professionals and community workers; c) educational resources for families; and d) community-based events. The above components were developed and implemented jointly by a team of health professionals, school teachers and community leaders from Leeds and Lahore.

Results: Our baseline survey showed that smoking takes place in majority of households in Leeds (54%) and Lahore (60%). However, almost all children in Lahore living with smoker (s) (93%) were exposed to SHS compared to Leeds, where a smaller but considerable proportion (42%) were exposed. A post-intervention survey in Leeds showed that the proportion of households where smoking took place in the presence of children has more than halved (20%). Results of the post-intervention survey in Lahore are currently being analysed. Experiences of shared learning included development of culturally sensitive health promotion messages and materials, effective use of health trainers and lady health workers, using faith leaders for community mobilisation.

Conclusions: Our multi-faceted intervention was successful in reducing children's exposure to SHS in

the home. Developing and implementing Smoke Free Homes in two populations in different countries with shared ancestry is effective.

PS-94730-07   Over four years building capacity by conducting the Union training course in China

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Background: Over 20 years since beginning the collaboration between the International Union Against Tuberculosis and Lung Disease (The Union) and Chinese Government, The Union has been supporting capacity building in addition to support Tuberculosis (TB) control, lung health and tobacco control projects in China. From January 2005 to December 2008, the Union run 10 capacity building courses and 214 participants received the training. In order to evaluate the achievement, a brief review was conducted in December 2008.
Methods: To review the participants list and telephone contact with the participants. A predesigned questionnaire was distributed to the participants during the course on budget and financial management in Xi'an, 15–19 December 2008. 100% (19) of the participants filled and submitted the questionnaire.
Results: Of the 214 participants, 13 of them participated at least 2 courses. Therefore, actual number of persons who received the training is 92. Among the 92 participants, 41 of them successfully applied a Union or other international grant in TB or tobacco control by the end of 2008. 7 of them published paper in English academic journals. 15 of them got a promotion to a higher position. Among 19 participants who submitted the questionnaire, 100% (19) feel increased capacity and useful to their work. 100% (19) would like to attend the future courses or recommend other to participate. Regarding the timeframe of the course, 15 of them feel appropriate, 3 of them expressed too long, and 1 expressed too short. 3 participants suggest to have the teaching material before the course.
Conclusions: The Union training courses are important resources to improve capacity building on project management and development. Future training strategy for tobacco control, lung health and TB staff is very much needed.

PS-94804-07   The role of the World Lung Foundation in global tobacco control

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The mission of World Lung Foundation is to improve the lives of individuals globallyby strengthening community capacity to prevent and manage lung disease. World Lung Foundation supports the activities of a variety of groups and organizations active in tobacco control. The Foundation endorses the Framework Convention on Tobacco Control (FCTC), the world's first public health treaty. The treaty mandates bans on direct and indirect tobacco advertising, tobacco tax and price increases, smoke-free environments in public and workplaces, and health messages on tobacco packaging—and limits the predatory behavior of the international tobacco industry. World Lung Foundation receives funds from a multi-million dollar initiative established by Michael R. Bloomberg. Through the initiative, the Foundation supports tobacco control efforts (such as regional centres and a grants programme) of the International Union Against Tuberculosis and Lung Disease, and the Framework Convention Alliance, an international coalition of over 260 organizations undertaking advocacy in support of the FCTC. Efforts are focused on low and middle income countries with high tobacco burdens. The key components of the initiative are to refine and optimize tobacco control programmes to help smokers quit and prevent children from starting; support public sector efforts to pass and enforce key laws and implement effective policies; support advocates' efforts to educate communities; develop a rigorous system to monitor the status of global tobacco use. Practical examples of this include atlas publications, where health statistics are presented in understandable maps and lively graphics; and mass media campaigns; and development of an image library.

PS-94924-07   What factors lead to participating in smoking cessation program at Quitline in Iran?

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Introduction: The harmful effects of tobacco on health have been recognized for more than 3 decades, and the factors which influence success in stopping smoking have been extensively investigated.
Aims and Objectives: We have done this study considering the high rate of smoking in Iran, and in order to provide a better understanding of the factors associated with the initiation of an attempt and its subsequent success or failure. Since knowledge of these differences may allow us to modify the existing approaches to help smokers stop smoking.
Methods: 480 smokers calling the only Smoker Helpline in IRAN completed a questionnaire about the factors that led those seeking help and their feelings about stop smoking.

Results: 89.8% reported 'Health concerns' as a reason for trying to stop smoking and about 37% of them wanted to quit smoking to have a good sense of improved social character. The most common events that triggered these participants were the experience of health problem related to smoking (54.6%). Quite a few were 'ready' to quit smoking at the time of calling (60.8%). Also 59.1% of all mentioned that they had already tried to stop smoking about 1 to 4 times before. About half of our cases had not been thinking about stop smoking before they heard about the quit-line (54.2%).

Conclusions: This study has provided one of the most complete patterns yet on the psychological factors leading up to making a quit attempt among smokers in IRAN.

PS-94930-07 'Smoker Help-Line' in Iran: How does it work? (3rd year experience)

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Introduction: There are about 10 million smokers in Iran and smoking related deaths are about 70 000 annually. Although there are different methods for stop smoking, prominent recent development is the worldwide proliferation of telephone based tobacco cessation programs, commonly referred to as quitlines.

Aims and objectives: In this study that has been done for the 1st time in Iran, we evaluated the efficacy of Smoker Help-line in smoking cessation.

Methods: We gave several announcements, via smoking cessation clinic and some advertisements. The volunteers called to stop smoking; or they just wanted to get some information about smoking. The program was consisting of 5 sessions with 1 week interval. Our telephone counseling was both reactive and proactive. Smoking status was based on self-report and regular follow-up was conducted after quit day.

Results: More than 1000 cases made contact. 480 cases of all subjects entered in cessation programs and the others used the rest of Help-Line services. 80% of all cases were male. The mean age was 38.54 years. 72.7% of participants were married. 72.7% of subjects were educated. 51.3% of cases had high nicotine dependency. The mean duration of consulting for each one was 24.50 minutes. 148 cases (82.4%) had successful cessation after at least 4 sessions. The abstinent rate after 1, 3, 6 and 12 months was respectively 81.8%, 67.6%, 60.3 and 40%.

Conclusions: These reasonable results show that this method is an appropriate and accessible method which can be used in smoking cessation.

PS-94931-07 Relation between successful smoking cessation and intensity of nicotine withdrawal syndrome

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Introduction: Smoking cessation at any age is the most effective way to reduce disease progression especially in pulmonary disorders (COPD). Understanding the barriers against successful quit can increase efficacy of smoking cessation programs. It seems that one of the barriers is experience of nicotine withdrawal syndrome. In this study we have evaluated the relation between successful cessation and intensity of this syndrome.

Material and methods: It is a cross-sectional study. During a one month course the volunteers stopped their smoking by nicotine gum under the supervision of the physician. At the end of the second week after the quit date the intensity of nicotine withdrawal syndrome has been evaluated by using Minnesota test. To evaluate the relation intensity of nicotine withdrawal syndrome with the quit rate, we has used chi-square test.

Result: 298 participants have been studied. 67.8% were male. At the end of the course 45% were successful and 11% decreased cigarette consumption. 43.3% didn't finish the course. The success rate with high intensity of anxiety, restlessness, craving and depression were respectively 66.7%, 62.5%, 80.3% and 57.7%. The success rate with low intensity of mentioned syndromes were respectively 88%, 88.5%, 93.1% and 90.4% ($P = 0.002$).

Conclusion: There was statistical relation between intensity of some of nicotine, Withdrawal symptoms (irritability, depression, restlessness, craving) with successful cessation. So we should prevent and control this syndrome for increasing the successful cessation among the volunteers.

PS-94932-07 Evaluating relation of expiratory carbon monoxide and quitting result

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Introduction: Smoking is considering as the first preventable cause of mortality worldwide which is affected by social, family and individual issues. There are ways to estimate smoking state in practice and one of the most suitable, objectives and non-invasive way is expiratory carbon monoxide (CO) test.

Material and methods: This is a cross-sectional study. Data obtained from all smokers who had participated in 6 session group therapy smoking cessation courses of Tehran smoking cessation clinic during 2003–2004

and followed until 2006. The questionnaires were designed based on WHO and IUATLD forms. Expiratory carbon monoxide rate was evaluated through Pico test at first visit. Finally the obtained data were analyzed by T-test and chi-square test via v.16 SPSS.

Results: There were 347 samples in the study in which 292 persons (84.1%) were males. At the end of the course 237 (68.3) person were successful (nonsmoking even one puff after third session) and 27 (7.8%) persons were notable to quit smoking. 83 (23.9%) persons was missed. After diminishing the missing group, the rate of success in cessation was 89.8%. Evaluation of CO test showed that 98 persons (28.2%) with CO < 10 PPM, 149 cases (42.9%) with 11 CO < 20 and 100 persons (28.8%) with CO $\geq$ 20. The maximum cessation success rate was among the smokers with exhaled carbon monoxide lesser them 10 PPM ($P = 0.03$). Quitting rate was significantly more in person with low exhaled CO concentration ($P = 0.01$), low dependency and ($P = 0.01$), smoked less than 30 cigarettes per day ($P = 0.00$).

Conclusion: According to this study the smokers with high Expiratory CO rate had a poor opportunity to become successful, so it's recommended to design special classes and follow up with longer period of time and use combination therapy for them.

PS-94933-07   Evaluation of the intensity of nicotine withdrawal syndrome according to gender, smoking cessation

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Introduction: More than half of smokers experience the nicotine withdrawal syndrome after the quit. Different studies show that smoking cessation is more difficult among women comparing with men. There is a possibility that one reason to this difference is the difference in the intensity of nicotine withdrawal syndrome among two genders. So in this study we have compared this intensity among two genders.

Materials and methods: It is a cross-sectional study. The volunteers of smoking cessation clinic have been studied during November 2006 to April 2007. They stopped their cigarette smoking by physician's counseling and using nicotine gum. Intensity of nicotine withdrawal syndrome has been evaluated by using Minnesota test at the end of second week after quit date. Finally intensity of symptoms has been compared among two genders by χ^2 test.

Results: 197 persons participated in this study among which 65% were male. At the end of the course, 49.2% were successful in their quit. The mean of intensity of anxiety, irritability restlessness and depression among females were respectively (4.6 $\pm$ 3.6), (5.7 $\pm$ 3.3), (4.8 $\pm$ 3.9) and (4.5 $\pm$ 3.4). The mean of

intensity of anxiety, irritability restlessness and depression among males were respectively (2.6 $\pm$ 2.9), (3.6 $\pm$ 3.3), (3.3 $\pm$ 3.2) and (3.1 $\pm$ 3.2) ($P = 0.0002$).

Conclusion: The comparison between two genders shows that intensity of nicotine withdrawal syndrome among females was significantly more than males. So we should have different treatment protocol for women in smoking cessation clinics.

PS-94934-07   Tobacco harm knowledge and attitude among infertile couples

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Setting: High prevalence of tobacco consumption in childbearing ages is an important topic of consideration. The ill effects of tobacco use on general health is well known and it has also been shown influential on fertility.

Materials and methods: This study was a cross-sectional analysis. All individuals with complain of infertility who attended the Avicenna fertility clinic between November of 2007 until February 2008 were included. Information of interest was collected using a questionnaire with 4 questions on knowledge (with a score of 1–4) and 6 questions about attitude (with a score of 1–24) and was entered into the computer and analyzed using the SPSS 16 software, the t and χ^2 tests.

Results: A total of 684 individuals (342 couples) participated in the study. The mean score of knowledge was 0.49 ± 0.79 (from a total of 4) and the mean score for attitude was 19.1 ± 2.70 (from a total of 24). In this study, the mean score for knowledge among women was 0.44 ± 0.73 and among men 0.54 ± 0.84 and the mean score of attitude was 19.35 ± 2.55 for women and 18.85 ± 2.82 for men. A significant correlation between level of knowledge and age, gender, education level and experience with tobacco use was not found. Yet, attitude was significantly more appropriate in women, the educated and inexperienced in the use of tobacco products ($P = 0.001, P = 0.001, P = 0.03$).

Discussion: It appears that in the population studied, attitude is appropriate but level of knowledge is low and this shows that direct education is insufficient or that the mass media personnel are not providing appropriate information on the harms of tobacco. Therefore, effort should be made to increase the level of public knowledge about this issue particularly in communities where information level is low.

PS-94936-07   Evaluation of smoking habit among the infertile

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Introduction: Smoking is one of the significant factors, which is harmful for public health. It causes diseases such as fertility disorders. Different studies show that smoking decreases the quality and motility of sperms, it prevents the growth of ovarian follicles and decreases the fertility potency. So it is a necessary to estimate the smoking states in Iranian infertile society.

Material and methods: This is an analytical cross-sectioned study. Infertile people came to Avicenna Infertility Clinic in Tehran during 2007–2008 have been studied according sample size. Data has been collected through questionnaire based on WHO and IUATLD questionnaires. Data were analyzed with SPSS v.16 by t-test and χ^2 with $P = 0.05$.

Results: 684 Cases have been studied, among which 246 Cases (36%) Cases had smoking experience (12.6% of women and 59.4% of men) and smoking experience was significantly different ($P = 0.00$). Their mean age of smoking initiation was 20.1 ± 5.8 years. Totally, 141 person (20.6%) were smoker; 3.5% of women and 37.7% or men and smoking was significantly more in men ($P = 0.00$). 70 persons (10.2%) of smokers were daily smokers, 29 persons (4.2%) were occasional smokers and 42 persons (6.1%) were ex-smokers. The mean of nicotine dependency according fagerström test among in smoking group was 2.9 ± 2.8. 15 persons (16.1%) of smokers had high nicotine dependency, 17 persons (18.3%) had average nicotine dependency and 61 persons (65.6%) had low nicotine dependency.

Conclusion: As smoking prevalence in Iranian society is 12.5%, According or study, Smoking statistics in our population was likely about the whole society's population. May be it is due to the wrong report of our population about their smoking trend or it suggests that the population is more susceptible of getting infertility smoking related diseases. However, it is needed to do more researches through complementary studies.

PS-94941-07   Gene-environment interaction with passive tobacco smoking and development of asthma symptoms

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Setting: Pre-existing airway abnormalities contribute to early virus induced symptoms which usually remit in early childhood, whereas an interaction with airway inflammation causes exacerbations in asthma. Children, who experience wheezing in the first 3–4 years of life have reduced lung function and increased BHR prior to any respiratory illness. This predisposing airway dysfunction is also associated with maternal smoking during pregnancy (MSDP). Exposure to MSDP leads to increased expression of inflammatory mediator genes wich contributing to the development of AS, but the response may depend on variation in these genes.

Methods: The retrospective cohort survey, based on the registers of paediatrics depertments, comprised 68 chidren, aged 3–6 on the time to investigate who been admitted between winter seasons 2001 and 2005 for a first RSV before age 1, was performed in order to elaborate and correlate possible specificity of asthma and BHR in term of pre- and postanatal smoke exposure were collected retrospectively from patientsjournal. Exposure to environmental passive tobacco smoking was defined as MSDP, smoke exposure in infancy and/or at the time of enrollment.

Results: There are significant overall interaction with environmental passive tobacco smoking with respect to wheeze in children up to 4 years old. Transient wheeze up to 2 years also occurs in those whose mothers have never smoked, suggesting additional prenatal environmental or genetic influences and fetal programming (metarnal age, chronic diseases, heredity, atopic predisposition).

Conclusions: Passive tobacco smoking is an independent factor for asthma in early adult age in subject with early wheezing. Prenatal smoke exposure may impair airway function and development of BHR.

PS-95111-07   Experiences in administering a tobacco control grants program: The Union grants team experience

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At the beginning of 2007 a Grants Program was established with funding from the Bloomberg Initiative to Reduce Tobacco Use, and is jointly administered by The International Union Against Tuberculosis and Lung Disease (The Union) and Campaign for Tobacco-Free Kids. The administrative processes developed and implemented by The Union's Grants Team have been based on the successes of other Union programmes, as well as the necessity to adapt to the current needs of global tobacco control, from the point of submission through to grant giving and monitoring. An integral part of the Grants Program has been the development of a grants database and the use of online tools for efficient submission, processing and reporting. This presentation will explore the administrative challenges and opportunities faced by The

Union Grants Team. Challenges include cross-cultural and language boundaries, for example the processing of applications from low- and middle-income countries. Other challenges include the fast-paced development of the program, and the importance of developing, reviewing and maintaining the grants database. Confidentiality and its impact and importance to the Grants Team will also be presented. Opportunities to be explored are the ongoing collaboration with key partners and organisations through administrative support and networking, as well as the tools used to deliver a highly visible and efficient grants program. The administrative processes of The Union Grants Team's monitoring system will also be presented, as well as the next steps in developing and maintaining administration support for the Bloomberg Initiative to Reduce Tobacco Use Grants Program by The Union.

PS-95140-07 Expression of P53-bcl2-bax proteins in normal oral mucosa of chronic smokers of Nargilla

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Aim: To study the expression of p53-bax-bcl2 protein by IHC in clinically and microscopically normal oral epithelial in heavy smokers of nargilla.
Methods: The group of study consist of 21 heavy smokers of nargilla, five healthy nonsmokers of nargilla or cigarette considered as control group. Biopsies had taken from oral buccal mucosa from both groups and stained with p53-bax-bcl2 anti body by IHC.
Results: Histological examination shows epithelial hyperplasia (EH) in 13 (61%) of nargilla smokers and 1 (20%) in control group with no evidence of dysplasia in all cases. The rest of cases were normal oral epithelial (NE):
  —p53 expression was restricted to the basal cell layer only, Maximum percent of positivity is 8.5% in smokers, Maximum percent of positivity is 6% in control group, No statistical differences between tow group ($P = 0.819$).
  —Strong Cytoplasmic Expression of bax protein across all layers of epithelial, especially in medium layers and week expression in upper layers, No statistical differences between tow group ($P = 0.05$).
  —Cytoplasmic Expression of bcl2 protein was restricted to the basal cell layer only; we also notice bcl2 expression in lymphocytic infiltration in the sub epithelial tissue. There was statically differences between two groups ($P = 0.043$), expression of bcl2 protein decrease in nargilla smokers in compare with control group.
Conclusion: Decrease expression of bcl2 in normal oral mucosa of heavy smokers of nargilla and high levels of bax protein expression with active normal p53 protein may propose that DNA damaged cells by narghilla carcinogenic agents are eliminated by activation of apoptosis pathway.

PS-95282-07 Smoke-free regulations in India: developing the shield against second-hand smoke

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Background: A law is as effective as it is implemented; though, the Government of India passed rules for effective realization of the objectives of smoke free environments, it did not yield desired results. In the light of fresh evidence and with the adoption of the guidelines on Article 8 of the FCTC, the Ministry of Health and Family Welfare (MoHFW) decided to formulate new regulations against exposure to second hand smoke. In developing these fresh regulations coordinated scientific review was undertaken by HRIDAY.
Objective: It is hereby envisioned to capture the development of the smoke-free rules of 2008 in India and a comparative analysis is proposed with the previously notified regulations of 2004.
Method: In formulating the rules besides the consultations with the enforcement officers, background papers, smoke-free laws and regulations from other jurisdictions, FCTC guidelines and other best practices were minutely analysed and the best possible adaptations were recommended for inclusion in the Indian regulation.
Result: Government's regulation GSR 417 (E) is a comprehensive smoke-free regulation that most nearly complies with the FCTC mandate and its guidelines. Besides giving an inclusive definition of 'public places', it proposes a strict ventilation norm and enlists the duties and number of officers who would implement the regulations. The effectiveness of the rules left the industry gasping and it cried foul before the High Court of Delhi. However, on request from the Union of India the Supreme Court of India refused to give any relief to the industry.
Conclusion: Though a progressive regulation it has a few minor gaps that might require timely corrective measures.

PS-95296-07   Smoke-free workplaces: an essential for protecting workers' health in India

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Background: India is the largest tuberculosis (TB) burden country with one-fifth of the global incidence —an estimated 1.9 cases annually. Tobacco use and exposure to second hand smoke (SHS) exacerbate progression of and may increase risk of TB. Occupational exposure to SHS at work causes 14% of all work related deaths.

Methodology: The Indian Tobacco Control Law prohibits smoking in all public places and workplaces. Sensitization programmes for private and public sector companies have been initiated to prevent and reduce occupational exposure to SHS. During February–March 2009, senior management, managers and medical officers representing these important stakeholders have been actively engaged in deliberations focused on the negative impact of tobacco use on individual and corporate productivity, effective measures for implementing smoke-free policies and providing tobacco cessation services at workplaces. Companies have been provided resource material for creating a conducive environment, supportive of smoke-free policies.

Results: Comprehensive action plans were developed by participating companies to ensure their worksites are 100% smoke-free and tobacco cessation services are provided. 35 companies have endorsed a 'Statement of Commitment' for smoke-free workplaces and many more are expected to express their support. Pre and post evaluation of these proceedings are underway.

Conclusion: Such collaborative efforts engaging the government, civil society and industries are important for effective enforcement of smoke-free law at workplaces. The next step is to facilitate development and enforcement of comprehensive smoke-free policies for these worksites, congruent to government regulations. TB control programmes might benefit from interventions aimed at reducing tobacco use and exposure to SHS at workplaces.

PS-95573-07   The Egyptian National Coalition Tobacco Control: a case study

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Aim: To highlight the role of The Union Middle East (UME) in supporting the establishment of a National Coalition on Tobacco Control in Egypt by a variety of NGOs in collaboration with The MOHP-Egypt.

Methods: Analysis of Strengths, weaknesses, Opportunities and Threats of the National Tobacco Control Program in Egypt was conducted by The UME which identified the scarce financial recourses as well as the extreme lack of manpower within the MOH to effectively implement and monitor tobacco control policies in Egypt. Through creating a database of most NGOs in Egypt, The UME was able to identify the potential members of a proposed coalition.

Results: Two NGO meetings were supported by The UME in collaboration with The MOH. The outcomes of the meetings were the formal decision by 18 NGOs with diverse geographical distribution to establish the National Coalition and the formulation of the 2 years work plan based on the gaps in and the needs of the national tobacco control program in Egypt.

Conclusion: Recognizing the important role the coalition can play in adding a momentum to the national tobacco control efforts in Egypt, The Union Middle East office in collaboration with The Tobacco Control Department Ministry of Health and Population have facilitated networking and planning by NGOs to establish and build a National Tobacco Control Coalition in Egypt. The NGOs members of the coalition will collaborate with the MOH in implementing tobacco control polices in Egypt as they have the needed human resources, wide geographical outreach as well as the experience to work at the grass root levels.

PS-95593-07   The risk of lifelong DNA damage caused by lung cancer among rural male smokers who begin at teenage

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Goals: To examine the effect of smoking on lung cancer risk and entire DNA damage in a relative large number of rural men, many of whom are poor and started smoking as teenagers.

Methods: We followed 50 232 men, ages 25 to 50 years, through a community-based tobacco control outreach programme with questionnaires both in English and the local language to the North western and North eastern Nigerian Cohort Study in 2002/2003, through December 2007. We estimated relative risk (RR) of lung cancer associated with different measures of smoking initiation, duration, and intensity adjusting for confounding variables. We conducted analyses on the entire study population, among men who had smoked for at least 15 years, among non drinkers, and separately for each geo-political zone.

Results: Altogether, 10 240 men were diagnosed with lung cancer. Compared with never smokers, men who smoked for at least 15 years and who smoked 10 cigarettes or more daily had a higher RR. In contrast, men who had smoked for at least 15 years, but started after their 19th birthday, did not experience

an increased lung cancer risk. The increased RR associated with smoking was observed among nondrinkers of alcohol, men with and without a family history of lung cancer in both geo-political zones in Nigeria. **Conclusion:** Our results support the notion that men who start smoking as teenagers and continue to smoke for at least 15 years may increase their lung cancer risk with dramatic and lifelong DNA damage.

ADVOCACY, COMMUNICATION AND SOCIAL MOBILISATION FOR TB

PS-94270-07   Advocacy, Communication and Social Mobilization (ACSM) vis-à-vis tuberculosis control: an assessment

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Background and challenges to implementation: Tuberculosis (TB) has been known to be a major public health challenge in India for a long time. Advocacy, Communication and Social Mobilization (ACSM) is one of the key strategies of Revised National Tuberculosis Control Programme (RNTCP) in reaching masses and detecting new cases.

Intervention or response: Advocacy programmes focused on local leaders, communication targeted individuals and social mobilisation aimed at secure support from board public. Attempt has been made to understand the referrals flow from the ACSM perspective of tuberculosis control unit of Narsapur. Collected 12 months ACSM data from Microscopic Centres (MC's) TB register and referral slips. Overall 51 advocacy, 144 social mobilisation and 52 communication programmes reached around 15 818 population including paramedical and registered medical practitioners.

Results: Of the 1919 TB cases referrals from January to December 2008, 594 [31%] cases were put on DOTS. Of 1295 male and 624 female referrals, 31.4 percent male 30 percent female TB cases detected. Advocacy and social mobilization programmes for community leaders and paramedical workers resulted in referring 784 suspects and communication programmes such as folk media and film shows resulted in 164 suspects in a TU catchment area. However, the case detection rate is highest among the self-help group referrals, which is 43 percent. The case detection rate has increased considerably by 58 percent, from 106 patients in first quarter to 184 patients in the fourth quarter.

Conclusions: The ACSM strategy has substantially increased TB case detection and established a strong mechanism of referral system. In the setting of a strong NGO sector, the combination of ACSM is a promising approach to improve TB case detection. Recognizing the importance, the new guidelines of RNTCP included ACSM as an individual scheme.
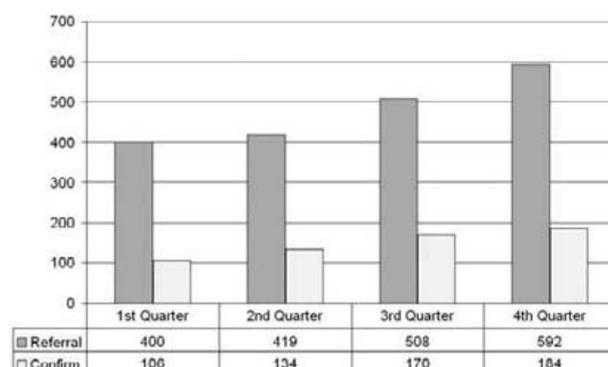
Figure ACSM vis-à-vis Quarter wise performance.

PS-94314-07   Advocacy, communication and social mobilization in Mexico: the SOLUCION TB experience

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In 2006, Project Concern International carried out a needs assessment process that in turn became a program proposal. The SOLUCION TB Expansion (STBE) project began in 2007, in partnership with the Mexican National TB Program, the State TB departments of 13 participant states and with the support of the USAID mission in Mexico. The project includes 3 main strategies: the provision of human resources for TB; the building of capacities of persons with TB (PATB) and health providers and the implementation of Advocacy, Communication and Social Mobilization strategies. The project promotes the empowerment of persons with TB; A person-centered approach to service provision and mobilization of communities affected by TB. The project seeks to increase political support for TB. STBE is implemented in 35 priority jurisdiction within 13 different states that together account for over 65% of all TB cases in Mexico. The earlier needs assessment indicated that the subject of 'advocacy' was not well known or understood within the ministry of health, and often confused with health promotion. While Mexico has developed appropriate guidelines for TB control, cure and detection rates vary widely amongst participant jurisdiction. Migration, HIV/AIDS co-infection, substance abuse and Diabetes are present and affect treatment outcome. In order to improve the provision of services in TB control, increase adherence and improve cure and detection rates, the TB control

programs at the state and jurisdiction level require the incorporation of a new service delivery model. In over a year, STBE has contributed to better TB outcomes increases of: 65% in # of baciloscopies compared to the same period the year before; 37% of new TB cases diagnosed and 32% of symptomatic studied.

PS-94316-07   From awareness to activism: the voices and images for TB project in Tijuana, Mexico

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In late 2007, the voices and images (VAI) for TB project started in Tijuana, Mexico. The VAI Tijuana is a collaboration between Project Concern International, the US–Mexico Border Health Association (USMBHA), the Ministry of Health and the Voices and Images advisory committee comprised of decision-makers, influentials and Persons affected by TB (PATB). The objective of the voices and images project is to increase awareness and public support for TB control. The VAI is an examplo of an advocacy, communication and social mobilization strategy and its goal is to improve TB detection and cure rates. The project consists of a group of PATB who receive training in TB and picture-taking and develop a series of photographs of their lives affected by TB including a short story of what the picture tells. A group of 8 individuals from Tijuana took pictures and develop the galery, and an additional 8 participate in an advisory committe for the project. In 2008, the joint efforts between the partners resulted in increased visibility and media participation around World TB Day. An estimated $16,000 US cy. in media coverage were obtained pro-bono, and over 580 000 individuals were reached with TB messages. The project resulted in increased activisim by VAI participants who became

advocates for TB control and have collaborated with the SOLUCION TB Expansion project making presentations at local, regional and binational TB forums. The Photovoice methodology helps humanize Tuberculosis and compellingly informs stakeholders on the daily challenges faced by those affected, resulting in improved awareness and resources for TB programs. The Voices and Images project products are useful to improve awareness and decrease stigma amongst health workers and service providers. The methodology helps empower persons with TB and their families who become advocates for their own health and wellbeing. The VAI project is being expanded throughout the 13 states where Project Concern works.

PS-94456-07   Million Youth March to Stop TB: innovative campaign in WHO Eastern Mediterranean Region

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Aim: Young people signify energy and commitment to a better future. The Eastern Mediterranean Partnership to Stop TB on the occasion of World Tuberculosis Day 2009, managed to gather one million youth in countries of WHO's Eastern Mediterranean Region. These young people from villages of Afghanistan to historic cities of Morocco, raised their voice collectively and pledged support to the existing one million tuberculosis affected patients and their families.
Methods: Activity plans and reports submitted by national tuberculosis programme and other implementing partners.
Results: Out of 22 countries in the Region, 18 submitted and conducted the march activities. More than 1 million school children, college and university students gathered along with national tuberculosis programmes and civil society in streets, historical and places of national importance and educational institutions. Several political and development leaders led the gatherings in different countries. A large number of print and electronic media commented on the event and considered it a unique happening in the Region. In some countries shopping malls established exclusive desks to disseminate information on TB. Innovative infotainment activities like march songs in English and local languages were organized.
Conclusions: Tuberculosis is a socio economic issue. Young people being an important segment of society need to be engaged in the fight against tuberculosis. Their involvement in awareness raising will help build profile of tuberculosis as a national public health and development threat that needs to be tackled on urgent basis. It will also help national tuberculosis programmes make the fight against tuberculosis multi sectoral and more inclusive.

PS-94708-07   Comparative evaluation of TB awareness rising interventions implemented by Project HOPE, Kyrgyzstan

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Background: In Kyrgyzstan a KAP survey was carried out in 2005 and 2008 to identify knowledge, attitude and practices of health providers, patients and the population in TB control and to evaluate the success of interventions in that area.
Methods: Questionnaires were developed by HOPE staff. Interviews and the analysis were conducted by trained workers of the experienced research Consulting Agency. Questionnaires, interviews and analysis in 2005 and 2008 were similar to obtain reliable comparisons.
Results: Data are provided for 2005 and 2008 respectively. Explanation that sputum examination is essential for making a correct diagnosis improved from 28% to 96% for TB specialists and in 20% to 96% for PHC physicians. Prescription of non-specific therapy for TB suspects increased from 40% to 64% among family doctors. All TB nurses and 80% of PHC nurses compared to 48% for both in 2005 believe now that unobserved treatment may result in development of drug-resistant TB. 68% of family nurses compared to 16% in 2005 explain patients that TB treatment is free of charge. Patients could name three and more TB symptoms in 95% versus 50% previously. Patients with symptoms visiting a doctor within 30 days increased from 39% to 73%.
Conclusion: The survey showed that awareness of health providers, patients and population about TB in 2008 has doubled to tripled compared to 2005, which may be seen as evidence for successful interventions. Nevertheless, further improvement is possible, both among professionals through enhanced training efforts and the general population through ACSM activities.

PS-94808-07   ACSM: involving different groups in TB control

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Introduction: Tuberculosis is a major public health problem in Bangladesh. Bangladesh is ranked 6th among the 22 high burden countries of the world by WHO. BRAC an NGO is collaborating with NTP in delivering services, demand creation and support generation. Advocacy, communication and social mobilization (ACSM) component is an important part of BRAC's community based TB Control Program.
Objective: To enhance knowledge and awareness on TB among community to increase early diagnosis and treatment adherence.

Method: BRAC is conducting different types of orientation sessions like advocacy workshops, round-table discussion, conferences and talk shows on TV, orientation of different stakeholders like local opinion and religious leaders, girls and boys scout, cured TB patients, civil society representatives. Popular theatres, folk songs, miking on TB are done at community level. Innovative IEC materials are used to accomplish these activities.

Result: In 2008 BRAC oriented 16 013 village doctors, 1709 religious leaders, 15 753 opinion leaders, 1992 girls and boys scout, 17 209 cured TB patients and 3182 factory workers. One round-table meeting with journalist was held, and 27 articles and 111 reports published in different newspapers. Case detection and cure rate is 78% and 94% in 2008 and 2007 respectively.

Conclusion: ACSM activities empower people on TB control; enhance early access to TB diagnostics and treatment services to involve them in DOTS services. Targeting ACSM activities are useful when there is policy level involvement like religious and opinion leaders, girls and boys scout, cured TB patients, journalist of newspaper and media.

PS-94999-07 Once in my life, someone called me 'brother': empowering tuberculosis patient's spirit

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Background: A needs assessment for the TB patient network conducted in Chiang Rai Hospital (CRH) suggested that most TB patients need encouragement from peers and economic support. CRH has experience in involving patient networks to care for people with HIV, diabetes and cancer but not for people with TB. None of the existing patient networks play a role in supporting poor patients.

Intervention: A group of volunteers who completed TB treatment set up a TB patient network in CRH. The volunteers provide TB education, HIV counseling and assist patients who need financial support.

Results: In a three months-period, the volunteers supported 33 TB patients. Of these, 12 patients received food, travel support and welfare referral. An impressive case study is that of a homeless man living with HIV. He completed TB treatment but tried to commit suicide because he felt lonely and hopeless with life. He could not start antiretroviral treatment (ART) due to unmet criteria. He neither had a home nor relatives who could be his ART-supporters. How-

ever, the volunteers successfully contacted a temple for him to live in, where a monk accepted to be his ART-supporter. To our surprise, a month later, the man who tried to commit suicide, a skinny man with dirty clothes, has become a new man. He said, 'I get a new life. I get warm support, I become strong. I am so exciting to be called '(elder)brother'. It is first time in my life that I feel someone pay respect to me and consider me as a relative.'

Conclusion: The TB patient network empowers poor and marginalized patients. The empowered patients also empowered health staff and volunteers.

PS-95097-07 Tuberculosis advocacy communication and social mobilization, Nepal

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Setting: About 27 million population with annual risk tuberculosis (TB) infection 1.53 in Nepal. DOTS services are available throughout the country achieving about 68% case detection and more than 85% treatment success rates.

Aim: To increase TB case detection and cure rates with DOTS.

Methods: Different types of media are being used such as electronic (radio, TV, local radio), print (national and local newspapers) and others (folks, street drama, public opinion, rallies, talk show). Public-private partnership has been built with civil societies, clubs, female community health volunteers, traditional healers, patient's organization. Leaflets, bill boards, poster, banners, wall painting are also used.

Result: Since introduction of DOTS in 1996, case finding was gradually increased and now it reached at 68% nationally. Treatment success rates were maintained for 8 years at 87% and defaulters rates was 04 in 2007.

Conclusion: Advocacy and social mobilization plays key role in increased case finding and treatment success rates in Nepal. TB Control programme has to enhance these activities at community level.

PS-95271-07 Patient empowerment to enhance adherence to MDR-TB treatment: experience in the Philippines

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Background: In the Philippines, MDR-TB patients either cured or almost cured have been engaged as treatment partners to co-patients in MDR-TB treatment centers (TC) mainly to improve treatment adherence. This initiative was done since patients were

deemed effective in motivating co-patients in adhering to treatment having experienced the same course themselves.

Objectives: To describe the involvement of patient volunteers in the management of MDR-TB in 5 TCs in Metro Manila.

Methods: Structured questionnaires to assess how patient volunteers participate in TC activities were distributed among patient volunteers, non-volunteer patients, and TC staff. The questionnaires given focused on identifying the benefits and acceptability of involving patient volunteers in the management of MDR-TB, qualifications for selection, tasks performed, needed training and support.

Results: Of 27 patient volunteers, 25 (93%) answered the questionnaires as well as 25 non-volunteer patients and 42 TC staff. Of the 25 patient volunteers, 24 had orientations on DOTS and MDR-TB management. Responses showed that patient volunteers mainly provided clinic- or home-based DOT for co-patients, a task viewed by 88% of non-volunteer patients as acceptable. The patient volunteers were also involved in other tasks for clinic, community, and peer support activities. TC staff acknowledged that patient volunteers unloaded them in their daily work and responsibilities and regarded them effective in encouraging co-patients to improve treatment adherence.

Conclusions: Engaging patient volunteers in MDR-TB management can be highly effective since they show better understanding, having experienced the same treatment themselves. It is imperative that they be given adequate support as well as standardized and regular training to be able to provide high level of quality care to co-patients.

Table   Tasks and responsibilities delegated to patient volunteers at TDF-MMC, LCP-PHDU, KASAKA-QI, DJNRMH, and PTSI-Tayuman treatment centers

	Response (n = 163)	
	n	%
Clinic activities		
DOT	67	41.1
Drug preparation	17	10.4
Maintenance of the clinic	16	9.8
Running errands/helping the staff	16	9.8
Noting patient attendance	5	3.1
Recognition of adverse drug reactions and taking proper action	2	1.2
Health education	2	1.2
Arranging charts	1	0.6
Taking vital signs	1	0.6
Assisting in sputum collection	1	0.6
Community activities		
Home DOT	15	9.2
Default tracing	4	2.5
Peer support		
Encouraging co-patients	9	5.5
Attending to patients' needs	5	3.1
Assisting in psychosocial activities	1	0.6
Assisting in livelihood activities	1	0.6

PS-95304-07   Success story on district-based information strategy to address chronic gaps on HMIS, Kenya

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Background and implementation approach: Kenya is plagued by a lack of reliable health data to inform decision-making at policy and implementation levels. To improve the quality of health reports, mainly for the TB and HIV programs, we devised a pilot program to coordinate health data management stakeholders to work in unison, pool resources, and collaborate with the District Health Management Teams (DHMT) to eliminate duplicated efforts.

Analysis design and methods: Stakeholders designed a pilot to test the strategy's feasibility in two intervention districts in Eastern province, Embu and Mbeere. We conducted a pre-intervention evaluation of the quality of districts' health and logistics reports. The intervention was a one-day training of DHMT members and follow-up with monthly district data review meetings. The meetings provided a forum to receive reports from all health facilities and provide feedback to peripheral staff. We compared the pre- and post-intervention assessments in the two districts and also reports from seven control districts.

Results: After one year, reporting rates for the two intervention districts shot up and remained high: Embu from 50–85%, Mbeere from 55–98%, with data completeness overall rising from 40–83%. The monthly meetings boosted staff team spirit; the staffs are now lobbying other programs/stakeholders to support this strategy to ensure its sustainability. DHMTs in the control districts are demanding quick implementation of this strategy in their districts.

Conclusions and recommendations: The monthly data review meetings coordinated by DHMT with support from stakeholders resulted in major improvements in data quality and reporting. The MOH and partners need to develop policy guidelines and resources to support rollout of this coordination strategy to systematically address the information system problems facing the public health sector.

PS-95306-07   ACSM plays an integral role in reducing the burden of TB amongst impoverished communities

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Objectives: To assess the impact of Advocacy, Communication and Social mobilization (ACSM) initiatives carried out by TBFREE, a private-public partnership between the South African National Department

of Health, Sanofi-Aventis and the Nelson Mandela Foundation, on TB awareness in rural and urban South Africa.

Methods: 1) Questionnaires on previous TB advertising and education campaigns were posed to persons in 11 villages from 8 provinces. 2) The numbers of persons screened for TB and HIV as a result of the ACSM initiatives during the roadshow were assessed.

Results: 1) Questionnaire: five urban and four rural areas were included. Of 180 persons surveyed, 130 responded. In rural areas, 54% (38/70) found radio more useful than newspapers (28%) and television (17%). Approximately 71% of rural responders found door to door campaigns useful to discuss TB and HIV with healthcare workers. In urban areas, 46% (28/60) of those interviewed reported receiving TB messages via branded taxis (18%), radio (15%), television (10%), newspapers (3%), billboards (0.7%). The most useful media were branded taxis, radio, TV and print adverts. Door to door campaigns gave people the opportunity to ask confidential questions. 2) Roadshow: a) nearly 30 000 people were reached nationwide. Those with TB symptoms were encouraged to undergo TB testing; b) 4318 were screened for TB and 37 were diagnosed; only 7 were placed on treatment; the remainder gave incorrect addresses or were already on treatment but could not be linked to the road show; c) of 747 (17%) who underwent VCT, 192 were HIV-positive and were referred to local healthcare facilities. TB facilities indicated that the ACSM activities increased the numbers of TB cases notified.

Discussion: The awareness of TB in most of the communities is directly linked to HIV/AIDS. The road show was effective in spreading TB messages. Radio is the most widely used medium. The effectiveness of radio versus television and print advertising is considerable. Newspaper readership is low due to cost, but free newspapers are read and passed on, reaching a larger audience, and have been found to be effective in spreading TB messages.

Conclusion: ACSM initiatives have had a positive effect on TB control. Door to door campaigns, interactive education and awareness initiatives should be continued.

PS-95644-07   Comunicacion sobre tuberculosis en la Jurisdiccion con mayor numero de casos Zacatecas, Mexico

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Objetivo : Informar a la población la existencia de la tuberculosis, sus principales signos, síntomas y los riesgos de contagio, así como la gratuidad del servicio.

Metodología : Se gestiono con medios de comunicación, Iglesia, Municipio, Comercios, Escuelas y DIF, la participación para la difusión de la tuberculosis.

Resultados : En la última página del misal del obispado se describen mensajes de tuberculosis, las panaderías otorgan bolsas selladas con mensajes alusivos aprox. 20 000, Sellado de recetarios médicos las cuales se distribuyen a todos la Jurisdicción ; se han emitido 18 mensajes en el periódico escritos y electrónicos, Se cuenta con apoyo del municipio para traslado del personal, difusión y promoción, A 10 meses de comienzo, aumento de detecciones realizadas en las cuales el personal del proyecto contribuye con el 22.1% de los sintomáticos respiratorios estudiados lo cual representa una mejoría de 25 puntos en relación del año 2007 Curación de 100% primer semestre 2008.

Conclusiones : Los medios de comunicación y la integración de otras organizaciones, fortalecen la difusión de la tuberculosis y permiten realizar diagnostico oportuno, empoderamiento de la población y mejoramiento en detección y curación.

PS-95651-07   Movilizacion social para la informacion en tuberculosis y empoderamiento de colonos

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Introducción : La movilización social en tuberculosis es una política mundial en proceso de aplicación en México, sin embargo su impacto no ha sido estudiado. Para este efecto, se realizo taller participativo de movilización social en tuberculosis y se verifico el aumento de la información a través de los lideres comunitarios, de los contactos, vecinos de enfermos de tuberculosis y de la comunidad en general previo criterio de selección en las zonas rurales del Regiones Sanitarias de Tonala, Tlaquepaque, regiones sanitarias, III, IV y IX.

Intervención : Estudio cuasiexperimental; se aplicaron 2700 encuestas en 31 municipios. Se realizaron talleres participativos, con colonos, con apoyo dirigido por lideres comunitarios ; a contactos y vecinos, se realizo pre y post evaluación, para conocer el grado de información de los participantes.

Resultado : La convocatoria del ayuntamiento demostró su liderazgo, con participación >60%, mejor a la situación previa. La prueba piloto fue la única donde intervinieron todos los lideres comunitarios. La información de los participantes mejoro significativamente en los componentes estudiados.

Conclusión : Los resultados señalan que debe darse continuidad a los talleres participativos, pues la población no puede ayudara a prevenir algo que no conoce. La tuberculosis ha rebasado la capacidad del

sector salud para el combate aislado, y deben participar todos los sectores sociales mediante alianzas para el control efectivo de la misma.

DOTS: PUBLIC-PRIVATE MIX

PS-94132-07 Tuberculosis detection in private laboratories in Syria

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Aim: To investigate the extent of engagement of the private sector in the diagnosis and management of tuberculosis, and the extent of underreporting of sputum smear positive cases to the national tuberculosis control programme (NTP).

Method: A comprehensive survey of all tuberculosis suspects referred to all private laboratories performing sputum smear microscopy in Syria ($n = 285$) was conducted during the 4th quarter of 2007. Positive cases were traced back in the NTP registers to verify their status of registration at the NTP and evaluate the extent of underreporting of cases at the NTP.

Results: 290 TB suspects were referred to the private laboratories by private practitioners compared to 2041 referred to NTP laboratories during the fourth quarter of 2006. The reason of referral was to confirm diagnosis. Males constituted 72.2% of suspects, and 33% of suspects were aged between 25–34 years of age. 47 (12%) were sputum smear positive, of which 41 were registered at NTP and 6 were missed. There was complete agreement between the diagnosis made in the NTP and in the private sector. Surveillance data showed that during the same quarter, 285 sputum smear positive cases were notified to NTP.

Conclusion: The NTP plays a major role in the diagnosis and treatment of tuberculosis cases in the country and only a limited proportion of cases are not detected by the NTP suggesting a high case detection in the country.

PS-94285-07 Role of non-government organizations to address tuberculosis in low-income countries

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Background: The Revised National Tuberculosis Control Program (RNTCP) in India is one of the few DOTS programs to have prescribed guidelines for involvement of non-government organizations (NGOs) in the program. On the basis of independent assessment of the NGOs working under the RNTCP, commissioned by Government of India and conducted by the Institute of Health Management Research, Jaipur, this paper reviews the schemes and draws lessons for future partnership.

Design and methods: The data were collected during September–October 2008 covering 108 key officials of 21 NGO and government facilities in four states using qualitative and quantitative methods.

Results: This study analyzes key issues of existing collaboration between government and NGOs in RNTCP for the schemes. It examines NGOs' overall capacity and their contribution to the performance, program components-wise planning, implementation, monitoring, and evaluation; and liaison with the district and state program cell. The study indicates that government-NGO collaboration is an effective way of improving access to and quality of RNTCP. To make it more effective, the recommendations included: strengthening participation of NGOs; better utilization of MIS for local decision-making; re-examine age and sex-disaggregated data; combining TB and HIV at least for creating awareness and counselling; building research capacity at the local level; implementing the behaviour change communication strategy effectively; develop guidelines and tools for minimizing gender disparities; and linkages with the development activities.

Conclusion and recommendations: The partnership requires increasingly better management, communication, and leadership on the part of managers both in public sector as well as non government sector.

PS-94338-07 Use of a checklist to improve treatment success in PPM DOTS centers

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Objective: To find out if a check list for smear positive TB patients could have any impact on Cure rate and treatment success rate.

Design: Intervention studies.

Setting: The study covered 5 major leading private hospitals in Mombasa Kenya. Through PPM initiative all the big hospitals are engaged in TB control activities in line with the national TB control strategies. Doctors in private practise refer their TB patients to these hospitals for continued TB care, case recording and reporting. In these private institution cure rate and treatment success rates has remained extremely low. Some of the contributing factors include lack of capacity building for frontline health care worker in private sector, poor referral linkage, high staff turnover and poor patients follow up.

Intervention: A checklist of all smear positive TB patients were made per facility on quarterly basis where follow up dates when the patient is expected to undergo sputum examination is clearly indicated. The TB nurse has to refer to the check list before giving

out drugs and remind the patients about the investigation which is due.

Results: Generally the cure rate increased from 38% in quarter 1 2007 to 81% quarter 4 2007. Below is a table which shows how the 5 private hospitals performed with the intervention, note that study only concentrated on the smear positive TB cases.

Hospitals	qtr 1 2007	qtr 2 2007	qtr 3 2007	qtr 4 2007
Mombasa	—	40%	43%	80%
Aga khan	25%	33%	50%	80%
Pandya	56%	25%	25%	86%
Avenue	—	—	—	100%
Aar	—	—	—	100%

Apart from Panya hospital, which started with a cure rate of 56%, all the other hospitals recorded gradual increase in their cure rates. In Pandya hospital default from treatment hindered the institution from improving the cure rates.

Study and report compiled by Godana M. Barako, Project officer Kenya Association for Prevention of TB and Lung Diseases.

PS-94364-07   Is there a role for patent medicine vendors in tuberculosis control in southern Nigeria?

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Background: Patent Medicine Vendors are an ubiquitous feature of the informal health sector in Nigeria. A previous study on health-seeking behaviour of persons with chronic cough in southern Nigeria found that over 60% of respondents chose the PMV as health provider of first instance.

This study sought to determine the willingness and capability of PMVs to play a role in the national tuberculosis control effort.

Methods: Study sites were selected through a multistage sampling process. A total of 388 PMVs, 17 principal officers of PMV-associations and 17 community leaders were purposively selected.

Structured questionnaires were administered to the PMVs while information from principal officers of PMV-associations and community leaders was elicited through in-depth interviews and Focus Group Discussions (FGDs). Quantitative data were collated in Epi Info version 6.04 and analysed using SPSS version 15.

Results: Majority (90%) of he PMVs indicated they would be ready to co-operate with the national tuberculosis control programme. More than two-thirds (73%) have attended to persons with prolonged cough in the course of their career. However, nearly half (48%) did not know the cause of tuberculosis. Only 3% indicated they ever attended a training session on tuberculosis control. 80% of the community leaders said they were happy with the work of PMVs. About two-thirds of the PMVs interviewed were male. Age range was 18 to 45 years while mean age was 33.2 years (standard deviation 8.8). 66% have completed at least twelve years of schooling with secondary school certificate.

Conclusion: Given their positive disposition, favourable educational background as well as widespread community acceptance, Patent Medicine Vendors have potentials for playing a role in TB control in southern Nigeria. Orientation workshops to introduce programme overview, guidelines and recording/reporting tools will be required to kick-start the process.

PS-94500-07   Perceptions and experiences of private physicians in accessing PPM DOTS services in the Philippines

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Background: The large private sector in the Philippines, seen as a potent resource in TB control, is the focus of the Public-Private Mix DOTS (PPMD) strategy of the NTP. To engage private physicians (PP) and engender their commitment to the program, interventions such as Basic DOTS Training for Referring Physicians, advocacy symposium, use of referral tools, etc. were designed and implemented. Despite these, many PPs tapped by the initiative have not accessed or fully maximized services provided by the PPMD units. The study aims to determine factors that influence PPs in accessing PPMD services in selected cities in the Philippines.

Methods: Five focus group discussions composed of referring physicians and health care providers were conducted in three cities. Qualitative content analysis with an inductive approach was used in data analysis.

Results: PPs are motivated to refer patients for several reasons: free drugs and services for patients, good quality of services, supervised treatment, close monitoring to ensure compliance, competency of staff, patients' inability to afford prescription drugs, PPs thorough understanding of NTP protocols, and provision of incentives. On the other hand, barriers for referral include: delay in treatment due to diagnostic requirements of Direct Sputum Smear Microscopy and TB Diagnostic Committee evaluation, inaccessibility of facility, unavailability of drugs, patients' own perceptions (i.e. tedious screening process, unsecured confidentiality, etc.), and inadequate feedback to PPs after referral of patients.

Conclusion and recommendations: Motivation to access PPMD services is influenced by considerations in the program, patient and PPs themselves. To increase PP participation, TB programs may focus on:

ensuring availability of logistics, promotion of program strengths (i.e. quality TB care, staff competency, close monitoring and supervision, free drugs, etc.), and strengthening of referral and feedback.

PS-94575-07   An assessment of manpower time allocation in private-initiated PPM DOTS in the Philippines

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Background: Since the primary cost driver in running a DOTS facility can be accounted to labor cost, it is critical for clinic administrators to review the work processes and the allocation of time resources of their staff to ensure efficient delivery of care. This study aims to quantify how nurses and medical technologists spend their time on-duty and how the work environment affects the use of their time.
Methods: A time and motion study was conducted to nurses and medical technologists of two private PPM DOTS models.
Results: The study reveals that in a for-profit hospital-based DOTS clinic, the nurse spends 70.02% of the time in DOTS related activities (i.e., patient enrollment, administration of medicines, releasing of test results, defaulter tracing); 13.05% in administrative tasks (i.e., reporting and attending to queries of physicians, out-of-office tasks); 6.97% for personal or relaxation time; and 9.96% for non value-added time (i.e., traveling to and from receiving area to record file, or stockroom). In the same manner, the medical technologist spends 40% in microscopy related work (i.e., smearing, reading, etc.); 31% in administrative tasks; 18% for personal time and relaxation, and 11% for non value-added. In contrast, in a university hospital DOTS clinic, the nurse spends 17.79% in DOTS related activities, 49.17% in administrative tasks; 7.58% for personal or relaxation time; and 25.46% for non-value added time. The medical technologist spends 21% in microscopy tasks, 58% in administrative tasks including supervision of interns, 3% in personal or relaxation and 18% in non-value added.
Conclusion: A significant amount of time is spent by manpower resources to administrative and non-value added tasks. Improving facility lay-out may improve work efficiency and reduce manpower fatigue and stress. Also, electronic generation and transmittal of reports can greatly ease manpower time allocation to administrative tasks.

PS-94579-07   Maximizing utilization of the TB-DOTS Benefit Package: local government policy support

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Background: In 2004, the Philippine Health Insurance Corporation (PhilHealth) implemented the TB-DOTS Benefit Package to catalyze the national efforts in controlling tuberculosis with the collaboration of public and private health care providers. The insurance package covers new cases of pulmonary and extra-pulmonary TB. Payment is given directly to the DOTS facility to cover the consultation fee of the attending physician and other operating cost including maintenance of the TB Diagnostic Committee. With the decentralized set-up of health services, DOTS facilities are directly under the authority of the local government. Utilization of reimbursements from the package therefore required local legislation.
Objective: To determine the local legislations pertaining to the utilization of TB-DOTS Benefit Package in a Public DOTS facility.
Methodology: A survey questionnaire was used to collect data on local policies supporting utilization of the TB-DOTS Benefit Package from fourteen (14) Public DOTS facility.
Results: The utilizations of the insurance package in the 14 public DOTS is now supported by a local policy that allows the allocation of payment for the services of private physicians, provision of funds for the maintenance of the TB Diagnostic Committee and other operating expense of the DOTS facility. Prior to the approval of the policy by the local chief executive, the proposed policy undergoes three committee readings from the local health board. This legislative process requires time, and the consistent lobbying efforts done by the DOTS facility head is a factor for approval.
Conclusion: The benefits of the TB DOTS Benefit Package as a mechanism to sustain PPM DOTS services had been maximized with the development of local policies in support of its utilization in a decentralized setting.

PS-94581-07   Sustaining Private-Public Mix DOTS initiatives: role of corporate social responsibility

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Background: The Philippines has a large for profit and not for profit private providers and a survey conducted in 1997 showed that about 36% of TB patients sought consult with private medical practitioners. In 2004, the National TB Program adopted PPM DOTS as a national strategy and with support

from the Global Fund, the strategy was scaled up with the installation of 170 PPMD Facilities, among of which 41 are privately owned. With the eventual phasing out of the grant support, sustainability has been the greatest challenge. Several sustainability mechanisms were introduced including advocacy for policy support.

Objective: To determine the mechanisms for achieving corporate social responsibility (CSR) in sustaining a privately owned DOTS facility.

Methodology: A questionnaire was used to gather information on the various mechanisms to obtain political support from the governing board of three (3) privately owned DOTS facilities.

Results: A Board resolution is now in placed in support of integrating the PPM DOTS into the general services of the private hospital. The wages of the nurse and microscopists which had been previously supported by the grant are now absorbed by the hospital management in addition to other operating costs of the PPMD unit. This was achieved through the positive influence of the PPMD head as a leader by means of effective lobbying techniques and development of an effective advocacy package.

Conclusion: The installation of privately-owned DOTS facilities as a strategy for increasing case detection under the National TB Program is sustainable beyond the project grant if the policy support of the governing body has been acquired through the passing of Board Resolutions in support of the PPMD operations including the human resource.

PS-94585-07   Monitoring the GF-assisted PPMD project using an electronic TB register: the Philippine experience

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Background and challenges to implementation: A paper base monitoring system was setup in 2005 to measure the performance of the Round 2 GF assisted project. Data is being consolidated from the units using a monitoring form that contains total tabulations of TB cases. Validations cannot be made since TB registers are not submitted to PhilCAT. Verification of data is rather weak since it is done through phone calls. The counting of TB cases is done manually including the tallying of different types of cases. Cohorts do not match with the registered cases.

Intervention: An ETR was developed using Epi Info 6 to address gaps in monitoring. TB registers from the units are sent via mail or fax. Each register is checked for completeness and accuracy before encoding. Verification is done before and after encoding. Due to scale up of the project, the system capacity was modified and upgraded to windows version while using Epi Info for Windows for analysis. The ETR

has automated outputs including graph, maps and equipped with security features. It is capable of generating frequencies, tabulation and line lists of cases. The work stations increased from 2 to 14 and linked to a network.

Results and lesson learnt: Through the use of ETR, the contribution to CDR (6%) of the private sector was measured accurately. High quality data was produced using the ETR. A result of periodic data verification of the Tropical Disease Foundation showed that the average accuracy level of quarterly report was 99.7% compared to approximately 93% prior to use of ETR. Missing data was also kept very minimal by applying the verification process.

Conclusion and key recommendations: Using an Electronic TB Register in a GF assisted project is highly useful. It increases reliability, promptness and produces reliable information.

PS-94630-07   Public-Private Mix in Global Fund supported TB grants: evolution, characteristics and contribution

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Introduction: Engaging all health care providers in TB control through Public-Private Mix (PPM) approaches is a component of the Stop TB strategy, which is currently being scaled up in several countries.

Objective: To assess the amount of funding and nature of PPM activities supported with grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria, and explore the performance of these grants.

Methods: We reviewed the Global Fund's official documents and guidelines and conducted quantitative analysis of the distribution of PPM within Global Fund TB grants, their characteristics by region and the performance of grants with PPM versus those without.

Results: 64% of the countries and multi-country entities with Global Fund-supported TB grants had PPM activities by the 8th round. PPM initially targeted mainly the private sector, thereafter hospitals, followed by NGOs and recently expanded significantly into prisons. The nature of PPM differs by regions; more than 90% of the grant recipients in Eastern Europe have prison-related PPM against a 7% in South Asia and none in Southern Africa. PPM grants in Asian countries focus mainly on the private sector. Grants with PPM component have higher performance in TB case detection and HIV-TB screening and treatment, while treatment success was the same as in non-PPM grants.

Conclusion: The Global Fund policies evidently encourage PPM as a key component in TB grants. PPM

is extensively implemented worldwide, though its characteristics vary between regions. PPM improves TB case detection, probably because it enables the national TB program to reach more providers and populations. Clearly, significant untapped potential still exists in scaling up PPM across countries with Global Fund support.

PS-94776-07   Successful model of Private-Public Partnership for multidrug-resistant TB management in Nepal

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Objective: Share experiences of Private Public Partnership for MDR-TB management in Nepal with details of process, practices, key requirements and challenges.

Background: Nepal NTP started GLC approved MDR-TB management programme in September 2005 using fully supervised standardized treatment regimens from 5 Treatment Centres and 11 Sub Treatment centres. To improve access programme was expanded to 10 Treatment Centre and 34 Sub Treatment Centres within primary health case services and sites run by Private and Public sector partners.

Methods: Role and responsibilities of concerned partners are well defined. Regular 4 monthly supervision and surveillance from NTP ensures all partners follow national guidelines and protocols for MDR-TB case management. All partners reports to NTP using standard national reporting forms. NTP provides training and 2nd line TB drugs based on requirements for patients registered.

Results: Nepal MDR-TB Management Programme is a unique example of Private Public Partnership. Under the leadership and guidance of NTP several private sector partners are providing MDR-TB management services. German Nepal Tuberculosis Project laboratory provides Culture and Drug Sensitivity Testing under quality control from Gauting Supra National Reference Laboratory. Almost half of the MDR-TB Treatment Centres and close of 30% of the Sub Treatment Centres are operated by partners from public and privates sectors including Medical Colleges and I/NGOs clinics and hospitals. Standardized treatment regimen of 8–12 months KmEtOfxCsZ/ 16–20 months EtOfxCsZ under direct supervision is provided by all partners. Comparison of treatment outcome between NTP and partner operated sites will be available before August 2009 and reported in the main presentation. Key challenges observed lack of socio economic support for patients and lack of infection control in the health institutions.
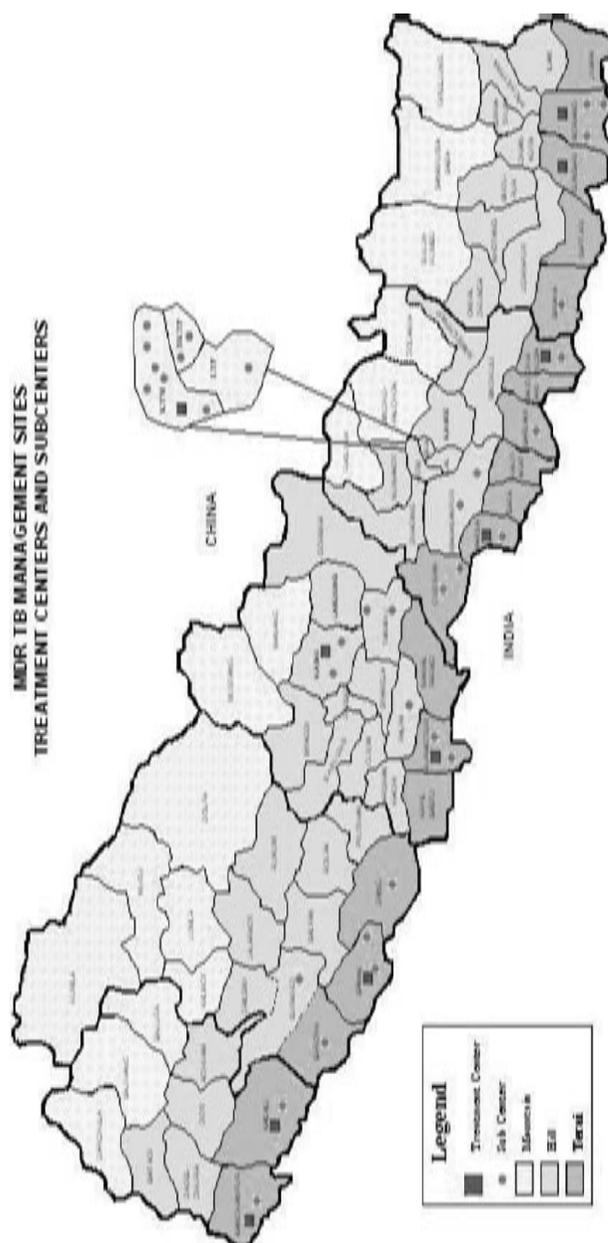
PS-94807-07   Involving all care providers: BRAC's experience in TB control

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Introduction: BRAC, a large NGO of Bangladeshi origin, working in collaboration with National TB Control Program is contributing in joint resource mobilization, implementation, capacity building and health system strengthening. To enhance TB control activities, BRAC is also engaging different care providers.

Objective: To enhance the involvement of qualified and nonqualified providers in TB control and thus to increase their participation in referral of TB suspects, raising awareness on tuberculosis and provision of DOT following the national guideline.

Strategy: BRAC conducted orientation program with non-graduate private practitioners such as village doctors and drug sellers at pharmacies. PPM activities expanded to workplaces by orienting factory workers. Intern doctors of different academic institutes are also oriented.

Result: In 2008, 16 013 village doctors in rural areas and 1623 drug sellers at pharmacies in urban areas were oriented on TB. Total 2422 qualified private practitioners, 763 intern doctors and 3182 factory workers were also oriented.

Conclusion: Successful TB control depends for the most part on effective partnership with all stakeholders. Strengthening linkage and regular follow-up mechanism for the participants who have been oriented would be helpful in PPM DOTS intervention. Further strengthening of PPM activities is needed in compliance of National Guidelines.

PS-94830-07   Ensuring the quality of acid fast bacilli: laboratory services at Public-Private Mix sites

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Background: Ethiopia ranked 7th in TB incidence among high burden countries according to WHO 2008 Report. Until August 2006, provision of Directly Observed Therapy-Short Course (DOTS) for TB treatment was limited to public sector health facilities. The USAID Private Sector Program for TB and HIV supports the implementation of TB-DOTS in 90 private clinics. This study examined external quality control (EQC) practice to ensure the accuracy of AFB microscopy provided by private sector providers.

Design/Methods: The project conducted a quantitative facility-based cross-sectional study jointly with Regional laboratories in 82 private laboratories which conduct AFB microscopy. The data collection used the National laboratory's AFB Supervision check list and functionality of microscope was also assessed. Regional Laboratory Experts collected and confirmed a total of 1231 AFB slides, of which 530 positive and 701 negative for AFB, using a blind verification method.

Results: The quality control verification showed 2.1% discordance between the results of the private health facilities and the verification tests—yielding 1.99% false negative and 2.26% false positives results. The rate of false negative is much lower than the nationally accepted 5.0%, the rate of false positive is slightly higher than the nationally accepted 2%. Quality of smearing revealed; 39% of normal smear size, 50% normal thickness and 70% of evenness while 78% of

the slides have good staining. Three consecutive EQC showed a consistent decline in the proportion of discordant slides from 17.5% in the first instance, 2.8% and recently to 1.2%. Almost all facilities have a well-functioning microscope.

The summary of slide verification finding

S.No	Implementation areas	No. of facilities	Total no of slides	Local result		Regional lab result		No of discordant slides	Proportion of false result	
				Neg	Pos	Neg	Pos		False Neg	False Pos
1	East Amarah	9	224	101	123	101	123	8	4	4
2	West Amhara	13	141	77	64	75	66	2	2	0
3	West Oromia	12	185	108	77	107	78	7	4	3
4	Addis Ababa	18	119	70	49	70	49	0	0	0
5	East Oromia	6	142	66	76	70	72	4	2	2
6	East Oromia	23	420	279	141	280	140	5	2	3
7	Total	81	1231	701	530	703	528	26	14	12
								2.10%	1.99%	2.26%

The assessment on the quality of smearing, staining and Cleanness slide background

Smearing technique								Staining		Cleanness of Slides Background	
Smear size			Thickness			Evenness					
Normal	Large	Small	Normal	Thick	Thin	Even	Uneven	Good	Poor	Clean	Dirty background
39%	33%	28%	50%	27%	23%	70%	30%	78%	22%	52%	48%

Conclusions and recommendations: The results indicate that the quality of AFB laboratory testing in the private sector is reasonably good, which have a significant role in increasing the public trust in the capability of the private sector to deliver high-quality AFB test service.

PS-95105-07   Evaluation of Private-Public Mix models working under DOTS strategy in Punjab, Pakistan

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Background: Pakistan is a high-burden country for tuberculosis. Punjab is largest province of country having 90.8 millions of population. Punjab has achieved targets of stop TB Partnership (70/85) since Qtr 1 2008. There are four models of PPM working in province. There is need to evaluate their performance and select useful model for further partnerships.

Objective: To assess the performance of PPM models practiced in Punjab Pakistan.

Methods: Study Design; Descriptive Observational study. Four models are practiced in the province-Pakistan Anti TB Association (PATA), Goodlife (General Practitioners), NTP (GPs) and Tertiary care Models.

Study area: 35 districts of Punjab. Study Subjects; Patients registered under different models in year 2006 and 2008. Data Collection: From quarterly reports, Interview from DOTS staff with questionnaire.

Results: In 2006, Case Detection Rate (CDR) of Tertiary care Models, PATA, Goodlife, was 2%,16%, 6% respectively ($P = 0.000$) In 2007 CDR of Tertiary care Model, PATA, Goodlife, was 3%,17%, 3% respectively ($P = 0.000$). In 2008 CDR of Tertiary care Model, PATA, Goodlife, NTP model was 5%,10%, 3%,0.2% respectively ($P = 0.01$). CDR of Public Sector in year 2006, 2007 and 2008 was 20%,

43%, 60% respectively ($P = 0.000$). In year 2006 treatment success rate of Tertiary care Model, PATA and Goodlife was 67%, 86%, 88% respectively ($P = 0.000$). In year 2007 treatment success rate of Tertiary care Model, PATA and Goodlife was 78%, 87% and 93% respectively ($P = 0.000$). Treatment success rate of whole Punjab in year 2006 and 2007 was 89% and 92% respectively. In year 2006, 2007, 2008 contribution in CDR by public sector was 45%, 65%, 77% and Private sector was 55%, 35%, 23% respectively.
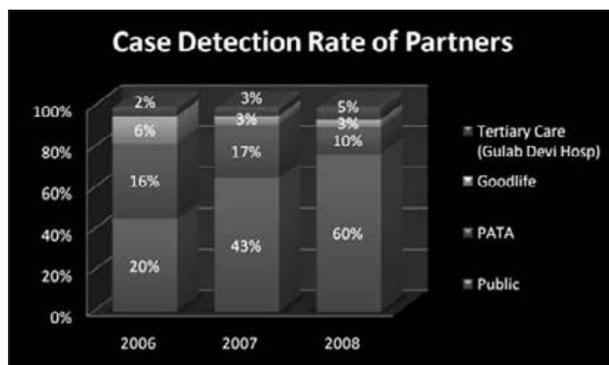
Conclusion: Public sector is strengthened significantly from 2006 to 2008. Private sector has significant contribution in case finding. Case finding is significantly high in PATA model. Case management is poor in tertiary care model.

PS-95184-07 Impact of Public-Private Partnership in case detection and treatment outcome in RNTCP in India

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Background: Private medical sector is an important source of health care in India. Pimpri Chinchwad Municipal Corporation (PCMC) Revised National Tuberculosis Control Programme (RNTCP) staff have direct relationship with private sector through memorandum of understanding, no mediator or any interface used for partnership. Present study finds out impact of public private partnership (PPP) in case detection and treatment outcome.
Methods: City TB centre of PCMC established 23 treatment observation centres in public and 175 in private health sector. Prospective observation study was carried out from January to December 2006. Total 2010 patients, of whom 761 were put on treatment at private sector's directly observed treatment (DOT) centres. Case detection was analysed from private practioner's (PPs) referrals and TB laboratory register while treatment outcome was followed after starting on treatment.
Results: PPs contributed 23, 16 and 7 percent of New

Smear Positive (NSP), New Smear Negative (NSN) and New Extra pulmonary (NEP) case detection respectively. Treatment outcome revealed NSP cure rate 83 percent at public sector with default rate 6 percent while at private sector it is 85 and 4 percent respectively. Treatment outcome of NSN cases disclose 81 percent treatment completed at public sector and 87 percent at private sector.
Conclusions: Private sector contributed 38 percent of DOT provision. PPs contributed nearby one fourth of total new sputum positive case detection. High cure rate and less default rate observed at private sector. It provides effective case holding in urban area. This model of PPP is sustainable and replicable.

PS-95318-07 Tuberculosis case detection via referral: case study of patent medicines vendors in Enugu, Nigeria

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Aim: We observed the effect of training on the knowledge of Patent Medicines Vendors (PMVs) of a pulmonary tuberculosis suspect case and the referral input by these PMVs on new clients presenting with cough at a tuberculosis diagnosis and treatment service.
Methods: Intervention on PMVs in a local government area (LGA), with PMVs in another LGA, same state as control. Six month study period. Data on sources of referral of new clients with cough, collected from one tuberculosis diagnosis and treatment service center each, in the study and control areas over a two month period. Knowledge of a pulmonary tuberculosis suspect case, assessed in both the study and control groups. Study group trained to recognize and refer pulmonary tuberculosis suspect cases using pre-written referral notes to the centre in the study area. Control group trained to recognize diarrhea and give early rehydration. Source of referral data collected again from same centers, over a three month period. Knowledge of a pulmonary tuberculosis suspect case re-assessed in both PMV groups. Referral input from different sources in both centers and change in knowledge of PMVs analyzed, using SPSS Version 11 and Microsoft Excel 2003.
Results: Knowledge rose by 28.5% in the study group. Patent medicines vendors from making no referral input to new clients with cough at both centers, post-intervention contributed 8.2% of new clients at the center in the study area ($\chi^2 = 5.53$; Fisher's Exact $P = 0.018$). 71.4% of these clients were sputum smear positive.
Conclusion and recommendations: A public private mix linked by referral between PMVs and national tuberculosis programs, may be beneficial. Further questions: will this reduce the average time between the onset of symptoms and diagnosis of TB cases

(reported to be 7–8 weeks)? And will this reduce the number of contacts testing positive as suspects' access diagnostic and treatment services earlier from the PMVs?

PS-95619-07   Health impact assessment para desarrollo y garantia de implementacion de DOTS con APP en Ecuador

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Objetivos :
— Establecer una metodología que garantice la implementación de la estrategia DOTS en los proveedores de servicios de salud públicos y privados extra Ministerio De Salud Pública.
— Establecer los impactos positivos y negativos de la implementación de la estrategia DOTS en la estructura de un centro de atención ambulatoria de la seguridad social ecuatoriana.

Diseño/métodos : Se seleccionó DOTS como intervención para mejorar el control de la tuberculosis en las organizaciones que por Alianzas Públicas y Privadas– APP, coordinan actividades con el Programa Nacional de Control de la Tuberculosis. Se eligió HIA como metodología para orientar la implementación de DOTS en la estructura del IESS y de otros proveedores de servicios de salud. Se aplicaron las fases de :
— Mapeo Rápido para identificación de: vínculos entre DOTS y la salud y aspectos de la salud que podrían afectarse
— Definición del ámbito o alcance de implementar la estrategia DOTS: respecto de qué población, métodos, recursos, período y análisis del posible impacto en la salud
— Tasación rápida del impacto en salud
— Valoración de Reportes : Impactos positivos e Impactos negativos
— Ajuste de la decisión propuesta
— Monitoreo
— Evaluación propiamente dicha

Resultados : Impactos positivos (favorables) :
1 Ampliación de cobertura en sospechosos y en pacientes.
2 Incremento en la detección de SR
3 Mejora en el proceso de atención de personas con tuberculosis
4 Menor tasa de abandono comprobado
5 Alta tasa de curación de TBBK+
6 Mejor imagen del Sistema Nacional de Salud
7 Mejora en la detección de TB MDR
8 Menor costo real para pacientes
9 Alto grado de oportunidad y accesibilidad al programa
10 RSE de alta calidad

Conclusión : HIA es una metodología eficaz para implementar DOTS de alta calidad en organizaciones de APP, con excelente reacción conductual de los miembros del equipo de salud y garantía de alto compromiso organizacional con el bienestar de sus afliados.

PS-95640-07   Resistencia a drogas y coinfeccion TB-VIH como una oportunidad para una alianza publico-privada

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Introducción : En Bucaramanga, Colombia, ha implementado la estrategia DOTS desde el año 2000. La resistencia a drogas y la coinfección VIH hasta el 2007 no parecía tener un impacto en el programa. Sin embargo, en el primer semestre de 2008 se diagnosticaron 4 casos de TB-MDR y se evidenció una mortalidad del 10% en el 2007, año en el que al menos el 78% de los pacientes eran asegurados por instituciones privadas. Las condiciones promovieron el desarrollo de una agenda entre sector privado y público.

Métodos : Desde Mayo a Diciembre de 2008 el Programa Control de Tuberculosis realizó reuniones mensuales con administradoras de planes de beneficios privadas y proveedores de servicios públicos y privados para la gestión del PCT. Las reuniones promovieron la capacitación de recurso humano y la evaluación sistemática de pacientes para VIH y cultivos para futuras pruebas de susceptibilidad. Se monitorearon y evaluaron los resultados de la implementación de las actividades.

Resultados : En el segundo semestre de 2008, 218 agentes de salud de servicios públicos y privados se entrenaron en aspectos básicos del control de TB. Se encontró que en el segundo semestre de 2007 se diagnosticaron 80 pacientes, nueve (11%) ya habían sido previamente diagnosticados con VIH y solo al

20% (16/80) se les realizó cultivo. Para el mismo periodo en el 2008 se diagnosticaron 138 casos, al 77% (99/138) se les evaluó para VIH, la coinfección encontrada fue 14% (19/138), y se aumentó la proporción de pacientes evaluados con cultivo a 62% (85/138). Dos nuevos casos de TB MDR fueron diagnosticados.

Discusión : En Colombia la reforma al sector salud ha impactado negativamente en los resultados del programa. En Bucaramanga los casos con TB-MDR encontrados y la mortalidad de pacientes, promovió una alianza publico-privadas que aumentó la detección de casos y optimizó la evaluación y monitoreo de los casos para disminuir el impacto negativo de la coinfección TB-VIH y la resistencia a drogas.

LABORATORY, TB AND DIAGNOSTIC II

PS-94062-07   The evaluation of Quantiferon TB Test (QFT-TB) in detection of children infected with *Mycobacterium tuberculosis*

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Introduction: Latent TB infection can persist for many years with a lifetime risk of reactivation to active disease. Recently a new diagnostic test (Quantiferon-TB Gold) which measures the production of interferon gamma in whole blood upon stimulation of *Mycobacterium tuberculosis* has been introduced. The aim is to compare the performance of the IFN-γ assay with TST for the identification of latent TB infection in childhood.

Material and methods: The present cross-sectional study was conducted on 100 children, aged 2 months–15 years during 2007–2008 in pediatric ward of NRITLD. Whole blood was collected for measuring Interferon-gamma using Quantiferon-TB Gold kit. *Mycobacterium tuberculosis* specific antigens, were used. In the research, 100 children were divided into three groups of Case (TB), Contact and Control. PPD test was performed by injecting 0.1 ml of the 5 unit solution.

Result: In regard to race 28% of the Contacts, 60% of the Cases and 10% of the Controls were Afghans. Smear of the gastric washing was prepared in Contact groups and Cases (TB); 30% of the Cases (TB) were AFB positive. History of BCG vaccination during neonatal period and BCG scar were present in all of the cases. Positive PPD test (PPD ⩾ 10 mm) was observed in 90% of the Cases and 24% of the Contacts. Of 50 contact cases, 18 (36%) showed positive QFT test, and in 20 TB patients 18 (90%) had positive test.

Conclusion: To our knowledge, this is the first study to investigate the performance of the whole blood IFN-γ, assay in diagnosing latent TB infection in children in Iran. In predominantly well children at high risk of latent TB infection, there is fair correlation between the TST and the whole blood IFN-γ assay. Our study has high lighted fair and moderate agreement in contact and TB group respectively between the TST and QFT-TB test in children at high risk for latent TB infection. More studies are required to clarify this.

PS-94134-07   Sensitivity and specificity of diagnostic tests for latent tuberculosis infection

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Background: The accurate diagnosis of latent tuberculosis infection (LTBI) depends on tuberculin skin testing (TST), clinical history and chest xray. Recent approval of interferon-gamma release assays (IGRAs) which are more specific for *M. tuberculosis* has given new options for diagnosis of LTBI. However, since there is no gold standard in testing for LTBI, proving that a new test for LTBI is more accurate is difficult. We applied a statistical technique called latent class analysis to determine the sensitivity and specificity of IGRAs when no standard exists.

Methods: Patients presenting to the TB Clinic with a potential diagnosis of LTBI were recruited for this study. All patients had the three tests done—TST, Quantiferon-TB Gold (QFT-G) and TSPOT.TB. Data on demographics were also collected on each patient. Estimates for the prevalence and the sensitivity and specificity of each test were obtained using maximum likelihood estimation of a latent class model.

Results: Two hundred and fifty eight patients were recruited for the study. The majority were women (68%), and born outside Canada (80%). Prevalence of LTBI was estimated to be 29%. The sensitivity of the TST test was 0.85 compared to 0.72 with QFT-G and 0.97 with TSPOT-TB. QFT-G had a high specificity of 1.00, compared to 0.81 with TSPOT-TB and 0.42 for TST.

Conclusion: The new diagnostic tests for LTBI have excellent specificity compared to TST. Sensitivity of TSPOT.TB is better than QFT-G.

PS-94136-07 Accuracy of screening tests for latent tuberculosis in the absence of a gold standard

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Objective: Due to lack of a gold standard, the diagnostic performance of tests for the detection of latent tuberculosis infection (LTBI) is not known. However, statistical methods can be used to estimate the accuracy from the studies reporting the concordance among the tests.
Study design and setting: We developed a random-effects latent-class model to estimate performance characteristics of three LTBI diagnostic tests: Tuberculin skin test (TST, at 10 mm cutoff), QuantiFERON-TB gold (QFG), and TSPOT-TB from the studies evaluating agreement among the tests.
Results: Nineteen studies were included. QFG had a sensitivity of 0.642 (95%CI 0.593–0.691) and specificity of 0.996 (0.989–1.000), TSPOT.TB had a sensitivity of 0.500 (95%CI 0.334–0.666) and specificity of 0.906 (95%CI 0.882–0.929), and TST had a sensitivity of 0.709 (95%CI 0.658–0.761) and specificity of 0.683 (95%CI 0.522–0.844). Results were not sensitive to the inclusion of any single study. When only the three studies that reported on TSPOT were removed, estimates for the other two tests varied minimally.
Conclusions: Statistical methods can help estimate the accuracy of LTBI tests. While the specificities were close to their reported values in the literature, the estimates for sensitivities were low; a finding that should be carefully evaluated.

PS-94137-07 A study of the potential for increased diagnostic test sensitivity to accelerate TB diagnosis

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Background: Globally the majority of TB is diagnosed by sputum microscopy but this has low sensitivity, so some patients diagnosis is delayed by initially false-negative tests. We studied the associated diagnostic delay to estimate the potential value of more sensitive diagnostic tests for accelerating diagnosis.
Methods: Symptom duration prior to diagnosis and the number of submitted sputum samples was assessed by interview for 819 consecutive patients who were commencing treatment for TB in Peruvian shantytowns.
Results: The health-seeking delay from symptom onset to seeking medical-care was an average of 4.4 times greater than the testing-delay between seeking medical-care and tuberculosis diagnosis. The initial 3 samples were sufficient for sputum microscopy to diagnose 86% (703) of patients and their median symptom duration prior to diagnosis was 30 days. To diagnose the remaining 14% (116) of patients, 4 or more sputum microscopy tests were necessary and the symptom duration before diagnosis was significantly greater in this group (median 60 days, $P = 0.0001$). Patients diagnosed from their initial 3 samples also had significantly prolonged cough duration compared with those whose diagnosis required more than 3 sputa ($P = 0.0001$).
Conclusion: Interventions to encourage earlier health-seeking behaviour have greater potential to accelerate tuberculosis diagnosis than increasing the sensitivity of diagnostic tests. Despite this, 1 in 7 patients had multiple false-negative sputum microscopy tests and this was associated with delayed diagnosis and significantly prolonged cough duration that may cause TB transmission. Improving the sensitivity of sputum microscopy may identify more cases and reduce diagnostic delay, but should be combined with interventions to encourage health-seeking behaviour.
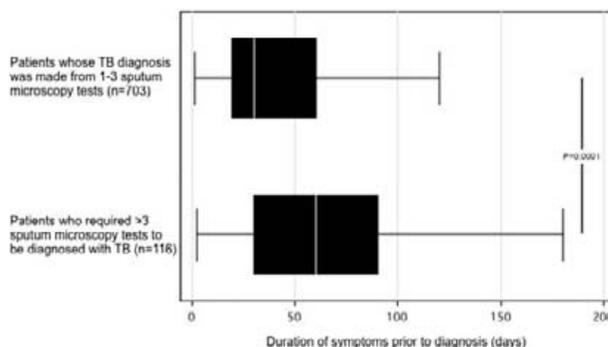
Figure The association between diagnostic delay and the number of sputum microscopy tests required to diagnose TB.

PS-94249-07 BD BACTEC MGIT 960 clinical mycobacterial cultures with antimicrobials for veterinary diagnostics

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Background: 18 ug/ml vancomycin (V-18) and 200 ug/ml nalidixic acid (N-200) is routinely added to BD BACTEC MGIT 960 Para TB System culture medium for *M. avium* subsp. paratuberculosis culture from highly contaminated bovine feces. Addition of erythromycin at 32 ug/ml (E-32) to the PANTA for contamination control has been reported for Myco-

bacterium bovis liquid culture. This study assessed the effect of V-18, N-200, or E-32 addition to MGIT PANTA on isolation of clinical mycobacteria in the BD BACTEC MGIT 960 system.

Methods: 13 *M. tuberculosis* complex (Mtbc) organisms, one *M. avium* and one *M. kansasii* were cultured in MGIT 960 medium with PANTA in the MGIT 960 instrument per manufacturer's instructions. Each organism was tested in triplicate with two target inocula (10–100 and 100–1000 cfu) and four antimicrobial formulations (PANTA alone or with V-18, N-200, or E-32). Nalidixic acid already in PANTA was accounted for in N-200. Outcome scoring: comparable growth detection = consistent detection with mean days to positive (mDTP) within 2 days of that with PANTA alone; delayed detection = consistent detection and mDTP within 3–7 days later than PANTA alone; impaired detection = detection failures and/or mDTP >7 days vs. PANTA alone.

Results: N-200 gave impaired detections for all organisms, and completely prevented detection of most organisms. E-32 gave delayed and/or impaired detections for all organisms, including *M. bovis*. V-18 gave delayed and/or impaired detections for all organisms except *M. avium* (comparable detection). Generally, mDTP were shorter with V-18 than E-32, but mDTP differences between inoculum levels were greater with V-18 than E-32.

Conclusions: Off-label use of 200 μg/ml nalidixic acid with PANTA in MGIT 960 medium prevented Mtbc organism recovery. Such use of 18 ug/ml vancomycin or 32 ug/ml erythromycin delayed Mtbc recovery. Recovery of *M. avium* was not prevented.

PS-94382-07 Antimicrobial oral rinse to reduce mycobacterial culture contamination

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Background: Although sputum decontamination procedures help reduce overgrowth (contamination) of sputum mycobacterial cultures by oral flora, they also inhibit mycobacterial growth. Following uncontrolled reports of high contamination rates in HIV-infected patients at the Uganda National Tuberculosis Reference Laboratory (NTRL), we carried out a pilot study to evaluate the efficacy of an alternative approach to reducing culture contamination—an antimicrobial oral rinse prior to sputum collection.

Methods: Consecutive patients admitted to Mulago Hospital in Kampala, Uganda with cough ⩾2 weeks were enrolled. Sputum specimens were collected at the time of enrollment (spot). Immediately prior to expectoration, patients were randomly assigned to receive oral rinse with chlorhexidine followed by oral rinse with nystatin, or no intervention. Specimens were processed at NTRL with NALC, 2% sodium citrate, and sodium hydroxide (NaOH, 1.5% final concentration) and pelleted at 3000g prior to inoculation onto Lowenstein-Jensen slants containing PANTA. Cultures were read weekly for up to 8 weeks by technicians blinded to study group assignment.

Results: Of 60 patients enrolled, 7 were unable to expectorate sputum. Of the remaining 53, 44 (83%) were HIV-infected. Median CD4+ T-lymphocyte count was 51.5 (interquartile range 16–198.5). 31 patients (58%) rinsed with chlorhexidine/nystatin. One patient received the incorrect treatment. In a per-protocol analysis, the contamination proportion trended higher in controls (18%) than in the chlorhexidine/nystatin group (3.2%), a risk difference of 15% (95%CI −32%–2.3%, $P = 0.066$).

Conclusions: Oral rinse with chlorhexidine and nystatin prior to sputum collection may reduce the proportion of contaminated sputum cultures in a predominantly HIV-infected population.

PS-94467-07 Evaluation of new immunological diagnostic methods for tuberculosis in patients with active disease

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Background: Our aim was to evaluate whether cellular immune response and gamma-interferon production to particular tuberculosis (TB) antigens (ESAT-6 and CFP-10) could enhance the diagnostic accuracy in patients with active disease.

Design/methods: The commercially available Quantiferon TB-gold from Cellestis and T-spot TB from Oxford Immunotec were evaluated together with FASCIA, an in-house method employing diluted whole-blood incubated for 3 and 7 days with TB antigens and controls whereafter cell-mediated immune-responses are detected as cell-proliferation by FACS analysis and cytokine secretion by Luminex analysis.

Results: Clinical data for 161 patients were compared with chest X-ray results for the individual patient, PPD reactivity, mycobacterial cultures and the three immunological diagnostic methods. 34% had active TB, of which 56% had pulmonary TB and 39% extrapulmonary TB. Another 36% had a high suspicion of latent TB and 8% had been previously treated for TB. Other diagnoses were pneumonia, tumors, sarcoidosis, chronic obstructive lung disease, reactive lymphadenitis, and non-specific cough. Two out of three HIV patients and one patient with acute myeloic leukemia were not reactive in FASCIA or T-SPOT TB. The concordance of FASCIA and Quantiferon TB-gold for active TB was 75% and the

concordance of FASCIA and T-spot TB was 61%. Overall sensitivity of the IGRA methods for pulmonary TB compared to FASCIA was 75% and 57%, respectively. Overall sensitivity of IGRA tests for extra-pulmonary TB compared to FASCIA was 88% and 96%, respectively. 100% of clinically negative controls were non reactive in IGRAs and FASCIA, however the numbers of controls are limited and will be evaluated further. In patients with previous TB and high suspicion of latent tuberculosis the results are preliminary and show around 60% reactivity in all three tests. Cytokine analyses of FASCIA are ongoing and will be presented.

PS-94469-07   External quality assurance for TB laboratory investigations in Donetsk oblast, Ukraine

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In 2001–2005 WHO recommended DOTS Strategy had been implemented in Donetsk oblast with population of 4,6 mln, in 2005 its extension started throughout the country. Since 2006 Project for control of multidrug-resistant tuberculosis (MDR-TB) started in Donetsk oblast with the support of Foundation 'Development of Ukraine'. Laboratory diagnostics of MDR-TB is one of the most important components of the Project. According to recommendations and with the technical support of WHO three-level laboratories' network was organized in Donetsk oblast. Taking into consideration that there is no functioning National Reference laboratory in Ukraine, supranational bacteriological laboratory of Gauting, Germany, fulfils external quality control for TB bacteriological investigations of Donetsk oblast TB laboratory. Annually 3rd level laboratory Donetsk oblast TB clinic receives testing panels (unstained sputum smears and samples for TB drugs' susceptibility testing), conduct the necessary investigations and then send these panels to other bacteriological laboratories of oblast. According to the last panel testing of 3rd level laboratory of Donetsk oblast TB clinic the following data has been received: coincidence of results on Streptomycin, Isoniazid and Rifampicin is 100%; on Ethambutol, 90%. Another 9 bacteriological laboratories of Donetsk oblast took part in panel testing, six of them successfully passed it.

PS-94470-07   Combine the ESAT-6/CFP-10 strip assay with smear morphology for rapid identification of *Mycobacterium tuberculosis* complex

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Aim: ESAT-6/CFP-10 strip assay (Formosa Biomedical Technology Corp.) is an immunochromatographic assay that detects the MTC secretory protein ESAT-6/CFP-10 fusion protein in liquid cultures by the ESAT-6/CFP-10-specific monoclonal antibody. This study was designed to evaluate whether the ESAT-6/CFP-10 strip assay or combined serpentine cording in cultural smear can be used for diagnosis of MTC in mycobacteria-positive BACTEC cultures.
Methods: Mycobacteria-positive BACTEC cultures were collected and MTC in the cultures were identified by the standard biochemical methods. Detection of MTC in the cultures was carried out by either serpentine coding in cultural smears, or the ESAT-6/CFP-10 strip assay and the results were compared.
Results: With 603 mycobacteria-positive BACTEC cultures collected, detection sensitivity and specificity of the ESAT-6/CFP-10 strip assay were determined to be 97% and 97.4%, while those of the serpentine cord in cultural smears was 92.5% and 97.4%, respectively. Combining the ESAT-6/CFP-10 strip assay with serpentine cording in smears led to 100% specificity for intersected results and 99.1% sensitivity for combined results.

Table   Comparison of results from identification of MTC in BACTEC cultures based on serpentine cording in smear, the ESAT-6/CFP-10 strip assay, and combination of serpentine cording in smear with the ESAT-6/CFP-10 strip assay

| | Identification of MTC in BACTEC cultures by | | | |
	A Serpentine cording in smear	B ESAT-6/CFP-10 strip assay	Intersection of A and B	Union of A and B
Sensitivity	92.5%	97%	90.4%	99.1%
Specificity	97.4%	97.4%	100%	94.8%
Positive predictive value	97.8%	97.9%	100%	95.9%
Negative predictive value	91.4%	96.4%	89.4%	98.9%
Likelihood ratio (LR)†	35.6	37.3	Infinite	19.1

Conclusion: The ESAT-6/CFP-10 strip assay can be used to identify MTC in BACTEC cultures. By com-

bining the assay with serpentine cording in smears, false-positives and -negatives may be reduced.

PS-94492-07 Estimating sensitivity and specificity of tuberculin skin tests and Quantiferon

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Background: Interferon gamma release assays (IGRAs) are a relatively new class of diagnostic tests is available for diagnosis of latent tuberculosis infection (LTBI). The performance characteristics of this test are difficult to assess as there is no gold standard and the current test, the tuberculin skin test has problems of false positive and negatives. This paper describes a method for determining test performance using results of dual testing on two different populations, with different pre-test probability.
Methods: Data from one adult and one child study on TST and IGRA test concordance are used as inputs. These published papers give the outcomes of TST and IGRA results in three populations, high, medium and low prevalences. Sufficient statistics for the method is the aggregate numbers of TST+/IGRA+, TST+/IGRA−, TST−/IGRA+ and TST−/IGRA− in each of the study populations.

Using the latent variable method, a likelihood function is developed for datasets. Parameters for the model are disease prevalences, sensitivity and specificity of the two tests. This likelihood is then used as part of a Bayesian inference algorithm to determine the poster probability distributions for the sensitivity and specificity of the two tests and the disease prevalence of each population being studied.
Findings: Estimates of the parameters were in keeping with expectations regarding disease prevalence in the groups. QFT was found to have superior positive likelihood ratio and specificity, with possibly inferior negative likelihood ratio and sensitivity.
Interpretation: This latent variable approach is a useful method for determining sensitivity and specificity in the absence of a Gold Standard and could be applied to other novel tests.

PS-94586-07 Impact of additional use of liquid media on the treatment of pulmonary tuberculosis

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Objectives: The combined use of liquid media and solid media is recommended for mycobacterial culture. Recently, liquid media was implemented in addition to solid media in our hospital and we evaluated the effect of liquid media use in addition to solid media on the treatment of pulmonary tuberculosis (TB).
Methods: The culture results of respiratory specimens using both Ogawa media and BACTEC Mycobacteria Growth Indicator Tube (MGIT; Becton Dickinson, USA) media performed between November 2007 and May 2008 were analysed retrospectively. The inclusion criteria were as follows: 1) positive culture for *Mycobacterium tuberculosis*, 2) initiation of first-line drug treatment, 3) exclusion of multidrug-resistant TB, and 4) follow-up cultures for more than 2 months after initiation of treatment. Among the enrolled subjects, time to culture conversion was compared between solid and liquid media, especially culture conversion rates at 2 months of treatment, and chest radiographic findings were anlysed regarding the presence or absence of cavity.
Results: One hundred thirty-six patients were enrolled. At the beginning of treatment, cavity was present in 42 patients (30.0%). The time to culture conversion was longer when using liquid media compared with solid media (2.4 ± 1.7 vs 2.0 ± 1.0 months, $P < 0.05$), respectively. The culture conversion rate after 2 months of treatment was higher when using solid media compared with liquid media (92% vs 77%, $P < 0.05$), respectively. The number of patients who have positve culture after 2 months of treatment and have a cavity at treatment initiation was 6 (4.4%) and 15 (11.0%) when using solid media or liquid media, respectively.
Conclusion: The additional use of liquid media detected more patients who have positve culture after 2 months of treatment and have a cavity. According to the ATS guidelines, the treatment duration should be prolonged to 9 months in more patients when using liquid media in addition to solid media

PS-94615-07 Diagnostic delay among tuberculosis patients attending primary health facilities in Kampala, Uganda

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Objectives: The objectives of this study were to quantify the delay from the onset of symptoms to diagnosis of tuberculosis and to assess factors associated with this delay.
Methods: Cross-sectional survey using structured interviews with new smear-positive pulmonary

tuberculosis patients registered for treatment at three public primary health facilities in Kampala city, aged 15 years and above. Associations between outcomes and factors were assessed by regression analysis.

Results: Between April 2007 and May 2008, 254 adults were included of whom 150 (59%) were male. Mean total delay was 13.1 weeks (SD 10.5). The mean patient delay was 7.4 weeks (SD 9.1) while health service delay was 6.1 weeks (SD 6.2). Factors associated with total treatment delay were age above 44 years ($P = 0.005$) and being divorced or separated ($P = 0.007$). Having visited clinics more than 5 times before a TB diagnosis was made (this was the case for 22% of patients) was also significantly associated with delay ($P < 0.001$), as was first provider consulted being another city clinic ($P = 0.004$).

Conclusions and recommendations: These findings suggest that an important proportion of TB patients visit clinics on numerous occasions with the same presenting complaints before a diagnosis of TB is made. We recommend that the City council and the national tuberculosis control program instill a higher degree of suspicion of TB among health care workers, in order to reduce the delay.

PS-94821-07   Use of containerized laboratories in the ZAMSTAR TB Prevalence Survey in Zambia

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Background: The ZAMSTAR TB Prevalence Survey, beginning October 2009, will determine prevalences of TB and HIV in 80 000 people at 16 sites in Zambia and 40 000 people at 8 sites in South Africa. In Zambia, great distances and poor roads make it difficult to transport sputum specimens for TB culture to central laboratories. Therefore, we developed a decentralized approach of placing containerized laboratories close to study sites.

Design: Laboratories, constructed within 40-foot shipping containers, are delivered by truck to existing health facilities, placed onto plinths and connected to local utilities. Equipped with air-conditioning and generator, each is divided into three sections: specimen receiving, vestibule, laboratory. Bar-coded sputum specimens enter the receiving area through the main entry/exit, are scanned into the database, then pass through the double-door vestibule into the laboratory. The laboratory, maintained at negative pressure, can process 50 sputum specimens per day and contains two class II, type A2 biological safety cabinets (BSC), centrifuge, incubator, autoclave, refrigerator and freezer. Specimens are decontaminated in BSC 1 (recirculating). Following centrifugation, manual MGIT cultures are inoculated in BSC 2 (externally-vented),

then incubated at 37°C. Cultures are scanned for growth once per week for up to 6 weeks. Cultures exhibiting growth are tested in BSC 2 using the Capilia TB assay to confirm the presence of *Mycobacterium tuberculosis* complex. Aliquots of decontaminated sputum and positive cultures are stored at −20°C until transported to the central laboratory. All biohazard waste is autoclaved, then incinerated on site.

Conclusion: Containerized laboratories may be a useful tool for performing large-scale TB prevalence surveys in areas with underdeveloped transportation networks. In addition, this design may serve as a model for expanding and decentralizing TB diagnostic capacity in many parts of the world.

PS-94937-07   Rapid identification of the *Mycobacterium tuberculosis* complex by an enzyme linked immunosorbent assay

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Setting: A medical center in Taipei, Taiwan.

Objective: To investigate the performance of an enzyme linked immunosorbent assay (ELISA) using anti-early secreted antigenic target 6 and culture filtrate protein 10 antibodies (Medipro *Mycobacterium tuberculosis* Antigen ELISA) for detection of *M. tuberculosis* in positive signals of Mycobacterium Growth Indicator Tubes (MGIT) (BACTEC MGIT 960 system).

Design: A total of 208 consecutive clinical samples, including 185 respiratory specimens and 23 non-respiratory specimens, with positive signals in MGIT were analyzed. The assay was performed on day 1 and on day 7. The ELISA and conventional culture results were compared.

Results: Among the tubes with positive signals, 86 (41.3%) were *M. tuberculosis*, 55 (26.4%) were non-tuberculous mycobacteria and 67 (32.2%) were

Table   Performance of Medipro *M. tuberculosis* Antigen ELISA on day 1 and day 7 after positive signals were obtained by the BACTEC 960 System for positive or negative acid-fast bacilli

Medipro ELISA assay day/ results *n*	*M. tuberculosis* (*n* = 86)		NTM (*n* = 55)		No* (*n* = 67)		Sensitivity (%) all/ AFS (+)	Specificity (%) all/ AFS (+)	Predictive values (%)	
	AFS (+) (*n* = 44)	AFS (−) (*n* = 42)	AFS (+) (*n* = 12)	AFS (-) (*n* = 43)	AFS (+) (*n* = 0)	AFS (−) (*n* = 67)			Positive all/ AFS (+)	Negative all/ AFS (+)
Day 1										
Positive (67)	31	34	0	1	0	1	75.6/70.5	98.4/100	97/100	85.1/48.0
Negative (141)	13	8	12	42	0	66				
Day 7										
Positive (83)	43	40	0	0	0	0	96.5/97.7	100/100	100/100	97.6/92.3
Negative (125)	1	2	12	43	0	67				

* Positive signals in BACTEC 960 system but finally culture negative.
NTM = non-tuberculous mycobacteria; AFS = acid-fast stain.

negative for mycobacteria. The sensitivity of the ELISA for tubes with positive signals (initial smear with positive acid-fast bacilli) on day 1 and day 7 was 75.6% (70.5%) and 96.5% (97.7%), respectively, and the specificity on day 1 and day 7 was 98.4% (100%) and 100% (100%), respectively.

Conclusion: Our results show that the Medipro *M. tuberculosis* Antigen ELISA a simple, rapid assay (less than 3 hours) for *M. tuberculosis* antigen detection, especially on day 7 of incubation with positive signals in the BACTEC MGIT 960 system.

PS-95216-07   The use of QuantiFERON-TB Gold In-Tube in the routine practice of contact investigation in Rotterdam

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Aim: QuantiFERON (QFT) is an interferon-gamma release assay with a high estimated specificity (99%) for the identification of latent tuberculosis infections and has a sensitivity of about 70% for active tuberculosis. We analyzed the results of the routine use of the QFT in contact investigation of BCG-vaccinated contacts.

Methods: Contacts of smear-positive and smear-negative pulmonary tuberculosis (PTB) cases in the Rotterdam area were examined with a tuberculin skin test (TST) or with a chest X-ray (13% of contacts). BCG-vaccinated contacts with a TST $\geqslant$10 mm were routinely tested with QFT (QuantiFERON-TB Gold In-Tube®, Cellestis, Victoria, Australia).

Results: In the period 1st May 2007 and 31st December 2008, 65 smear-positive PTB cases and 74 smear-negative PTB cases were notified. 107 contact investigations were carried out involving 2980 contacts. Of 2471 contacts with a TST read, 619 (25%) had a TST $\geqslant$10 mm. Out of these, 355 with a BCG scar had additional QFT-testing with 131 (37%) having a positive result ($\geqslant$0.35 U/l). QFT-positivity in BCG-vaccinated contacts was associated with contact with a smear-positive PTB case (39%, versus 23% among contacts of smear-negative PTB cases, $P = 0.05$), degree of exposure (52% in 1st ring, 38% in 2nd ring and 27% in 3rd ring, χ^2 test for trend: $P < 0.001$) and size of TST reaction (13% QFT-positive in TST 10–14 mm, 36% in TST 15–19 mm and 64% in TST $\geqslant$20 mm, χ^2 test for trend: $P < 0.001$).

Conclusion: QFT correlates well with risk of infection among BCG-vaccinated contacts.

PS-95223-07   Quality indicators of tuberculosis cultures using two decontamination methods for sputum samples

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Aim: Examination by bacteriological culture provides the definitive diagnosis of tuberculosis. Depending on the decontamination method and the type of culture medium used, as few as ten viable tubercle bacilli can be detected. Quality control of culture ensures that the information generated by the laboratory is accurate, reliable and reproducible. We compared the quality indicators of cultures using two decontamination methods of sputum smears.

Method: It was carried out the comparison of the quality indicators (QI) of the mycobacteria cultures using the slow precipitation methods (SPM) and the modified Petroff method (MPM). Were evaluated 1460 samples received in the National Reference Laboratory of Tuberculosis, IPK, during January to December 2006.

Results: The contamination rate (CR) with the SPM was 3.4%, twice minor that the observed with the MPM (7.3%). The percentage of the AFB smears positive with negative culture was twice minor in the SPM (6.3%) in comparison with the MPM (15.4%). The sensibility (20.5%) and specificity (99.85%) obtained with the SPM, presented similar values to the MPM (19,3% of sensibility and 99.7% of specificity). The QI results of cultures with SPM were better than the MPM. Only the CR obtained with the SPM showed a value according to the international parameters (5%).

Conclusions: The results of this study suggest the necessity to incorporate the evaluation of the QI in the national cultures laboratories network in order to improve the yield and contribute to the quality of tuberculosis diagnosis in Cuba.

PS-95389-07   Urinary LAM antigen detection for TB diagnosis among HIV-infected TB suspects in Tanzania

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Background: TB is a common cause of serious illness and bacteremia in HIV-infected hospitalized patients in some settings where rapid, accurate TB diagnosis may be challenging. We hypothesized that gravely ill patients with advanced HIV and TB have readily detectable TB antigens in their urine.

Methods: We prospectively enrolled hospitalized HIV-infected patients with cough, fever or weight loss at two hospitals in Dar es Salaam, Tanzania. Subjects gave 10 mL of urine to test for the TB glycolipid, lipoarabinomannan (LAM) using a commercially available ELISA, at least 2 sputum specimens for concentrated AFB smear and solid media culture, and 40 ml of blood for culture by both automated broth-based MB Bac T and manual agar-based Isolator methods. Those subjects who were not initially microbiologically confirmed with TB were seen in follow up >2 months after enrolment to ensure proper classification of nonTB patients.

Results: 258 of 265 patients agreed to participate. Among the 212 subjects with LAM testing, 68% were female, with a mean age 37.2 years, and a mean CD4 count of 163 cells/mm^3. 69 subjects (32.5%) had microbiological confirmation of TB. Sensitivity of sputum smear, sputum culture and blood culture was 35.9%, 100% and 44.9%, respectively. 45 of 69 with microbiological confirmation of TB had a positive urine LAM assays (65% sensitivity) and 123 of 143 without TB confirmation had a negative LAM assay (86% specificity). Sensitivity was similar among TB patients with and without positive blood cultures (64.5% and 65.8%, respectively).

Conclusions: Among our population of hospitalized HIV-infected patients, urine LAM detection did not meet high international specificity standards for new TB diagnostics, but is promising as part of a screening algorithm or with technologic improvement.

PS-95491-07   Diagnosis of paucibacillary pulmonary tuberculosis with a low-cost strategy

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Aim: To evaluate the benefit of rapid and low-cost tests for the early diagnosis of paucibacillary pulmonary tuberculosis (PPTB).

Methods: From 10/2006 to 12/2008 sputa from patients with suspected pulmonary TB were included. Samples were processed using N-acetyl-cysteine and then inoculated onto 24-well microplates with 7H9 broth (7H9), 7H11 agar media (7H11), Lowenstein-Jensen (LJ), and MGIT system. 7H9, 7H11 and LJ were incubated at 7.5% CO2, 37°C for 8 weeks and the MGIT during 8 weeks. Growth was checked, microscopically twice a week in 7H9 and 7H11; and once a week in LJ. If growth was detected, we did AFB-smear and identification by DNA probes or biochemical methods.

Results: We analysed 1701 samples with all four methods (Table); 326 were AFB-smear positive, and 364 were culture positive by any of the four methods; only 214 samples grew in the four methods; 89 only in MGIT/LJ, 38 only in MGIT, and 23 only in LJ. Major contamination occurred in 7H9 (15.8%), MGIT (11.7%), 7H11 (9.8%), and LJ (1.4%). Concordance among methods was: MGIT vs. LJ, 0.88; MGIT vs. 7H9, 0.79; MGIT vs. 7H11, 0.78; LJ vs. 7H9, 0.82; LJ vs. 7H11, 0.81; 7H9 vs. 7H11, 0.87.

N = 1701 Media	Culture		Time to detection (weeks)								Positive cultures	
	Positive %	Negative %	1	2	3	4	5	6	7	8	ZN+	ZN−
MGIT	341 (20.9)	1360 (80)	140	150	35	9	1	1	1	4	276	65
LJ	326 (19.2)	1375 (80.8)	5	160	122	30	3	2	1	3	274	52
7H11	266 (15.6)	1435 (84.4)	5	117	109	29	6				243	23
7H9	272 (16)	1428 (84)	19	143	77	18	15				246	26

Conclusions: Our data show that up to 18% of PPTB samples can be detected using any of the four methods. However, diagnostic yield using MGIT or LJ is far better than the other methods. By the second week, MGIT detected 79.6% of the positive samples, LJ 45.3%, agar 7H11 33.5%, and 7H9 44.5%; 7H9 and 7H11 performed poorly.

PS-95499-07   Comparison of molecular and culture-based stool testing for diagnosis of pulmonary tuberculosis

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Aim: Establishing a microbiologic diagnosis of pulmonary tuberculosis is difficult in patients unable to provide sputum samples. Most sputum is swallowed and we therefore evaluated molecular and culture-based tests for detecting *M. tuberculosis* from swallowed sputum in stool samples for the diagnosis of pulmonary tuberculosis.

Methods: We analyzed 860 stool samples from 431 adults with pulmonary tuberculosis. Diagnostic sensitivities were compared between an IS*6110* nested polymerase chain reaction (PCR), the Microscopic-Observation Drug-Susceptibility (MODS) culture assay, culture on antibiotic-enriched selective 7H10 thin-layer agar, and culture on conventional Lowenstein-Jensen agar. Prior to culture, samples were decontaminated with the n-acetyl cysteine technique

traditionally used for sputum samples. Contamination rates and time to positivity were compared for the different culture techniques.

Results: Overall sensitivity was similar for PCR (13%) and culture (12%) ($P = 0.5$). Auramine stained microscopy was positive in 7.2% of samples. PCR and culture had similar sensitivity when stratified by microscopy results (positive microscopy: PCR 74% vs. culture 77%, $P = 0.7$; negative microscopy: PCR 9% vs. culture 7%, $P = 0.3$). MODS had the highest sensitivity, detecting 87% (89/102) of samples with any positive culture result. Contamination rates were low for MODS (2.1%) and thin-layer agar (2.7%) but significantly higher for Lowenstein-Jensen (11.9%) ($P < 0.01$). Time to culture positivity was shortest for MODS and longest for Lowenstein-Jensen (Figure).
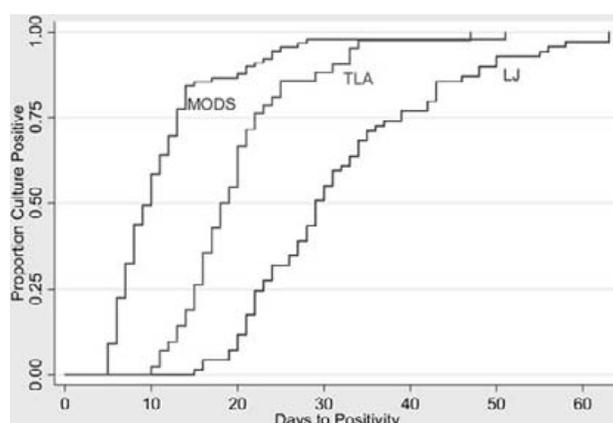
Figure Time to culture positivity. LJ = Löwenstein-Jensen agar; MODS = Microscopic-Observation Drug-Susceptibility assay; TLA = thin-layer agar.

Conclusions: PCR and culture of stool specimens have similar sensitivities for the diagnosis of pulmonary tuberculosis in adults. Cultures using MODS had the highest sensitivity, lowest contamination rates, and the shortest time to positivity.

PS-95569-07   Evaluation of the value of PCR method in the diagnosis of tuberculosis

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Aim: To compare the sensitivity of a real-time PCR method with a standard culture method and to evaluate the value of PCR results in deciding the initiation of treatment in suspected patients.
Method: Routine laboratory results for AFB smear, culture and PCR for the diagnosis of TB in last two years were evaluated retrospectively. 57 culture positive samples were included in the study; 42 respiratory and 15 were non-respiratory. Besides these samples, 10 samples with AFB smear and culture (−) but PCR positive and 3 samples with PCR (+) but no smear or culture result were included in the study. Two of these samples were respiratory samples while 11 were non-respiratory specimens. Initiation of TB treatment in PCR positive patients were looked up from national database.
Results: Forty-six of 57 culture (+) samples were PCR (+) and the sensitivity of PCR method was found 80.7%. There were smear (+) but culture and PCR (−) 26 samples. 27 of the samples (47.3%) were found to be positive by using three methods while 19 (33.3%) were positive by using culture and PCR, 11 (19.2%) were positive by using culture only. Among culture positive 57 isolates, 3 INH resistant, 1 INH+RIF resistant isolates were detected. Five of 10 PCR positive samples who were negative by AFB smear and culture were received TB treatment. There was no AFB smear and culture request for the remaining 3 PCR positive samples but two patients from this group received TB treatment. As a total, 7 out of 13 samples were given TB therapy only by PCR positivity and clinical findings. All these samples were from extra-pulmonary sites.

Smear	Culture	PCR	Number
—	—	—	Not evaluated
−	−	+	10
Unknown	Unknown	+	3
−	+	−	11
−	+	+	19
+	+	+	27
+	−	−	26

Conclusions: This study shows PCR results for the diagnosis of TB has considerable benefit especially for extra-pulmonary cases. But in pulmonary cases, PCR results cannot provide additional diagnostic benefit other than that of smear and culture results.

PS-95605-07   Aporte del cultivo y control de calidad de medios Ogawa, 2000–2007

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Objetivo : Conocer la calidad de medios de cultivo preparados en laboratorios de la Red nacional del Perú.
Material y métodos : En los años 2000–2007, se evaluaron 256 lotes de medios de cultivo Ogawa de un lote de reciente preparación y se comparó con medio preparado en el laboratorio central nacional, se utilizó la cepa H37Rv como control de crecimiento. Se evaluaron aspectos físicos, contaminación y número de colonias desarrolladas. Los medios fueron calificados como aceptable o calidad deficiente según resultados de evaluación de los lotes.

Resultados : Del 2000 al 2002 fueron evaluados 83 lotes de medio preparados en 28 laboratorios siendo evaluados como aceptables de Buena Calidad con 100% de sensibilidad. En 2003, se evaluaron 26 laboratorios (96% Aceptable), 2004 se evaluaron 24 (88% Aceptable), 2005 se evaluaron 39 (97% Aceptable), 2006 se evaluaron 34 (100% Aceptable) y en 2007 se evaluaron 50 laboratorios (96% Aceptable) respectivamente. Del 2000 al 2007, se reportaron 118 498 ; 115 496 ; 111 946 ; 105 001 ; 97 805 ; 92 043 ; 101 042 y 104 418 cultivos realizados por los Laboratorios de la Red ; de los cuales 6898 (5.82%), 6636 (5.75%), 9093 (8.12%), 8046 (7.66%), 8897 (9.10%), 9103 (9.89%), 10 650 (10.54%) y 10 809 (10.35%) fueron positivos respectivamente.

Discusión : El Control de calidad sistemático de medios de cultivo permite identificar problemas ó deficiencias en los laboratorios y tomar acciones correctivas para mejorar la eficiencia del cultivo. El **cual** favorecerá a un mejor diagnóstico especialmente en los pacientes Paucibacilares y BK negativos.

PS-95625-07　Comparison of BBL for detection of mycobacterium in Lima, Peru

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Background: Early detection of *Mycobacterium tuberculosis* is an important tool for tuberculosis control. *M. tuberculosis* isolation has been usually performed in solid media, especially in low resources settings, with the disadvantage of delayed detection. Mycobacteria Growth Indicator Tube (BBL 'MGIT') liquid media for diagnosis of tuberculosis was compared to Löwenstein-Jensen (LJ) solid media to evaluate the performance of the test and the turn-around time among tuberculosis suspects.

Methods: The samples were enrolled in a parallel diagnostic trial. After less than 48 hours of store at 4ºC, samples were decontaminated with NALC-NaOH method and inoculated in LJ and MGIT media. Culture reading was done daily for MGIT using BD BACTEC 'MicroMGIT' Fluorescence Reader and twice per week for LJ until positivity. All positive cultures were tested for *M. tuberculosis* complex; negative cultures were reported after 8 weeks for both types.

Results: 745 samples were collected from TB suspect patients. Turn-around time was 12 days for MGIT and 20 days for LJ. MGIT media showed: sensitivity: 98.3%, specificity: 99.2%, PPV: 99.1% and NPV: 98.4%. 743 cultures were *M. tuberculosis* complex. The MGIT contamination rate was 2.4% and 0.5% for LJ, 88.9% of MGIT contaminated cultures were

successfully recovered and only 0.26% was considered lost.

Conclusions: This study shows that MGIT is a reliable alternative for faster detection of mycobacteria. Contamination rate is low. This method offers the advantage of not only rapid detection but also faster Drug Susceptibility Test (DST) with the potential of improving overall TB management could provide a rapid tool for detection and also for accelerate the first step for DST.

PS-95633-07　Evaluation of oral antiseptic use for mycobacteria culture contamination rate reduction in SRs

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Identifying individuals with respiratory symptoms (SRs) is considered an important strategy in detecting new cases of tuberculosis (TB). Although clinical and radiographic findings play an important role in the diagnosis of TB, a positive culture of *Mycobacterium tuberculosis* is a definitive diagnostic evidence of this disease. However, cultures can be contaminated with organisms from the oral microbiota that avoid the multiplication of the tubercle bacili and interfere in the diagnosis, especially in paucibacillary patients. Oral antiseptics have been used as a complement to oral hygienization in order to minimize proliferation of contaminant organisms. In the present study, we assessed the efficacy of intraoral anti-sepsis methods in the reduction of culture contamination. A hundred-twenty patients with respiratory symptoms were analyzed. On the first visiting day, a sputum sample was collected after the patient was oriented to do the oral hygienization using water (control group). On the next day, the same patient was selected at random to join one of two different groups before collecting the second sputum sample: 59 patients did oral hygienization using chlorhexidine gluconate (CHX) and 61 patients did oral hygienization using cetylpyridinium chloride (CPC). The use of two concentrations of PANTA antibiotic (1X e 2X) on MGIT was evaluated. The contamination rate found for the group of patients that used the CHX was significatively lower than the one observed for the group of patients that used just water for oral hygienization, especially on MGIT cultures ($P = 0.0391$). The contamination rate was also significatively lower when samples were inoculated on MGIT supplemented with PANTA 2X ($P = 0.0039$). These results suggest that the use of CHX in oral hygienization is effective in reducing the contamination of mycobacteria culture with other organisms. In addition, the use of MGIT with PANTA 2X was also helpful in reducing the culture contamination rate.

TB-HIV II

PS-94157-07   Improving access to anti-retroviral treatment in TB patients with HIV infection in Thailand

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Background: HIV is epidemic in Thailand. It increases mortality among TB patients with HIV infection. Introducing ART during TB treatment is a life-saving measure for these co-infection patients.

Purpose: To assess ART provision during TB treatment in TB patients infected with HIV in 79 government hospitals from 4 provinces in the Northeastern region.

Method: HIV testing is routinely offered for all TB patients by TB clinic staff. HIV related care is provided by HIV clinic staff. Criteria for CPT is CD4 < 200 and for ART as CD4 < 250. CPT and ART are provided as early as possible during TB treatment. Trainings, supervisions, meetings were implemented to strengthen capacity of staff to provide ART for TB-HIV patients. Quarterly TB-HIV reports from October 2006 to September 2008 were reviewed.

Results: A total of 1015 TB patients with HIV infection were enrolled. These patients were registered for TB treatment (in 2007 for 5383 patients and in 2008 for 6613 patients). CD4 testing was performed in 375 (89%) TB-HIV patients in 2007, and 286 (48%) in 2008. Proportion of CPT has been increased from 90% (380/421) in 2007 to 94% (558/594) in 2008. Half of TB-HIV patients (222/421 in 2007 and 302/594 in 2008) accessed to ART during TB treatment.

Conclusions: Provision of ART can be improved through training, supervision, and meetings. HIV related care is already in place for years. Collaboration between TB clinic staff and HIV clinic staff is the main factor for successful implementation.

PS-94321-07   Diagnosis of TB in attributed hospital deaths in a region of high-HIV population prevalence

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Background: Despite significant efforts by South Africa to roll out antiretroviral therapy, which has been shown to significantly reduce the incidence of HIV-associated TB, the number of hospitalized TB cases and deaths in KwaZuluNatal (KZN) remains high.

Objectives:
1 To measure the TB diagnosis rate by ultimate sputum smear and culture results in TB-attributed hospital deaths.

2 To estimate the rates of multidrug-resistant (MDR) and extensively drug-resistant (XDR) TB in TB-attributed deaths.

Methods: A retrospective cohort study of medical inpatients who died with a clinical diagnosis of TB at Edendale Hospital, Pietermaritzburg, KZN, South Africa between September 2006 and March 2007 was done using physician-signed death certificates.

Results: Of 2752 deaths in the study period, 403 were attributed to TB (14.6%) according to the death certificate. Approximately one quarter of the patients had a specimen sent for smear or culture, and of those, only about one third had a TB diagnosis confirmed with either test. Of the 39 culture-confirmed cases, 27/39 (69%) had fully susceptible TB, and 27/39 (69%) had sputum smear-negative, culture-positive PTB (SNTB).

Conclusion: Although limited by a small sample size, these findings support the fact that the high prevalence of HIV in the region has increased rates of SNTB, resulting in diagnostic delays. In turn, patients present with more advanced pan-susceptible TB disease upon admission to hospital, and experience short survival in hospital despite treatment.

PS-94419-07   TB workplace policy in a VCT setting

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Botswana has a TB prevalence rate of 454/100 000 persons (WHO) and is actively fighting dual pandemics of TB and HIV. Tebelopele (TVCT) is the largest NGO provider of HIV counseling and testing (CT) services, providing over 150 000 tests in 2008. In 2007, TVCT began using screening questions with clients to identify TB suspects for referral and diagnosis at local clinics. In 2008, TVCT identified a need to have a workplace policy to clarify TVCT's own procedures and outline protections for the workplace. The policy's purpose is to adequately address those who may be infected with TB, while minimizing the risk to staff. The policy includes risk assessment and screening, cough hygiene, referrals, and frequently asked questions about TB. The policy was developed with input from staff, technical advisors including the National STOP-TB program with the Ministry of Health (MoH), and the TVCT Board. Employees are advised to ensure adequate ventilation, support cough hygiene and enable an environment that encourages TB diagnosis and treatment without fostering stigma and discrimination. In complement to the workplace policy, TVCT has revised its CT protocols to include TB screening as standard operating procedures, as well as requiring a self-directed TB course (also reviewed by the MoH's STOP-TB Program) be completed by

counseling and testing staff to ensure they have access to up-to-date information about TB in Botswana. Intensified TB case-finding, followed by diagnosis and prompt treatment, increases chances of survival, improves quality of life, and reduces transmission. The policy is intended to reinforce these efforts, as well as provide staff with information about their rights and responsibilities to address TB as a workplace issue in a CT setting. The policy has been welcomed by board and staff as an opportunity to clarify roles, responsibilities, and protections.

PS-94444-07   The analysis of epidemiology situation on HIV/AIDS and related factors in tuberculosis patients

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Objective: To research the epidemiology situation of HIV/AIDS in tuberculosis patients in Jiangxi province, to explore the mechanism of prevention and cure for TB-HIV double infection and provide academic foundation for local government.
Method: A study was conducted in 10 couties of Jiangxi province which was sampled by random during the 4 months from September to December in 2007, and developed the screening of HIV/AIDS in the new registered tuberculosis patients who would like to accept this meidical examination.
Result: The detection rate of HIV in TB patients was 0.36%, and there are significant between severe epidemic situation couties on HIV/AIDS and in low epidemic situation counties ($\chi^2 = 20.92$, $P < 0.001$).
Conclusion: The study shows that the epidemic situation of TB-HIV double infection of tuberculosis patients in Jiangxi province is not severe, and it is necessary to provide medical examination service to tuberculosis patients and estabilsh the cooperation mechanism between TB control dispensaries and HIV/AIDS control departments in the high epidemic situation on HIV/AIDS districts.

PS-94464-07   TB-HIV in congregate settings: PATH's experience in armies and prison facilities in Tanzania

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Background: The WHO stop TB strategy emphasizes the scaling up TB activities in the congregate setting where people are in clusters and the spread of infections needs to be prevented and disease to be managed promptly. PATH, in collaboration with the Ministry of Health and Social Welfare began scaling up TB and TB-HIV services in public and private facilities including the prisons and uniformed forces in four regions in Tanzania since 2006. The implementation challenges in scaling up TB and TB-HIV services was the introduction of these services in the prisons and defense forces.
Approach: PATH identified and assessed the prisons and uniformed forces' health facilities and sensitized the leadership and staff on provision of TB and TB-HIV services. This was followed by a participatory selection of staff that were trained and later provided services to their clients. Technical supportive supervision is provided by PATH seconded District TB-HIV and Council District TB/Leprosy Coordinators to ensure provision of good quality services.
Successes: By September 2007 a total of 764 new TB patients were registered at 3 prisons and 4 defense forces' health facilities; of these, 559 were tested for HIV and received their results while by September 2008, 1251 new TB cases were registered in 7 prison and 5 defense forces' facilities. Of these, 1215 were tested for HIV.
Challenges: Access to prisons and uniformed forces' health facilities is sometimes difficult, Provision of comprehensive HIV/AIDS care and support to TB-HIV patients is erratic, Few staff and staff turnover.
Lessons learned: Training and sensitization of the leadership and health care workers in prisons and uniformed forces is crucial in attaining the best results in TB and TB-HIV services. TB and TB-HIV services can be implemented in prisons, DTLCs and DTHCs are good links between the prisons and TB programme, involvement of prison and uniformed forces leaders is crucial in scaling up TB-HIV control in these settings.

PS-94471-07   Evaluation du processus de transfert des patients TB-VIH du PNT au PNLS en fin de traitement anti-TB

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Objectif : Evaluer la poursuite de la prise en charge du VIH après le traitement anti-tuberculose.
Lieu : Centre National Hospitalier de Pneumo-Phtisiologie de Cotonou, Bénin.
Méthode : Enquête rétrospective auprès d'un échantillon aléatoire de patients TB-VIH (cohortes 2005–2007) référés aux sites PNLS pour poursuivre leur prise en charge en fin de traitement anti-tuberculose.
Résultats : Parmi les 418 patients TB-VIH en succès thérapeutique en 2005–2007, 94 patients aléatoirement choisis ont été recherchés en 2008 ; 40% d'entre eux n'ont pu être localisés, 22% se trouvaient hors du territoire/de Cotonou, 8% étaient décédés et 30% ont été retrouvés. Parmi les 28 patients revus pour entretien, counseling et évaluation clinique, 12

(43%) indiquent ne pas se souvenir d'avoir été référés vers un site PNLS, et un seul a effectué cette démarche. Des 16 patients (57%) qui disent avoir reçu l'information, 5 (31%) n'y ont pas donné suite pour des raisons diverses. 12 (75%) patients se sont présentés dans un site PNLS : 9 (75%) sont encore en suivi mais 3 (25%) ont arrêté la prise en charge, invoquant principalement un mauvais accueil ou des difficultés financières. Aucun des 19 patients ayant interrompu le suivi n'était sous ARV au moment du transfert. Tous ont cessé la prise régulière du Cotrimoxazole.

Conclusion : L'information des patients sur la poursuite de leur prise en charge, la disponibilité des médicaments et réactifs, la formation et le suivi des agents dans l'application des directives sont des points clés à revoir par le PNT et le PNLS.

PS-94567-07 Community participation in the implementation of TB-HIV collaborative activities in South Africa

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Background: Involvement of the community in delivering some of the core health activities could be one of the avenues to address human resource crisis for health. An operational research was conducted in one of the rural district in SA to explore ways community care givers (CCGs) could be integrated in the provision of TB-HIV collaborative activities. This paper will focus on baseline assessment.
Methods: An audit using a questionnaire was conducted in 42 health facilities and 32 NGOs involved in TB and HIV care. Thirty-three key informants' interviews with provincial, district and facility managers as well NGOs involved in TB and HIV care, 6 focus group interviews with CCGs were conducted.
Results: All the managers acknowledged the potential benefits of involvement of CCGs in enhancing TB-HIV collaborative activities beyond the facility fences. The identified predominant core activities for TB-HIV integrated care to be provided by CCGs include

Table Training of community care givers on TB and HIV care (CCGs)

Training	% of CCGs trained
General home based care	40
HIV/AIDS care including lay counselling	30
Voluntary counselling and HIV testing	10
TB symptoms screening and DOT	10
First Aid	4
Infant management of childhood and illness (IMCI)	3
STI symptom screening	2
ART adherence	1

n = 33 NGOs.
CCGs include both community health workers and home based careers.

TB and HIV case find (including TB symptoms screening, HIV testing in homes) and holding (TB DOT, ARV adherence, dual therapy support for PMTCT clients); counseling on feeding options and education on positive living. The findings from facility-NGO audit show that the majority of CCGs were inadequately trained on TB and HIV care; 60% of facilities couldn't link patients to CCGs for follow up in the community and only 42% of facilities had someone dedicated to coordinate and monitor CCGs.
Conclusion: Participation of CCGs in provision of TB-HIV integrated care requires collaboration between health facilities and NGOs; set up mechanism of coordination and supervision of CCGs; up-skilling of CCGs; task shifting such as home based VCT by CCGs and political will for increase in funding for NGOs and stipend of CCGs. The findings of the baseline assessment led to a design and implementation of a TB-HIV comprehensive care package for CCGs. The later is under evaluation.

PS-94622-07 Experience of implementing TB and TB-HIV services and improvement of indicators in Western Uganda

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Background and challenges to implementation: Four districts in western Uganda were selected for support by Tuberculosis Control Assistance Program (TB-CAP) due to poor performance on Tuberculosis (TB) and TB-HIV indicators. In 2007, the Case Detection Rate (CDR) was 41.2%, Treatment Success Rate (TSR) was 70.5% (2006 cohort). In addition TB-HIV indicators reflected inadequate uptake of: HIV counseling and testing (HCT) in TB patients, 40.5%, CPT 67.9% and TB patients on anti-retroviral therapy (ART) 17.9%. Reasons identified for poor performance were: lack of trained staff to implement TB, TB-HIV collaborative activities; shortage of supplies; poor recording and reporting.
Intervention: The district health teams developed workplans to improve: HIV testing and care for TB patients; TB screening, diagnosis and care for People Living with HIV; TB infection control at health facilities; monitoring and evaluation of TB, TB-HIV activities; and capacity for TB, TB HIV activities. TBCAP provided both technical and financial support to implement the district workplans.
Results and lessons learnt: In one year of TBCAP support to implement TB, TB-HIV collaborative activities, there has been improvement in TB and TB-HIV indicators. CDR improved from 41.2% (2007) to 49.6% (2008), TSR from 70.5% (2006 cohort) to 74.6% (2007 cohort), HCT from 40.5% (2007) to

60.8% (2008), uptake of CPT from 67.9% (2006 cohort) to 94.2% (2007 cohort) and TB patients on ART from 17.9% (2006 cohort) to 19.4 (2007 cohort). Involvement of district health staff in planning and implementation of services did not only build capacity in the district, but created confidence and feeling of ownership of the program by the district authorities which is paramount for the sustainability of the services.

Conclusion: Implementing a comprehensive package to address challenges of implementing TB, TB-HIV colloborative activities and working through the existing district health care system improves care for TB patient.

PS-94672-07 Innovative approaches to increasing counseling and testing access to TB patients in South Africa

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Background: South Africa has the fourth highest TB incidence in the world. While the South African National Department of Health policy requires that all TB patients be tested for HIV, only a third received HIV testing in 2006. The failure to diagnosis HIV can lead to an under diagnosis of TB as sputum smear tests have lowered sensitivity in HIV+ individuals. Proper diagnosis and treatment of TB requires knowledge of a patient's HIV status.

Intervention: In 2006, Society for Family Health (SFH) partnered with two hospitals in KwaZulu-Natal Province, South Africa. SFH utilized their mobile VCT units to provide HIV counseling and rapid testing for TB center patients within the hospitals. All TB suspects from the Out Patient Departments and TB wards were referred to SFH for VCT. The patients were sent back to OPD or the ward with their HIV test results in hand in under an hour.

Results: As of January, 2009, 7376 suspected TB patients have been tested, 60% of these were female. Of these clients, 1944 were identified TB patients and of these, 78% tested HIV positive. 1104 registered TB clients were male and 70% of them tested positive for HIV. Among the females, 840 were registered for TB and 89% were HIV+. All clients were referred back into the hospital system.

Conclusion: Integrating HIV counseling and testing into the standard diagnosis and care for suspected TB patients can lead to more accurate TB diagnosis. NGO and Public Sector partnerships can help increase HIV counseling and testing access to TB patients. Further research is needed into the differences in care seeking and TB-HIV coinfection between men and women.

PS-94677-07 Assessment of TB-HIV collaborative activities in a rural area of South Africa

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Background: The assessment of TB-HIV collaboration in South Africa has been problematic due to lack of standardised recording and reporting systems that reflect TB-HIV collaborative indicators, including PMTCT. This project was conducted to assess the level of integration of TB-HIV/PMTCT services at facility level.

Methods: First a review of existing recording and reporting tools for TB-HIV/PMTCT collaborative activities was conducted. New tools for both TB and HIV care included indicators for TB and HIV collaborative activities were devised. Data were analysed for October–December 2007 (Q3), January–March 2008 (Q4) and April–June 2008 (Q1) in ten facilities, Sisonke district.

Results: From HIV baseline data (Q3), out of 1388 HIV-positive clients, 84.3% were screened for TB, 10% were diagnosed and referred for TB treatment and none of them were screened for IPT. At Q1, out of 1328 HIV patients, 93% were screened for TB and 8.5% were diagnosed and referred for TB treatment. Among ANC clients, out of 1850 clients, 82% were counseled and tested for HIV, 30% were HIV-positive and 24% were screened for TB. From TB baseline data (Q3), out of 415 TB patients, 64% were counseled and tested, 52% were HIV positive, 3.7% were on CPT and none of the TB-HIV positive patients had a CD4 test done. At Q3-2008, out of 300 TB patients, 94% were counseled and tested, 60% were HIV positive and only 2.2% of them had a CD4 test done.
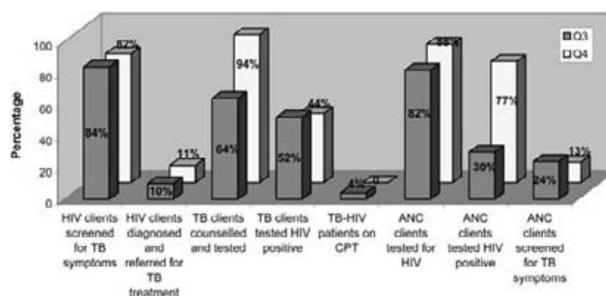
Figure Provision of TB/HIV/PMTCT integrated care.

Conclusion: The use of recording and reporting tools that included key elements for TB and HIV collaborative activities including PMTCT is vital in monitoring the progress of TB-HIV collaborative activities and identify strength and weakness. None of the HIV patients were screened for IPT and stated on IPT.

There is a need to strengthen TB screening, HIV testing among TB patients, ART workup (CD4 testing) and ART initiation. Nevertheless, the implementation of IPT in SA need to be reinforced even in high burden areas such as KZN.

PS-94687-07 Provider-initiated HIV testing and counselling of TB patients in Central Province, Kenya

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Background: HIV testing among TB patients is a key entry point to HIV care and remains a challenge in implementation of TB-HIV collaborative activities. The HIV epidemic remains a major factor responsible for the increase in number of notified TB cases. HIV testing in TB care setting has evolved from opt in approaches to various opt out approaches such as Diagnostic Counselling and Testing (DTC) and PITC. This abstracts demonstrates the uptake of HIV testing among TB patients in Central Province over the last three years.

Methods: PITC of TB patients using an 'opt-out' approach started actively in Central Province in the fourth quarter of 2005. All newly diagnosed TB patients are offered a HIV test at the initial visit to the TB clinic using the standard testing procedures. Those who test HIV positive are either referred to the comprehensive care centre (CCC) to access HIV care (in un-integrated sites) while in integrated sites, all services are offered in the TB clinic.

Results: Among the 10259 patients diagnosed with TB in 2006, 6335 (62%) were tested for HIV with 3258 (51%) being positive. In 2007, of the 10623 new TB patients, 8600 (81%) were tested for HIV with 3810 (44%) being positive. In 2008, 10774 patients were newly diagnosed with TB. Of these 9770 (91%) were tested for HIV with 3843 (39%) being positive. This represents a 29% increase in the number of TB patients tested for HIV in a period of 3 years. Of a total of 3843 patients diagnosed with HIV in 2008, 1656 (43%) were started on antiretroviral therapy and all were offered cotrimoxazole preventive therapy. Only 376 (9.8%) partners were tested.

Conclusions: This abstracts demonstrates that PITC in TB clinics is feasible. The high percentage of co-infected patients coupled with the low ART uptake underscores the need to implement PITC and ART services in TB clinical settings. Partner testing has a low uptake and needs to be strengthened.

PS-94797-07   Promoting implementation of collaborative TB-HIV activities through PPM

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Engaging wider spectrum of public and private health care providers for the delivery of collaborative TB-HIV activities has been discussed over the last few years and there is consensus that it offers a huge untapped opportunity for scaling up of interventions in HIV prevalent settings. As part of the TBCAP APA 3, The Union is leading implementation of pilot project in Mumbai, India to 'field test' the TBHIV PPM protocol to ensure that the lessons learned from the pilot projects are successfully integrated into final policy guidelines. The key objectives of the pilot project (started in Nov 2008) are to examine processes for involving all stakeholders (public and private) to implement TB HIV coordination activities. 2 sites in the pilot project (site 1 specifically focussed on general population with high HIV prevalence—ANC 1.13% ; and site 2 with concentration of CSW population) were selected for the interventions. Interventions include intensified TB case finding in high risk groups and PLWHA; providing TB services for high risk group and PLWHA; TB case finding in urban slum dwellers, migrants; sensitization of TB patients and their families about HIV/AIDS. Early numbers indicate observable 22% increase in suspect-referral and 30% increase in sputum positive cases in NGO operated DMC. 40-fold increase in RNTCP based referrals for HIV testing at ICTC's was observed in Shatabdi hospital and the Involvement of local NGO's was perceived to be strong. This increase may possibly be attributed to multitude of factors including intensified effort in implementing project activities by LSS within the target population, increasing slum population with M/E ward due to new slum rehabilitation centers, and an improved RNTCP programme performance. Conclusive results will be available by Aug 2009 for wider dissemination.

PS-94942-07   Patient involvement in contact invitation of TB case identification in Nairobi

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Setting: The Kawangware slum in Nairobi Kenya where the incidence of TB-HIV is high.

Objective: To assess the impact on case notification by involving TB patients in contact investigation activities in the slum area of Kawangware in Nairobi, Kenya.

Methods: New smear positive PTB patients from Riruta Health Centre in Kawangware were supported

to collect sputum samples from all household members capable of producing sputum for TB screening. The number of patients engaged in this initiative and the number of 'additional' smear positive PTB cases diagnosed through this initiative was monitored.

Results: Between 2006 and 2008 a total of 540 smear positive PTB patients were diagnosed. Of these 265 (49%) brought in sputum samples from their household contacts in 2007 and 2008 after initiating contact invitation. The number of sputum smears performed at the Riruta Health centre increased from 747 in 2006 to 1339 in 2008. Of these 218 (24%) were smear positive.

Conclusion: Engagement of patients in contact evaluation activities is feasible and has the potential to increase case identification and notification.

PS-95000-07 International partnership in prevention of TB-HIV development among inmates in Kyrgyzstan

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Aim: Life conditions and risky behaviour of inmates, lack of information on HIV, TB and prevention skills promote spread of these 2 infections. According to data of Kyrgyzstan's AIDS Center, inmates make up to a quarter of the PLHIV in the country. Among 2031 HIV infection cases registered, 270 were HIV-TB. Due to a specific structure of the healthcare system, national TB and HIV programs are implemented parallel to each other without almost no interrelation. Thus, it is necessary for international organizations implementing HIV-TB projects to act jointly in preventing further dissociation of national structures.

Methods: AFEW supports the coordination mechanism of GO, NGO and IO through implementing the project 'ACCESS' HIV/AIDS and HIV-TB Collaborative Efforts in Central Asia directed to improving the access of vulnerable groups to medical-social services. This partnership has been established to increase awareness on HIV, TB, drug use and help build on inmates' skills of safe behaviour for TB and MDR-TB patients.

Results: AFEW, MSF and ICRC helped to teach medical and non-medical staff of TB hospitals within prisons on HIV-TB issues. Consequently, 520 inmates, 31 peer educators were trained, who later conducted 100 information sessions covering 90% of prison populations. It should be noted that 86% of inmates stated about availability of information on HIV and 78% of inmates claimed about presence of information on TB. International partners conduct monitoring and provide national trainers and peer educators with ongoing support.

Conclusion: To accomplish strategies on HIV-TB in prisons successfully, international organizations

assisting to national AIDS or TB programs must work in tight cooperation with each other as well as with governmental agencies as joint partnership will help to prevent TB-HIV development among inmates.

PS-95571-07 Busqueda de casos de tuberculosis, VIH y otros padecimientos en prisiones y comunidades marginadas

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Objetivo : Incrementar la cobertura de detección y diagnostico oportuno de casos de TBP en prisiones y comunidades marginadas

Método : Se estableció coordinación con las autoridades de 3 prisiones del Estado. Acudió Brigada de Salud coordinada con la Red TAES Local para promoción de la Unidad Móvil de TB en comunidad. Coordinación con programas de VIH-SIDA e ITS, Salud del Adulto y Salud Reproductiva.

Resultados : Se visitaron 7 prisiones, 16 Centros de Rehabilitación para adictos, 19 Campos de Jornaleros Agrícolas y 32 localidades con alta incidencia. Aplicación de 16 649 cuestionarios a Sintomáticos Respiratorios, se procesaron 5274 baciloscopias confirmándose 20 casos TBP. Se tomaron 6094 pruebas de VDRL, 246 positivos (4%) ; 4497 detecciones de VIH y 37 positivos (0,82%) confirmados por Western-Blot ; 13 574 detecciones de Diabetes Mellitus ; 13 850 HAS ; 22 962 dosis de biológicos, se distribuyeron 3460 sobres de Suero Vida Oral y 2980 cartillas ; 210 detecciones de Cáncer Cervicouterino.

Conclusiones : El trabajo conjunto en forma multidisciplinaria en Población Vulnerable y de Alto Riesgo para TB brindó la oportunidad de identificar otros factores de riesgo para poder otorgar atención integrada y de oportunidad para el control del la TB.

PS-95620-07 Cuidadores comunitarios pares en VIH expandiendo la estrategia DOTS

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Introducción : Los servicios de tuberculosis se apoyan en la estructura comunitaria de cuidadores pares para personas con VIH (PVVIH), para incrementar la captación y evaluación de sintomáticos respiratorios y apoyo al DOTS. Mediante estrecha relación con el gobierno, Visión Mundial desarrolla un Proyecto de Atención Integral del VIH y TB, implementado a través de sus Programas en El Seibo y Villa Altagracia, desarrollando una respuesta articulada entre VIH, TB y la comunidad.

Intervención : Impulsado por este Proyecto, se capacitaron en prevención, seguimiento a la adherencia de uno o ambos tratamientos o sobre quimioprofilaxis

para la TB, a cuidadores comunitarios pares en VIH. Se suman, enfermeras de los Centros de Atención Primaria, médicos, promotoras de salud, líderes comunitarios y maestros, para orientar a la comunidad e incrementar la detección y referimiento de nuevos casos. PVVIH y personas sintomáticas respiratorias son orientadas sobre ambas enfermedades, mediante reuniones de grupos de apoyo o charlas educativas y dirigidas para la detección de TB. Si es una PVVIH sin TB, se le inicia su quimioprofilaxis. Y, todas las personas con tuberculosis se refieren al servicio de consejería y prueba voluntaria.

Resultados : De enero a septiembre 2008, 210 PVVS y 27 personas con TB reciben acompañamiento para su cuidado y apoyo emocional. Actualmente, no se registra ningún caso de TB en PVVIH en áreas intervenidas. El 30% de las PVVIH registradas en ambas áreas, reciben quimioprofilaxis para la TB, luego de ser evaluadas un 63% de éstas, para descartar esta enfermedad.

Conclusión : Los cuidadores comunitarios pares en VIH, se constituyen en aliados importantes en la expansión del DOTS. Se inició la terapia preventiva a PVVIH. Se mejoraron las capacidades de recursos humanos. Se desarrolló el involucramiento del personal comunitario, como agentes de prevención. Se incrementó la demanda de ambos servicios de salud.

PS-95642-07   Implementacion de actividades colaborativas interprogramaticas TB-VIH en la Republica Dominicana

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Introducción : Los Programas Nacionales de VIH/Sida (DIGECITSS) y de TB (PNCT) en la República Dominicana se propusieron implementar actividades colaborativas como cumplimiento a los objetivos de la Estrategia de Alto a la Tuberculosis en el Plan estratégico Regional 2006–2015 de la OPS/OMS teniendo en cuenta su realidad epidemiológica de alta carga de TB con mas de 85 casos por 100 000 habitantes, la seroprevalencia de VIH de 1% y la coinfeccion de 8.6% (CENISMI,2005)

Se intervino al discutir las implicaciones de la situación epidemiológica en el desarrollo de las actividades de colaboración TB-VIH a nivel nacional y con priorización a las subpoblaciones más expuestas analizando sus prioridades, mecanismos, pasos y procedimientos.

Como resultado se logro la creación por resolución ministerial de un ente coordinador llamado Comité Nacional de Coinfeccion (CONACO), se diseño, reviso y valido sus estatutos y se capacitaron técnicos de ambos programas hasta la celebración del primer curso gerencial de coinfeccion donde se elaboraron planes locales de coinfeccion en 14 provincias, servicios de salud en cárceles y en el sector de las Fuerzas

Armadas, se elaboraron y validaron las guías de manejo clínico de coinfeccion TB-VIH y adecuación del Plan Nacional de Coinfección en Diciembre del 2009. Faltaría la financiación para la aplicación de los planes elaborados y los talleres provinciales de capacitación en manejo de coinfeccion en establecimiento de salud y sitios congregados (prisiones, cuarteles, zona fronteriza).

Conclusión y recomendaciones : Las actividades colaborativas implementadas han sido de beneficio para ambos programas de TB y VIH y han permitido la toma de decisiones de forma multisectorial y representativa de los principales actores y organizaciones que laboran en ambos temas a nivel nacional. Esta experiencia pudiera servir una práctica efectiva para los diversos programas en países con alta carga tanto de TB.

TB TRANSMISSION CONTROL AND LABORATORY DECONTAMINATION

PS-94164-07   Population-based predictive value of mutation analysis for rifamycin resistance, New York City

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Background: Most *M. tuberculosis* isolates that are resistant to rifamycins have a mutation within an 81 base-pair region of the *rpoB* gene. Since over 90% of rifamycin-resistant isolates are also resistant to isoniazid, these mutations can also indicate multidrug-resistance (MDR). Mutation analysis reduces medical and public health delays associated with phenotypic drug susceptibility testing (DST) by providing results almost immediately. Yet, its accuracy has not been studied on the population level, where most tuberculosis (TB) is drug susceptible.

Methods: Mutation analysis via direct DNA sequencing of the resistance-determining region of the *rpoB* gene was performed on isolates from the 1089 culture-confirmed New York City TB cases from 10/2005 to 3/2007. Genotypic results were compared with phenotypic DST as the 'gold standard' for rifampin (RIF), rifabutin (RBT) and isoniazid.

Results: Mutation analysis was available for 862 (79%) isolates. Mutation analysis was not available for 227 isolates due to technical constraints, such as isolates being mixed with non-TB mycobacteria or insufficient quantities of DNA. Genotypic results matched phenotypic RIF resistance in 27/29, RBT resistance in 22/24, and MDR in 23/24 isolates. No

resistance mutation was detected in 830/833 RIF-susceptible isolates. For RIF resistance, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of genotypic DST were 93%, 99%, 90% and 99%, respectively. For RBT resistance, sensitivity, specificity, PPV and NPV were 92%, 96%, 85% and 98%, respectively. Three of four isolates with the Leu511Pro mutation were RIF susceptible and all were RBT susceptible.

Conclusion: For this large group of clinical isolates, mutation analysis predicted rifamycin resistance and MDR very well. The Leu511Pro mutation was inconsistent at predicting phenotypic resistance and its impact on treatment response is yet to be established.

PS-94301-07   Closing the knowledge and the "know-do" gap for better TB transmission control via GHDonline

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Introduction: Infection control is essential to the management of TB, but is very challenging to implement in resource-constrained settings where professionals often work in isolation with little access to readily available practical information or expert advice.
Aim: We will demonstrate how hundreds of practitioners—from researchers to facility administrators and architects—representing a variety of organizations have created a vibrant virtual collaboration space: the TB Infection Control community (http://www.ghdonline.org/ic/), where they share proven practices, access lists of trained international consultants, engage in problem-solving, and address challenges to control the transmission of TB. Guided by expert moderators, GHDonline communities allow members, among other functionalities, to start and participate in discussions either online or seamlessly via email and publish resources. Information in multiple languages, free access, and the ability to share content with peers contribute to a user-friendly experience and foster broader collaborations.
Methods: A qualitative review of in-depth discussions which have shown potential to impact practice such as outlining a protocol for outdoor sputum induction; guiding members when dealing with a defective biosafety cabinet; sharing recommendations for using germicidal lamps, or ensuring the protection of health workers with N95 respirators and masks.
Conclusion: With efficiency issues at the center of funders' considerations, organizations in developing and poor countries now more than ever need to share the lessons learned in the field. We will explain how practitioners can join and use GHDonline, and

provide recommendations to organizations who wish to harness this unique capacity to support and enhance their work in the field.

PS-94306-07   Latent tuberculosis infection in health care staff at a general hospital in Cuba

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Background: Knowledge on *Mycobacterium tuberculosis* transmission in general population and risk groups will be very useful to perform specific and necessary interventions to face the TB elimination stage in Cuba.
Objectives: To determine the prevalence of tuberculosis infection and to value its possible association whit some predictor variables.
Methods: A Tuberculin Skin Test and a questionnaire were applied in a 371 staff sample from a general hospital at Santiago de Cuba province, to explore the association of latent tuberculosis infection with age, gender, occupational category, occupation, contact history with tuberculosis patients and BCG scar.
Results: 82% of surveyed staff were feminine, age mean was 37.6 years old. Prevalence of tuberculin reactors was 15.4%, the highest in professionals (20.6%). Physicians had the highest percentage of reactors (21.8%), followed by nurses (19.6%); the lowest in office staff (3.3%). The induration mean 3.78 mm, higher in professionals (4.41 mm) and lower in non-professional workers (2.59 mm). The induration mean followed the same pattern: bigger in physicians and nurses, smaller in office personnel. A statistical association was found between latent TB infection and contact history with TB cases in bi-variated analysis, while in multi-variated analysis just contact with TB cases remained as predictor variable.

Table   Tuberculin reactivity prevalence and induration diameter mean by occupation

Occupation	N	Positive mantoux (≥10 mm) Cases *n*	Positive mantoux (≥10 mm) Prevalence (%)	Prevalence 95%CI	Induration mean (mm)	Mean 95%CI
Nurse	92	18	19.6	[12.4–28.6]	4.23	[3.1–5.3]
Physician	55	12	21.8	[12.4–34.1]	4.90	[2.8–7.0]
General services	123	18	14.6	[9.2–21.7]	3.75	[2.8–4.8]
Diagnostic and therapeutic technician	50	5	10.0	[3.8–20.8]	3.04	[1.3–4.8]
Office	30	1	3.3	[0.2–15.4]	1.77	[0.3–3.3]
Total	350	54	15.4	[11.9–19.5]	3.78	[3.3–4.3]

Source: Performed Survey.

Conclusions and recomendations: The presence of latent tuberculosis infection in health care staff in the studied hospital could be associated to the increased exposition risk. So, it could be recommended to value the application of preventive quimotherapy.

PS-94347-07   Diagnosing pulmonary TB: added value of combining sputum microscopy with biomarker-based blood tests

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Objective: We evaluated the added value of combining sputum microscopy with a whole blood biomarker based diagnostic test in the diagnosis of pulmonary tuberculosis (TB) in an HIV endemic setting.
Materials and methods: 157 TB patients with a positive culture for M.tb. were included and had sputum microscopy performed. All participants were HIV-tested and tested with the QuantiFERON-TB In tube test (QFT-IT) and a Luminex based IP-10 test.
Results: Sensitivity was 78% for microscopy, 73% for the QFT-IT and 77% for the IP-10 test. Sensitivity was lower in HIV-positive compared to HIV-negative patients for the QFT-IT (63vs.80%, $P = 0.02$) and the IP-10 test (66 vs. 85%, $P = 0.01$), but not for microscopy (74 vs. 82%, $P = 0.25$). Sensitivity when combining all 3 tests was 96% (95%CI: 93–99%) with no difference between HIV-positive and -negative patients. Combining microscopy with either the QFT-IT or the IP-10 test identified significantly more patients than microscopy alone (92 resp. 95% vs. 78%, $P < 0.01$ for both). In HIV-positive, but not in HIV-negative patients the combination of microscopy and the IP-10 test was more sensitive than the combination of microscopy and the QFT-IT (94 vs. 89%, $P = 0.05$).
Conclusions: Combining an IGRA with sputum microscopy significantly improved the diagnosis of pulmonary tuberculosis. The IP-10 test appeared superior to the QFT-IT in this combinatory approach. However, since the whole blood based assays cannot distinguish between active and latent TB infection prospective studies of patients suspected of TB are needed to clarify to what extent the lack of specificity for active infection limits the use of whole blood based tests for this purpose.

PS-94551-07   Peracetic acid disinfection of sputum for aerial transport and MDR-TB testing by DNA line-probe

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Background: MDR-TB is a major public health problem in South Africa and line-probe testing is being phased in for rapid detection of drug-resistant strains. Specimen transport from remote clinics poses a major challenge and for this an unmanned aircraft system (UAS) is being investigated. Small aerial vehicles are vulnerable to climatic and traffic hazards and safety of specimens is mandatory.
Intervention: Chemical disinfection of sputum not compromising line-probe testing was investigated to address safety concerns. For this peracetic acid formulation (PAF), Ultraseptin aktiv (Esteer® Pharma GmbH, Reilingen) was evaluated. *Mycobacterium terrae* cell suspensions of 10^4–10^6 cfu/ml were exposed to 2% and 4% PAF in the presence of 0.3g/l bovine albumin for intervals of 3 min to 96 h. Performance criteria required a >4 $\log_{10}$ reduction in cfu/ml and preservation of DNA integrity for real-time PCR. Mycobactericidal activity was also studied on sputa of varying viscosity. PAF concentrations and exposure times were established for rendering TB-positive specimens and filter paper discs impregnated with such sputum for air transport, negative on culture in the MGIT 960 system (BD Diagnostic Systems), without interfering with PCR-based assay for MDR-TB.
Results: At a 2% concentration and in presence of bovine albumin, PAF produced 4.8 $\log_{10}$ and ~ 6 $\log_{10}$ reductions respectively in cfu/ml of *M. terrae* after exposure times of 5 and 15 min. At final PAF concentration of 2%, highly muco-purulent sputum required 30 min, and less mucoid sputa 15 min exposure to be rendered TB culture negative. PAF exposure of up to 96 h did not affect adversely real-time PCR or line-probe testing for MDR-TB.
Conclusion: Ultraseptin aktiv is a candidate for high-level disinfection of sputum for aerial transport.

PS-94626-07   Testing for TB antigen in breath in Ethiopia

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Investigation of the 'infectiousness' of individual TB patients has previously been limited by the lack of

tools to detect exhaled bacilli. Increased knowledge regarding shedding of bacteria would greatly enhance our understanding of transmission. A rapid, portable device to detect TB antigen (Ag85B) in breath has been developed (Rapid Biosenor Systems Ltd, UK). In a pilot study to field test the device sixty adults with respiratory complaints were tested at an outpatient clinic in Ethiopia. Triage and the breathalyzer test were performed by separate physicians, known TB patients were excluded. Demographic and clinical data were recorded to include smoking habits, description of cough, haemoglobin, erythrocyte sedimentation rate and white cell counts. All patients were subjected to chest radiogram and sputum examination by Ziehl-Nielsen microscopy. Prior to testing patients were nebulised with 0.9% saline to lubricate the trachea using a hand operated pump. Samples for analysis were collected in disposable collection tubes. Each individual was shown how to cough into the tube and requested not to attempt to expectorate sputum. Once samples had been collected tubes were placed in the instrument and the digital readout recorded over a period of two minutes. Testing was completed in less than 10 min and was well tolerated by all patients. Positive breath test results were recorded for 29 (48.3%) patients. Of 31 patients with a final diagnosis of TB 20 (64.5%) were found positive for acid fast bacilli in their sputum and 23 (74.2%) were positive for antigen in their breath. The portability, simplicity of use and speed of the test device suggest it may find use in poorly resourced TB endemic settings as a tool to investigate exhalation of *M. tuberculosis*. Further studies should be undertaken to ascertain its value as a screening tool to assist early case detection.

PS-94714-07   Infection control in TB hospitals and tuberculin skin test for health care workers in Cambodia

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Background: Research Institute of Tuberculosis (Japan) and Japan International Corporation Agency have supported the Cambodia national tuberculosis control project in collaboration with National Center for Tuberculosis and Leprosy Control (CENAT). The prevalence of TB infection among younger generation would be expected to decrease. TB hospital infection control has been emphasized recently in consideration of relatively higher HIV positive ratio with 7.8% among TB patients (2007) and the emergence of MDR-TB. In this study, we analyzed infection control in TB hospitals in Cambodia.

Methods: We analyzed the possibility of application of WHO guideline (Guidelines for the prevention of tuberculosis in health care facilities in resource-limited settings, 1999) on the questionnaire for health care workers (HCWs). Then we conducted tuberculin skin test (TST) for students ($n = 820$) in TSMC (Technical School of Medical Care) and HCWs ($n = 64$) at CENAT. PPD 2TU was injected. TSMC is a school for HCWs in Phnom Penh, and CENAT has hospital for patients with TB, and TB and HIV co-infection. TST positive cut-off is 10 mm induration.

Results: Administrative and environmental measures in WHO guideline are relatively possible in Cambodia. TST positive in TSMC was 242 of 768 (32%). (Male: 42%, Female: 27%). The distribution of induration was by-phase, with one peak at 0 mm and another peak at $\geqslant 10$ mm. TST positive in CENAT was 41 (64%). There was not significant difference in age and career. Those with positive might get acquiring infection with TB early timing after working as HCWs.

Conclusions: TST provides useful information about TB infection condition of every HCW. The prevalence of TB infection in younger generation was still high. However, those with TST negative would be exposed to the risk of TB infection at health care facilities after graduation. The application of WHO guideline should be ensured, HCWs should be given a sufficient education for TB hospital infection control.

PS-94752-07   Natural ventilation for preventing tuberculosis transmission in health care facility waiting rooms

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Background: Waiting rooms in health care facilities are likely to be foci of TB transmission because they are often overcrowded, and because undiagnosed, untreated patients, who are in general the most infectious, are found there. Little is known about room ventilation in waiting rooms in low resource settings.

Aims: To measure natural ventilation in hospital waiting rooms in a high TB-burden country and to model the risk of TB transmission.

Methods: Room ventilation was measured on repeated occasions using a carbon dioxide tracer-gas technique in 145 experiments in 59 waiting rooms in 16 hospitals in Peru. Waiting rooms in out-patient, HIV, and TB clinics, and emergency and X-ray departments were included. TB transmission risk for a health care worker on a 12 hour shift was estimated using the Wells-Riley airborne infection model for each experiment.

Results: Median air changes per hour (ACH) was 1.2 (inter-quartile range, IQR 0.8–0.9) with windows and doors closed, and 18 (IQR 11–27) with windows and doors open. There was considerable variation in ventilation between different waiting rooms (range 2.6 to 80 ACH) with larger openable window area, cross ventilation and wind speed being independently associated with increased room ventilation ($P < 0.001$). Increased TB transmission risk was independently associated with decreasing: floor area per occupant, ceiling height, and room ventilation (all $P < 0.001$).

Conclusions: A wide range of room ventilation was measured in a variety of hospital waiting rooms in a low resource setting. Despite apparently high ACH in some rooms, TB transmission risk remained high due to overcrowding. Recommendations for airborne infection control should include consideration of total room ventilation per occupant rather than just ACH alone. TB infection control should be prioritised in waiting rooms in out-patient, emergency, and X-ray departments, where untreated infectious TB patients are most likely to be found.

PS-94850-07 Assessment of infection control measures at selected health facilities in Tanzania

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Background: As part of the national TB-HIV policy, in 2008 the MOH of Tanzania launched the Three I's' package. The National TB and Leprosy programme (NTLP), the National AIDS Control Programme (NACP) and ICAP–Columbia University collaborated in the TB infection Control (IC) component. Prior to developing national TB IC guidelines, a baseline assessment of TB IC measures was conducted in May 2008.

Methods: Assessment of TB IC measures was conducted at 7 sites in 2 regions of Tanzania. Sites were selected by geographical location and high HIV-TB prevalence. Reference, regional and district hospitals and HCs were assessed using a checklist. The checklist was field tested during assessment and modified to be suitable for the country setting. The assessment was conducted by a team of experts from ICAP, NTLP MOHSW and an external consultant. The assessment was based on on-site observations and interviews of key staff.

Results: A written TB IC plan was not available at any of the sites. TB suspects were not actively identified at registration desk. Posters on cough hygiene and tissues for coughing patients were not available. On average 48–72 hours were required to obtain 3 sputum smear results, and TB treatment was started within 24 hours following the diagnosis. Sputum samples were collected in open air for out-patients, while at the bed side for in-patients. In the general ward, TB patients were not separated from other patients. In TB wards, respirators were not available and there were no restrictive measures for entering. There were no work restrictions for HCWs diagnosed with TB. There was no specific policy on opening windows and ceiling fans were often found out of order. A specific training curriculum on TB IC was not in use.

Conclusions: Use of a standardized checklist to assess existing TB IC measures at HFs is feasible and is a key step which informs the development and implementation of TB IC guidelines.

PS-94891-07 Doing no harm? A study of TB infection control practices in health facilities with TB-HIV

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Background: The drive towards universal access to comprehensive HIV services has led increasingly to facility co-location of TB and HIV services. In order to ensure that convenient and patient-friendly access does not unwittingly translate to increased incidence of nosocomial (TB) infections amongst immune-compromised clients, the Nigerian national TB-HIV working group has recently approved guidelines for TB infection control. This study was an attempt to document current practices at the facilities and establish a baseline for evaluating future interventions.

Methods: This is a descriptive study combining self-administered mostly-structured questionnaire survey with observation technique. Study sites were selected through a multi-stage sampling process. Altogether 12 health facilities and 173 health workers were involved in the study. Quantitative data were analysed using SPSS version 11.0 while qualitative data were analysed separately.

Results: Only one facility, a faith-based primary health centre (8.3%) had an infection control policy document in place. While most facilities (83%) screened their TB patients for HIV only 50% of the facilities screened their HIV clients for TB. In more than half of the facilities (58%), TB patients were routinely nursed in the same ward as other patients including those who are HIV-positive. Only in one facility (8.3%) were patients routinely asked for history of cough and triaged to the front row for quick consultation.

Conclusion/recommendations: This study suggests

that awareness of and current TB infection control practices at health facilities offering TB-HIV services in this setting are poor. We recommend quick implementation of the TB infection control policy based on national guidelines.

PS-94897-07   Implementing TB infection control risk assessments: lessons from South Africa

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Aim: The response to emergence of DR-TB globally has led to massive allocation of funds to build DR-TB facilities, buy drugs and train HCWs. For several years Health facilities designs have not considered the risk of TB transmission. We have assessed the risk of TB transmission in selected health care settings.

Methods: A structured questionnaire developed by the University Research Co., LLC was administered in 18 facilities comprising 4 MDR-TB facilities, 6 general hospitals, 5 Community Health Centre and 3 PHC clinics, in 5 provinces out of the 9 provinces in South Africa between October 2007 and March 2009. Data was analyzed by reviewing responses from facilities according to 4 key areas: implementation of TB IC, environmental controls, respiratory protection plan and sputum collection and testing.

Results: Among 18 facilities, only 5 facilities had done TB IC risk assessments before our visit while only 8 had TB IC plans. Building designs prevent isolation and implementation of TB IC plan in 3 out of 4 facilities. Natural ventilation was not seen as priority during interview with Health Care Workers in most facilities. Technology used for ventilation was poorly understood by all hence maintenance staffs were not involved. Respiratory protection plan were only found in the 4 DR-TB facilities and 3 other general facilities. Although no facility had conducted fitting tests for staff members. Turn-around-time for TB microscopy results was 48 hours or less in 15 out of 18 facilities visited. Two facilities had adequate dedicated rooms for sputum collection.

Conclusion: The risk assessment tool was able to identify basic gaps in TB Infection Control practices at facility level.

PS-95147-07   Detección oportuna de tuberculosis en contactos y usuarios de drogas en el municipio de la Paz, BCS

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Objetivo: Detectar nuevos casos de tuberculosis en contactos y grupos de riesgo en la periferia de ciudad La Paz BCS por Red TAES de enfermería.

Metodología: Gestión de recursos, capacitación a 54 enfermeras en búsqueda de casos, Búsqueda de contactos (2006–2008) por visita domiciliaria con Red TAES, Se revisaron tarjetas y expedientes de pacientes, se identificaron 151 contactos con sintomatología respiratoria. Se visitaron 13 grupos vulnerables, 263 usuarios de drogas, (1 septiembre al 10 de diciembre del 2008).

Resultados: Se realizaron 75 visitas a contactos, informándose sobre TB a 171 convivientes, enfatizando en la detección oportuna, se realizaron 54 baciloscopias (35.76%) confirmándose 2 casos. En grupos vulnerables se informó sobre tuberculosis a 415 personas, realizándose 202 baciloscopias confirmando 2 casos (1%) de personas enfermas.

Conclusiones: Se encontró que la población no identifica a la tuberculosis como un problema grave de salud por tal motivo no se realiza la baciloscopia. La vigilancia de los contactos y grupos concéntricos disminuye el riesgo de contraer la enfermedad.

PS-95237-07   Efficacy of UV air disinfection on MDR-TB transmission in an African hospital: preliminary results

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Tuberculosis (TB), one of the world's greatest killers, is predominantly spread indoors by the airborne route. Sub-Saharan Africa is burdened with high rates of HIV and is currently home to a growing MDR and XDR-TB epidemic with strong evidence of nosocomial transmission. International guidelines for TB infection control in resource poor settings are available, but little field data supports the implementation of specific transmission control interventions. Air disinfection is an important part of transmission control, and upper room ultraviolet germicidal irradiation (UVGI) is being widely used in Southern Africa and other high burden settings with little proof of efficacy under real life conditions. The Airborne Infections Research (AIR) facility was established to test the effectiveness of air disinfection interventions by quantifying the airborne concentration of infectious *Mtb* organisms using sentinel guinea pig air sampling. The facility is part of a regional MDR-TB referral hospital and consists of three 2-bed patient wards from

which infectious air is extracted and conveyed to two identical exposure chambers, each housing 90 healthy guinea pigs. The efficacy of UVGI in reducing MDR-TB transmission is being assessed in the AIR Facility by comparing the tuberculin skin test conversion rate in the intervention guinea pig chamber (receiving all ward air on odd days when upper room UV is on in the wards) to that in the control guinea pig chamber (receiving all ward air on even days when UV fixtures were turned off). Preliminary results after 3 months exposure shows 9 guinea pigs skin test conversions in the control animal chamber and none in the intervention chamber. Pending confirmatory experiments, this preliminary 100% point efficacy estimate has an exact confidence interval of 61.5 to 100%. This brackets the 72% efficacy recently reported by Escombe using a similar experimental design in Lima, Peru.

PS-95242-07   Effectiveness in the use of air isolation rooms for pulmonary tuberculosis in Brazil

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Background: In Rio de Janeiro city, the tuberculosis (TB) incidence is 100/100 000 hab, and one third of the TB cases are diagnosed in hospitals. A prompt isolation of a suspected TB case is a key administrative measure that can reduce the nosocomial TB transmission to others patients and health care workers (HCWs).
Objective: To evaluate the effectiveness of the use of air isolate rooms (AIR) for suspected pulmonary TB (SPTB) and confirmed pulmonary TB (CPTB) patients at teaching Hospital in Rio de Janeiro city, Brazil.
Methods: From January, 2003 to December, 2006 all SPTB or CPTB cases admitted in any of the 13 AIR were evaluated by professionals working at a structured Hospital TB Control Program in a Teaching Hospital, in Rio de Janeiro City. Allocation delay was defined as smear positive PTB case allocated outside AIR for more than one day after admission to the hospital.
Results: 1021 subjects were admitted in the AIR; 106 (10.4%) were CPTB cases, 3/106 (2.8%) smear positive cases were allocated in AIR only two days after the admission. Among 915 SPTB cases, allocation delay in AIR occurred in 5.7% (52/915), with average of 1–73 days (median of 5 days). Active TB was confirmed in 174/915 (19%) SPTB cases and allocation delay was reported in 15.5% (27/174) with average of 1 to 73 days (median of 6 days). Considering all SPTB cases, allocation delay of active TB cases occurred in 2.9% (27/915). Among all admittances to AIR, active TB was the final diagnosis in 27.4% (280/1021).
Conclusions: Overall, a high effectiveness of a prompt

respiratory isolation in PTB suspect cases was observed. Nevertheless it was lower among smear positive PTB cases. Clinical score for smear positive PTB cases are under evaluation pursuing to diminish the allocation delay.

PS-95339-07   Tuberculosis infection in health care workers in a high-incidence area of tuberculosis in Peru

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Introduction: Tuberculosis (TB) in health care workers (HCWs) is a matter of concern in developing countries due to the high burden of disease. Understanding the dynamics of its transmission is a key point for control. Therefore, we aimed to determine the prevalence of *Mycobacterium tuberculosis* infection in health care workers of a health network that serves a highly populated area in Lima, Peru.
Methods: We performed a cross-sectional study in 2008. Structured questionnaires were administered to providers from forty two facilities, regardless of whether they treated TB patients. Tuberculin skin test (TST) was used to detect latent *M. tuberculosis* infection. Infection with *M. tuberculosis* was defined as TST $\geqslant$ 10 mm. We calculated the prevalence of *M. tuberculosis* infection stratified by sex, age, type of exposure, years of exposure and other relevant variables.
Results: The overall prevalence of *M. tuberculosis* infection was 57.39%. There were not statistical differences in the prevalence of *M. tuberculosis* by gender, last year's exposure to a TB patient, treating TB patients or job position. However, we observed a higher prevalence in providers treating TB patients. The prevalence was directly associated with the number of years working at a health facility and the HCW's age.
Conclusion: The prevalence of *M. tuberculosis* infection was high in the HCWs' population studied, independent of sex, job position in the health facility, previous exposure to TB patients or treating TB patients. This high prevalence could probably be attributed to the high rate of TB transmission in this area.

PS-95382-07   The efficacy of a peracetic acid disinfectant against mycobacteria

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Background: Disinfection of equipment and surface areas in TB hospitals, clinics, and laboratories play a

critical role to ensure the safety of personnel and prevent contamination. Commercial disinfectants demonstrate variable efficacy against mycobacteria such as *Mycobacterium tuberculosis*. We tested the efficacy of a commercially-available peracetic acid disinfectant against *M. smegmatis*, *M. bovis* BCG and *M. tuberculosis* H37Rv, in comparison with 70% ethanol and commercially-available phenolic and peroxygen disinfectants.

Methods: A modified suspension test was used where samples of known concentrations of mycobacteria were exposed to the various disinfectant solutions prepared according to manufacturer's instructions. After different exposure periods, serial dilutions were plated on solid agar media and incubated at 37°C for a specified time, followed by CFU enumeration.

Results: Exposure to a 2% Ultraseptin solution for 15 minutes led to an almost 4-log reduction in BCG viability, compared to a 2.6-log reduction for ethanol and no significant reduction for the two other products tested. However, longer exposure times led to an increased reduction in viability, with a maximum of a 3.4-log reduction after 60 minutes exposure to 70% ethanol. Similar results were obtained for *M. tuberculosis*. All 4 disinfectants tested were effective against *M. smegmatis*, with complete elimination of viable cells after a 15 minute exposure.

Conclusion: The mycobacteria tested were all susceptible to a 2% peracetic acid (Ultraseptin) solution with a 4-log reduction in viability after a 15 minute exposure to the disinfectant. Ultraseptin was more effective than 70% ethanol in reducing viable cell counts upon exposure.

PS-95527-07   Capacity building and improvement in tuberculosis infection control in a low-income setting, Uganda

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Setting: In 1999, the World Health Organization (WHO) made guidelines for prevention of Tuberculosis (TB) in Health Care Facilities in Resource Limited Settings. Despite the guidelines, data indicate that nosocomial transmission of TB still occurs to a great extent, as 57% of Health Care Workers (HCWs) compared to 23% of community members in Uganda were found to have TB infection respectively. To address the problem HCWs were trained to manage and minimize the risk of TB transmission in Health facilities in the four Eastern Tuberculosis Control Assistance Program (TB-CAP) Supported Districts.

Intervention or response: Health Care Workers were trained to implement Tuberculosis Infection Control (TB-IC) measures in health facilities. Immediately following the training they assessed the adequacy of

TB-IC in their respective health facilities and implemented measures to reduce TB transmission. Six-month later re-assessment of the health facilities was done.

Results: A total of 13 health facilities were assessed. The incidence of TB among HCWs in the past one year was 565/100 000 population. In the six-month assessment of TB-IC compared to that conducted immediately after training, health facilities were more likely to have TB-IC plans 8 (100%) vs. 2 (40%), to separate coughing and non-coughing patients in the waiting area 8 (100%) vs 0 (0%). Despite, the improvement in administrative TB-IC measures there was no improvement in ventilation in settings with inadequate ventilation due to lack of resources to make the necessary structural adjustments.

Conclusion: Training of health care workers can lead to immediate implementation of TB-IC measures with minimal resource input.

PS-95534-07   Usefulness of calcium oxide on disposal of positive sputum samples of patients with pulmonary tuberculosis

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Introduction: In Bolivia, one of the preventive measures for health personnel and community that is in contact with the waste, is the optimal treatment of positive sputum samples processed in the laboratory.

Objectives: To determine the bactericidal action of lime against *Mycobacterium tuberculosis*.

Methods: Samples of sputum smear-positive result were in contact with the lime and mix with a wooden rod in the ratio of lime to 3 from a sample. Thereafter readings were smear and culture of the mixture, after leaving at 6.12 and 24 hours contact the sample with lime.

Results: The optimal time of exposure of the lime with the sample of sputum smear-positive is 24 hours, because after this contact time of sputum with lime, the cultures were negative.

Conclusions: The elimination of sputum samples with the use of lime is a cheap alternative available that does not harm the environment.

PS-95589-07   Comparison of five novel methods to detect tuberculosis cough aerosols in low-resource settings

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Background: As a disease that affects underserved populations, modern tuberculosis infection control strategies are usually out of reach where they are needed most. It is imperative that methods to identify the most infectious patients be developed so that infection control measures in low-resource settings can be executed in a targeted and cost-effective manner.

Methods: Patients were recruited from a shantytown near Lima, Peru after disease confirmation by sputum smear microscopy or chest X-ray. Five different low-cost aerosol collection methods were employed for direct cough inoculation and culture using selective agar or broth culture media. Common laboratory materials were used for each method, such as 24-well plates, Petri dishes, N95 masks, and disposable plastic bottles. Patients coughed 10 times into each apparatus before nurses transported the media to a laboratory for incubation. A questionnaire regarding patient symptoms was also administered at each visit. Analysis of bacterial colony counts and evaluation of sensitivity for each collection method were done in STATA 10.

Results: The broth-filled 24-well plate provides the highest sensitivity, 23.2% (95%CI 13.0–36.4), versus the lowest sensitivity, 8.9% (95%CI 3.0–19.6), seen with the 24-well agar plate or Petri dish cough plate. The cough chamber apparatus, made from plastic bottles, presented the highest collection efficiency with a mean of 11 042.0 (95%CI 10965.2–11121.0) colony-forming-units (CFUs). The mean CFUs for the 24-well broth plate was 1485.4 (95%CI 1464.5–1506.5).

Comparison of Sputum Analyses and Novel Cough Aerosol Capture and Culture Methods: Detection of M. tuberculosis*

Conclusion: It may be possible to identify the most infectious tuberculosis patients by innovatively using common laboratory materials to capture and culture cough aerosols. Future analyses must investigate how patient characteristics and symptoms are associated with infectious aerosol production, since this may shed new light on opportunities for infection control.

PS-95624-07   Prevalence of tuberculin skin testing positivity among health care workers in Rio de Janeiro

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Aim: Tuberculin skin testing (TST) is both a standard tool to estimate TB infection risk among Health Care Workers (HCWs) and also an important measure to prevent occupational disease. We compared TST results among five professional categories in six health care facilities.

Methods: From 2006 to 2008, TST were performed in 470 HCWs of a general hospital, two emergency rooms and three primary care facilities using Mantoux technique, PPD 2TU RT 23, 48–72h for reading time and cut off of 10 mm. The analyzed professional categories were community health workers (CHWs), nurse assistants (NA), nurses, physicians and administrative assistants (AA).

Results: Overall, out of the 470 professionals who underwent testing, 166 (35.3%) were positive. In primary care facilities, positive testing was found in 30 of the 128 CHWs (23.44%), in 1 of the 8 physicians (12.5%), in 6 of the 14 nurses (42.86%), in 6 nurse assistants out of 21 (28.57%) and in 1 out of the 10 administrative assistants (10%). In ER positivity was found in 2 physicians (25%) out of 8, in 52 of the 108 nurse assistants (48.14%), but in none of the nurses who were tested. In general hospitals, positive tests were found in 1 physician out of 10 (10%), in 8 of the 26 nurses (30.77%), in 31of the 53 NA (58.49%) and in 3 AA out of 13 (23%) (Table).

	CHW		Nurse assistant		Nurse		Physician		Administ agent	
Positivity	Yes % (n)	No % (n)	Yes % (n)	No % (n)	Yes % (n)	No % (n)	Yes % (n)	No % (n)	Yes % (n)	No % (n)
Primary care facility	23.4% (30)	76.6% (98)	71.4% (15)	28.6% (6)	42.9% (6)	52.1% (8)	12.5% (1)	87.5% (7)	10% (1)	90% (9)
Emergency room			48.1% (52)	51.9% (56)	0% (0)	100% (10)	25% (2)	75% (6)		
General hospital			58.5% (31)	41.5% (22)	30.8% (8)	69.2% (18)	10% (1)	90% (5)	23% (3)	77% (10)

Conclusions: Despite its limitations the study suggests that TST prevalence among HCW in Rio is high for all categories in special among ER and General Hospitals NA and Primary Care Facilities nurses. This may reflect both a high exposition and also a lack of prevention measures at these facilities.

IMMUNOLOGY GENETICS AND MOLECULAR BIOLOGY

PS-94416-07 Single nucleotide polymorphism of fadD28 gene in Beijing genotype *Mycobacterium tuberculosis*

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Objective: To understand association between single nucleotide polymorphism (SNP) of virulence gene and to develop a simple and rapid system for identification of Beijing genotype of *M. tuberculosis*.
Methods: Genotyping methods including IS*6110*-restriction fragment length polymorphism (RFLP) and spacer oligonucleotide typing (spoligotyping) were applied. A total of 114 representative isolates of each clustered RFLP genotype were selected for spoligotyping and SNP analysis. The resolved spoligotype was designated by comparing to SpolDB4 database. The SNP of fadD28 gene involved in cell wall synthesis was analyzed by sequencing. Based on the SNP results, a real-time PCR system was designed. Of the 231 clinical isolates tested, 151 were Beijing and 80 non-Beijing genotypes.
Results: Beijing genotype was identified as the major genotype of *M. tuberculosis* in Taiwan. The SNP of fadD28 codon 507 ATC to ATT (Ile to Ile) was found in 100.0% (53/53) Beijing genotype isolates by sequencing. Preliminarily, a real-time PCR assay with SNP of fadD28 codon 507 ATC to ATT for rapid identification of Beijing genotype *M. tuberculosis* isolates was established. The sensitivity and specificity of the SNP assay were 100.0% and 93.8%, respectively.
Conclusion: We identified a SNP marker, fadD28 codon 507 ATC to ATT, for Beijing genotype *M. tuberculosis*. A simple and efficient SNP-based real-time PCR assay could facilitate the rapid identification of Beijing genotype.

PS-94693-07 Genotyping of multidrug-resistant *Mycobacterium tuberculosis* isolates from Cuba, 2000–2008

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Background: World Health Organization (WHO) has estimated a high global rate of multidrug-resistant (MDR) tuberculosis (TB) of almost 500 000 cases per year. Recently, the WHO also expressed its concern about the occurrence of extensively drug-resistant (XDR) strains in more than thirty countries. In Cuba, MDR-TB rate is still very low; however, a few dozens occurred in the last ten years.
Objective: To characterize Cuban MDR *Mycobacterium tuberculosis* isolates by genotyping methods.

Methods: IS*6110* RFLP typing, Spoligotyping and/or the new standard for TB genotyping, MIRU-15, were used to characterize 13 MDR *M. tuberculosis* isolates, from different cases, diagnosed in Cuba between 2000 and 2008. The patterns were compared against a National Genotyping Database or against the International Spoligotyping Database located in Guadeloupe, France (SpolDB 4.0).
Results: Eleven out of 13 isolates were available for genotyping. RFLP, Spoligotyping MIRU-15 and analysis found only one cluster, formed by the same two strains in both cases, however no epidemiological connection between the patients could be done. The remained isolates showed unique RFLP, Spoligo and/or MIRU-15 patterns. The IS*6110* DNA fingerprints from these MDR strains were not previously identified in the National RFLP Database. In contrast, the majority of Spoligo patterns were already listed in the Cuban Spoligotyping Database.
Conclusion: The recent transmission of MDR-TB is still an infrequent phenomenon in Cuba. The creation of a Cuban MDR-TB Genotyping Database (with IS*6110*-RFLP, Spoligotyping and MIRU-15) will help to confirm the transmission of MDR-TB and to detect 'imported' cases in the future.

PS-94748-07 Molecular characterization of *M. tuberculosis*: clinical isolates from Honduras

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Aim: To provide an insight of the genetic biodiversity of the *M. tuberculosis* population in Honduras.
Methods: Spoligotyping was used to characterize 208 *M. tuberculosis* strains isolated from Honduran TB patients between 1994 and 2002. Then, the SpolDB4 international data base was used to compare all the patterns obtained in order to identify the genotypes found among the clinical isolates.
Results: A total of 175 strains (84%) were grouped into 28 clusters. The clusters size ranged from 2 to 44 strains. Thirty-three isolates (16%) had a unique spoligo pattern; of those, 18 have not been previously described in SpolDB4. In addition, eight clusters (2–3 strains each) also had unknown patterns. Thirty-five shared international types (SIT) from SpolDB4 were identified among the Honduran isolates. The SIT 33 was the most prevalent with 21%. The Latin American Mediterranean lineage was the more common in our study; 57% of the strains belonged to this family. This finding is in line with previous reports from South American countries. Other genotypes found were Haarlem (18%), T (15%),

X (7%), U (1%) and S (1%). Only one Beijing strain was identified (0.6%).

Conclusion: Our study provides an overview of the circulating *M. tuberculosis* strains in Honduras and determined the predominant genotypes in the country.

PS-94118-07 Contribution of fingerprinting to the surveillance of tuberculosis in Germany

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Background: To determine the predominant risk factors for tuberculosis (TB) transmission and efficiency of current TB control strategies in 6 German regions (Hamburg, Berlin, Munich, Hanover, Lower Franconia and the Upper Palatinate).

Methods: A prospective, molecular-epidemiological study was performed. IS*6110* RFLP clusters were assumed to be due to recent transmission. Results of conventional contact tracing and patient interviews were used for further analyses.

Results: 1670 TB patients were analysed between 2001 and 2004 (88% of all culture+ patients). Isolates from 549 patients (33%) showed identical RFLP patterns and were classified into 181 clusters (range 2 to 16 patients). In multivariate analyses, alcohol abuse was the strongest predictor for clustering (OR 1.67), followed by AFB positivity (OR 1.6). Coughing was also a considerable risk (OR 1.4), followed by unemployment (OR 1.38) and younger age (OR 0.98). Homelessness, foreign ethnicity, sex, drug addiction, and HIV positivity were no independent risk factors. Contact tracing, performed prior to IS*6110* RFLP, predicted a recent transmission in only 19.2% of clustered patients with retrospectively confirmed or presumed epidemiological links. Vice versa, transmission links were assumed among 80 patients by classical epidemiological data, but of these only 46 (58%) were cluster members. Contact tracing was performed in 1995 of 2551 index patients (78.2%), by which 154, 6.0%, were identified. Only 586 out of 4633 contacts (1.9%) were classified as 'infected' based on TST. Only 113 contacts of 31 066 investigated persons (0.36%) developed active TB during the study period indicating a great number of superficial, falsely included contacts.

Conclusions: Conventional contact tracing alone is insufficient for detecting infection chains. In view of the low efficiency and of the financial means required for the costly RFLP analysis, a more careful selection of truly exposed contacts is necessary.

PS-95277-07 Genetic diversity of *M. tuberculosis* complex in Cameroon: evidence for *M. africanum* Quasi extension

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Aim: The study of genetic biodiversity of 455 strains isolated in 455 patients in the western region of Cameroon during a survey in 1998, previously revealed a group of closely related *Mycobacterium tuberculosis* strains designed 'Cameroon family' responsible for 42% of all pulmonary tuberculosis cases and the regression of *M. africanum* strains as etiologic agent of TB, from 56% 3 decades years ago to 9% (S. N Niobe-Eyangoh et al., 2003). We evaluate the evolution of genetic biodiversity of *M. tuberculosis* complex isolated in the same region during another survey 7 years latter in 2005.

Methods: The spoligotyping method was applied to 568 strains of *M. tuberculosis* complex isolated in 568 patients during the survey conducted in western region in 2005.

Results: Analysis of different spoligotypes confirmed the establishment of 'Cameroon family' strains, with an increased tendency but not significantly different, representing 47% of all typed isolates and confirmed the genuine regression of *M. africanum* as etiologic agent of tuberculosis, found only in 3% of cases. The widespread genotypes ST50, ST52 and ST53 showed also an increase tendency representing 30% of all typed isolates compared to 17% in 1998.

Discussion: It is believed that BCG vaccination applied for four decades, could have profoundly shaped the population structure of *M. tuberculosis* by concurrently favouring the selection and accommodation of particular genotypes. It is also possible that the HIV pandemic might play a role in this evolution.

PS-94885-07 Towards understanding the mechanism and safety of nano drug delivery systems

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The field of drug development experiences very low success rates with regards to drugs that enter the market. These shortfalls are due to factors such as toxicity of the therapeutic compounds, low solubility

leading to lowered bioavailability and thus reduced efficacy. These challenges are even more pronounced in poverty related diseases, such as tuberculosis and malaria. This has lead to the development of novel and more effective drug delivery technologies, such as nanoparticulate systems. However since this technology is new, further understanding of the delivery systems is still required prior to entry into the market. PLGA nanoparticles which are currently extensively used in drug delivery, particularly for TB, were prepared and characterized based on size, zeta potential and morphology. PLGA nanoparticle uptake was analyzed in CaCo-2 cells via confocal microscopy where particle uptake was illustrated. Subsequent to oral administration of fluorescently labelled PLGA nanoparticles to Balb/C mice, fluorescence detection of the particles was performed. These particles were detected via FACS in the macrophages of the peritoneum cell exudates. The particles were further detected in all tissues analysed. When histopathology assays were conducted on all tissues, i.e spleen, lungs, kidney, liver spleen, heart and the brain no lesions were observed. The in vivo uptake of the particles by cells as well as good biodistribution will enable improved bioavailability of the encapsulated drugs, in that intracellular drug release can be obtained. Furthermore, this study has illustrated that PLGA nanoparticles are safe for use in drug delivery applications. Therefore it is proposed that with this system the challenges of poor bioavailability, reduced efficacy and adverse side effect can be addressed.

PS-94123-07   Why BCG does not work

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BCG is given to >85% of new-born children across the world. It is cheap and safe, and there is good evidence it protects against certain forms of disease, but after 10–15 years or so any protective effect is lost. Here I present the hypothesis that BCG induces a very strong effector T cell memory response, but a very poor central memory response. The BCG-induced effector memory population is stable for a long time, but is probably lost by attrition [in about 10–15 years or so in the case of viral infections], with no strong central memory population to respond in its absence. I will demonstrate the kinetics of these populations established in mice by flow cytometric analysis, in comparison to populations established by chronic *M. tuberculosis* infection. In further studies, infection of mice with *M. tuberculosis* followed by chemotherapy to clear the infection now appears to change the balance of these populations. When re-challenged, these animals showed evidence of a very rapid central memory T cell response, followed a week or so later by expansion of an effector memory T cell population. If CFUs are measured at this time the animal is

highly resistant compared to controls given a primary challenge, consistent with the classical literature. Soon after however, both populations of memory cells rapidly disappear from the lungs, the infectious load increases, the lungs become consolidated, and the animal dies. These data imply that BCG is ineffective in inducing central memory [and this may extend to new recombinant BCG vaccines as well]. When the source of antigen is removed by chemotherapy, then this allows the proper expansion of central memory. The rather surprising fact that this is only transient however, may explain relapse in drug-treated individuals, and also exogenous re-infection, in people who theoretically should be highly immune to secondary infection and yet clearly are not.

PS-94415-07   Genotypic diversity of extensively drug-resistant tuberculosis (XDR) in Pakistan

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Pakistan has the eighth highest tuberculosis (TB) burden in the world. MDR rate in untreated patients is reported to be 1.8%. WHO estimates suggest 5% overall MDR. In the present study resistance to second line agents amongst 2067 MDR strains received in our laboratory (2006–2008) was assessed. During the study period quinolone resistance amongst MDR strains increased from 6.3 (n:122) to 12% (n:223). 40 (9.3%) of the 426 quinolone resistant strains that were tested showed additional resistance to one or more of amikacin, kanamycin and capreomycin and were defined as XDR. To further study the XDR strains in our setting, these strains were genotyped using spoligotyping and 15 loci MIRU-VNTR. Spoligotyping of 23 strains showed 47% (n:11) belonged to the Central Asian strain (CAS) and 13% (n:3) to Beijing genotypes. MIRU-VNTR analysis did not reveal clustering thus suggesting greater possibility of acquisition rather than transmission of resistance. Given that prevalence of Beijing isolates in *Mycobacterium tuberculosis* strains overall in our population is reported at 3%, our data suggests greater representation on Beijing isolates amongst the XDR. We hypothesis that Beijing genotype in our community appear to have a greater predisposition to acquiring resistance to second line agents.

PS-94652-07   Expression of pst regulon of *Mycobacterium tuberculosis* in the mouse model of chronic tuberculosis

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Introduction: The sequencing of the genome of *M. tuberculosis* has allowed the identification of genes coding for potential survival virulence factors, such as the pst regulon which is involved in inorganic phosphate uptake. Genes associated for this regulon are arranged in three operons, the first consisting of genes pstB, pstS-1, pstC-1 and pstA-2; the second contains the genes pstS-2 and pknD and the third is formed by genes pstS3, pstC-2 and pstA-1.

The aim of this study was to quantify the gene expression of the pst regulon of *M. tuberculosis* in the mouse model of chronic tuberculosis.

Methods: RNA from *M. tuberculosis* lung-infected tissues was isolated at different times: month 1, 3, 5 and 7 after infection. RNA purification was performed by the trizol technique. The expression of the nine genes of the three pst operons was carried out by real time RT-PCR using the 16SrRNA gene as a normalizer.

Results: The pstA2 gene (operon I) was 1.33 fold up-regulated at month 7 of chronic infection; the pknD gene (operon II) was over-expressed 2.44 times at month 1 and 1.13 fold at month 5. All other genes were down-regulated in the same conditions.

Conclusion: The results suggest that *M. tuberculosis* requires the expression of some genes involved in phosphate uptake during the first three months of chronic infection, in order to survive inside the host. Later, when the *M. tuberculosis* is adapted to this condition, the expression of these genes decreases.

PS-94612-07 Immune cell phenotypes in blood from *M. tuberculosis* infected patients before and after therapy

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Objective: To characterize the phenotypes of T-cells and dendritic cells in blood in patients with active and latent tuberculosis (TB) infection.

Methods: Patients with culture confirmed active TB and persons with positive tuberculin skin test (TST) referred to the Pulmonary out-patient department for evaluation of TB were included. The patients were tested with the 'QuantiFERON TB GOLD In-tube assay' (QFT) before and after 3 months of preventive anti-TB therapy. Mononuclear cells were isolated from blood, stained with monoclonal antibodies against cell surface and intracellular markers of activation, maturity, dendritic cell and regulatory T-lymphocyte phenotypes, and analysed by multicolour flowcytometry.

Results: The study subjects were classified into three groups; 1) active TB ($n = 20$), 2) latent TB (TST+/QFT+) ($n = 20$) and 3) controls (TST+/QFT−) ($n = 20$). The latent TB group had no signs of active TB

based on x-ray and clinical findings. The percentage of HLA-DR+/CD38+ among CD8+ T-cells was higher ($P = 0.001$) and the percentage of CD28+ among CD8+ T-cells was lower ($P = 0.005$) in the active TB group compared with the controls. A similar trend was found in the group with latent TB, although this was not significant. The percentage of CD45RA+CCR7+ (naive phenotype) among CD8+ T cells was lower in the latent ($P = 0.026$) and the active ($P = 0.035$) TB groups compared with controls. No significant differences between the three groups were found in the percentages of dendritic cells or CD4+ T regulatory cells in blood. Immune cell phenotypes after therapy will be presented.

Conclusion: Patients with TB infection express an activated phenotype of CD8+ T-cells indicating ongoing immune stimulation. The fraction of naive CD8+ T-cells seems to be reduced in latent as well as active TB infection, indicating immune activation and increased cell turnover already from asymptomatic TB infection. Immune mechanisms in the different stages of TB infection will be discuss

PS-95091-07 Genetic markers for recent *Mycobacterium tuberculosis* infection and active tuberculosis in adults

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Background: Close contacts (CC) of smear-positive pulmonary tuberculosis (TB) index cases are at increased risk for acquiring *M. tuberculosis* infection and for developing active TB. Little is known about the immune and genetic factors that place them at risk.

Objective: To assess the association of TLR4 (Thr399Lle) single nucleotide polymorphisms with recent *M. tuberculosis* infection and with active TB among adult CC.

Methods: We conducted a case-control study among HIV-seronegative Brazilian adult (>15 years) CC followed in a Hospital Tuberculosis Control Program (HTCP) in Rio de Janeiro for at least 12 months. Cases subjects had active bacteriologically confirmed TB or recent *M. tuberculosis* infection, diagnosed by 10 mm increase of induration in a second tuberculin skin test (TST) over TST1. There control subjects were those with positive TST1 using 10 mm as the cut-off point. Association of recent *M. tuberculosis* infection and of TB was tested using a multivariable logistic regression model adjusting for index cases variables (time of cough, positivity of AFB smear, cavitation on chest X-ray) and CC variables (sex, age, type and frequency of contact with index case, previous BCG vaccination).

Results: From October 1998 to March 2004, 238 index cases and 526 adult CC were followed by the HTCP, 346 (66%) were BCG-vaccinated. Among CC, 256 (49%) had a positive TST1 and 157 returned for TST2; among them, 29 (18%) converted the TST. Forty-three (8%) patients developed active TB. Heterozygous genotype for TLR4 Thr399Ile (CT) was independently associated both with TST conversion as well as TB disease among close contacts, with a fourfold increased risk for recent TB infection (aOR = 4.21 95%CI = 1.27–13.93) and a fivefold risk for TB disease (aOR = 5.32, 95%CI = 1.83–15.46).

Conclusion: Mutant alleles TLR4 may be a marker for the risk of infection with *M. tuberculosis* and for the development of active TB disease in adult CC. Other polymorphisms are currently under investigation

PS-94546-07   Deletions in RD149 and RD152 regions enhance persistence and decreased TNF-alpha CCL2 responses

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Background: Deletions in the Region of Differences (RDs) of *Mycobacterium tuberculosis* are thought to be associated with decreased strain virulence. We have used a THP-1 monocytic cell line to study the intracellular growth rates and persistence of clinical *M. tuberculosis* strains belonging to the Central Asian Strain 1 family with deletions in RD149 and RD152 regions as compared with *M. tuberculosis* H37Rv.

Methods: THP-1 monocytes stimulated with IFN-γ were infected with CAS1 *M. tuberculosis* and H37Rv strains; S1 and S2 had deletions in RD149; S3 with RD149 and RD152 deletions. S4 had no deletions. Mycobacterium growth was measured at day3 post-infection. Mycobacterium-stimulated TNF-α and CCL2 was measured in cell supernatants at 24 h.

Results: In unstimulated monocytes no differences in growth between strains was observed. In IFN-γ activated THP1 cells, deletion strains S2 and S3 showed decreased growth as compared with H37Rv (3.75, 4.01 and 5 $\log_{10}$CFU/ml respectively, $P < 0.05$); and also as compared with S4 5.02 $\log_{10}$CFU/m, $P < 0.05$. H37Rv and S4 stimulated TNF-α levels were comparable; 4059 ± 228 and 3086 ± 519 pg/ml respectively, while CCL2 levels were1834 ± 185 and 2217 ± 151 pg/ml, respectively. S1 induced TNF-α was 31.7 pg/ml while none was induced by S2 and S3. CCL2 secretion induced by S1, S2 and S3 were 1580 ± 131; 919.2 ± 336 and 1234 ± 94.5 pg/ml, respectively which was lower than by H37Rv and S4, $P < 0.05$.

Conclusion: These results indicate that loss of deletions is specific RD regions may result in increased persistence within macrophages and decreased activation of proinflammatory cytokines. This may result in an increased virulence capacity in these strains.

PS-94838-07   BCG vaccination augments human humoral as well as cellular anti-mycobacterial immunity

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Background: A blood test to predict TB susceptibility would facilitate TB control. We optimised an assay of human anti-mycobacterial immunity to differentiate between humoral and cellular immunity.

Methods: Luminescent mycobacteria were added to 715 whole-blood and 697 plasma samples from healthy adult volunteer participants in Peru. A portable luminometer was used to estimate mycobacterial growth/killing over 96 hours incubation at 37°C. Growth/killing of mycobacterial was compared between participants without BCG vaccination scars vs. those with single vaccinations vs. multiple BCG vaccinations.

Results: The number of volunteers with 0, 1, 2 or ⩾3 BCG scars was 157, 266, 202 and 90 respectively. The graph illustrates how mycobacteria grew less in whole blood from BCG vaccinated individuals compared to unvaccinated individuals ($P < 0.001$). Furthermore, mycobacteria grew less in whole blood from subjects who had received multiple BCG vaccinations compared with those who had received only one ($P = 0.05$). The association between growth of mycobacteria and number of BCG vaccinations was not confounded by age in a multiple linear regression analysis. This pattern was also observed in plasma, where the mycobacterial growth was significantly diminished in BCG vaccinated subjects vs. unvaccinated individuals ($P < 0.004$). However, no additional effect of multiple BCG vaccinations was noted compared to one vaccination (all $P > 0.6$).
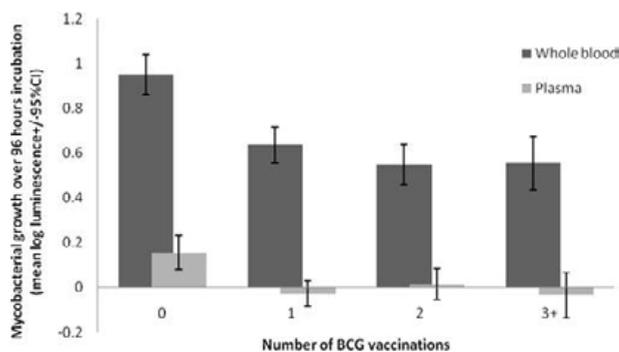
Figure Mycobacterial growth in blood and plasma: the effect of BCG vaccination.

Conclusion: Analysis using this bioassay suggests that BCG vaccination augments humoral as well as

cellular anti-mycobacterial immunity and that cellular anti-mycobacterial immunity is augmented more by multiple than single vaccinations.

PS-95325-07   Massive parallel sequencing of the flanking regions of IS*6110* insertion element of *Mycobacterium tuberculosis*

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Aim: Genetic diversity in *Mycobacterium tuberculosis* is due to DNA mutations such as rearrangements, single nucleotide polymorphism, insertions and deletions. The insertion element IS*6110*, which can mediate some of these changes, is commonly found in multiple copies in the *M. tuberculosis* genome. To analyze the possible consequences of interrupting specific genes, we developed a method to amplify and sequence all IS*6110* flanking regions in 579 clinical isolates from collections of Colombia, Argentina and Spain.
Methods: DNA was isolated and processed to generate ~200bp fragments harboring sequencing primers and sample-specific barcodes. Multiplex PCR was performed and massive parallel sequencing (Illumina) was carried out on the amplified products. Sequence reads were sorted according to the barcode, assembled and mapped against annotated sequenced genomes.
Results: Preliminary analysis of 6 samples showed high efficiency of the method. We were able to identify 64 insertion sites for the 6 samples, 58 of which were confirmed by PCR (0% false positive). Three sites previously found by PCR were not found by sequencing (False Negative), a problem that may be overcome when analyzing the deeper sequencing coverage of the final dataset.
Conclusions: New sequencing technologies allowed us to identify IS*6110* flanking regions and determine the exact point of insertion in multiple strains. This information is relevant to decipher the role of mobile elements, their contribution to genomic diversity, and the understanding of their participation in modulation of the mycobacterial phenotype.

PS-94084-07   Host markers in Quantiferon supernatants differentiate active TB from latent TB infection

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Background: Interferon gamma release assays, including the QuantiFERON® TB Gold In Tube (QFT) have been shown to be accurate in diagnosing *Mycobacterium tuberculosis* infection. These assays however, do not discriminate between latent TB infection (LTBI) and active TB disease.
Methods: We recruited twenty-three pulmonary TB patients and 34 household contacts from Cape Town, South Africa and performed the QFT test. To investigate the ability of new host markers to differentiate between LTBI and active TB, levels of 29 biomarkers in QFT supernatants were evaluated using a Luminex multiplex cytokine assay.
Results: Eight out of 29 biomarkers distinguished active TB from LTBI in a pilot study. Baseline levels of epidermal growth factor (EGF) soluble CD40 ligand (sCD40L), antigen stimulated levels of EGF, and the background corrected antigen stimulated levels of EGF and macrophage inflammatory protein (MIP)-1α were the most informative single markers for differentiation between TB disease and LTBI, with AUCs of 0.88, 0.84, 0.87, 0.90 and 0.79 respectively. The combination of EGF and MIP-1α predicted 96% of active TB cases and 92% of LTBIs. Combinations between EGF, sCD40L, VEGF, TGF-β and IL-1β also showed potential to differentiate between TB infection states. EGF, VEGF, TGF-β and sCD40L levels were higher in TB patients.
Conclusions: These preliminary data suggest that active TB may be accurately differentiated from LTBI utilizing adaptations of the commercial QFT test that includes measurement of EGF, sCD40L, MIP-1α, VEGF, TGF-β or IL-1β in supernatants from QFT assays. This approach holds promise for development as a rapid diagnostic test for active TB.

PS-95272-07   La proteina ESAT-6 de *M. tuberculosis*, estimula la macropinocitosis en neumocitos humanos tipo II

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Introducción : *M. tuberculosis* estimula la macropinocitosis para lograr su interiorización en la célula no fagocítica, los componentes de la micobacteria que inducen

esta vía endocítica aún no son conocidos. En este trabajo se analizó a la proteína de secreción ESAT-6, como probable inductor de la macropinocitosis en neumocitos humanos tipo II.

Material y métodos : La proteína ESAT-6 recombinante se utilizó en ensayos de captación de fase fluida (CFF); se estudió su participación en el rearreglo del citoesqueleto utilizando microscopía confocal (MC) y se determinó su capacidad para inducir la producción de óxido nítrico (NO). Como testigos de alteraciones en el citoesqueleto, se analizó la respuesta de las células A549 hacia lipopolisacárido (LPS) ; 3 proteínas bacterianas recombinantes no micobacterianas (proteínas HSP60kDa de *E. coli* y *K. pneumoniae* y la proteína Sortasa A de *S. aureus*) ; así como 3 proteínas fisiológicas no relacionadas al metabolismo bacteriano.

Resultados : El LPS y las diferentes proteínas no relacionadas a bacterias no tuvieron efecto en la captación de fase fluída ; tampoco indujeron cambios en la morfología celular ni en la distribución en los filamentos de actina. En comparación ESAT-6 indujo un aumento significativo ($P < 0.05$) en la captación del Dextran-FITC, también estimuló la formación de lamelipodios de gran longitud (>5 μm) y un aumento en el volumen celular a nivel de la región perinuclear. Interesantemente, la proteínas recombinantes de choque térmico no micobacterianas estimularon de igual forma la captación de fase fluída, modificaron el citoesqueleto celular e indujeron la formación de lamelipodios membranales. En cuanto a la producción de NO, ESAT-6 indujo una discreta pero no significativa producción de este metabolito.

Conclusiones : ESAT-6 estimula la macropinocitosis en las células A549 pero no la producción de NO, señalando su participación en la interiorización e infección de *M. tuberculosis* hacia este tipo de células.

PS-95409-07   Partial mapping of the promoter region of the IL-10 gene in Brazilians

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Tuberculosis (TB) is endemic in several countries and according to the World Health Organization, 9.2 million new patients are diagnosed a year. Brazil is responsible for 80% of TB cases in the world. After infection by *Mycobacterium tuberculosis* (M. tb) the occurrence of active TB depends on a complex immune response As described in the literature, the interindividual variations in the production of the immunity related molecules, particularly cytokine, are directly related to the genetic background. Interleukin-10 (IL-10) is an important anti-inflammatory cytokine, and genetic variations such as single nucleotide polymorphisms (SNPs), mainly in the promoter region, can influence its production. In the present study, a partial mapping of part of the promoter region of IL-10 gene was carried out in DNA samples from 492 individuals, being 221 TB patients and 271 healthy individuals from Rio de Janeiro, with no consanguineous relation and without previous TB history. To evaluate the possible association of the identified SNPs and the different TB outcomes, genotype, allele and haplotype frequencies were compared between the following groups: 139 pulmonary TB patients, 43 extra-pulmonary TB and 271 controls, being 126 positive for the tuberculin skin test (TST+) and 145 negative (TST−). After genotyping by sequencing, thirteen SNPs were identified, seven of which have not yet been described in the literature. Our results showed a strong association of the −1189, −840 and −464 SNPs with tuberculosis susceptibility and of the SNP at position −750 with protection. The SNPs at positions −1117, −854, −627, also reported as −1082, −819 and −592, did not present any association with the outcomes evaluated. Three haplotypes with the higher frequencies were analyzed for susceptibility per ser, gravity or protection to TB and no association could be observed.

PS-94684-07   Gene expression and morphology of *Mycobacterium avium* during in vitro

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Aim: To determine the effect of hypoxia and starvation on the cellular morphology and expression of some genes involved in lipid metabolism, cell envelope components, cell cycle and dormancy of *Mycobacterium avium*.

Methods: Total RNA was isolated from *M. avium* cells growing during both, log phase and in vitro dormancy (Wayne's model and Archuleta's model) at different times. Total quantity of transcripts was determined by real time PCR. At the same time, morphological changes of mycobacterial cells grown under those conditions were determined by transmission and scanning electron microscopy.

Results: The results showed that all genes involved in mycobacterial lipid synthesis as well as the cell cycle (*ace*A, *fad*D32, *glp*K, *emb*A, *dna*A, *par*A, *par*B and *hsp*X) were up-regulated compared to log phase during early hypoxia (26 days). On the other hand, during starvation conditions, expression of most *M. avium* genes involved in lipid metabolism was

diminished, *lip*U was the only overexpressed gene under this condition. Regarding cellular morphology, hypoxic conditions led to a population of smaller *M. avium* cells (compared to log phase) and an increase population of pleomorphic and rough cells into the culture. Many cytoplasmic vacuola-like inclusions were also observed during these conditions. In respect to starvation conditions, *M. avium* cells decreased their size in a quicker fashion compared to hypoxia.
Conclusion: *M. avium* can regulate gene expression and viability under hypoxia in a better way than in starvation conditions. It seems that under this latter condition mycobacteria decrease the expression of genes involved in several metabolic pathways and therefore, they also loss viability.

PS-94485-07   Cell-cycle gene expression during in vitro dormancy of *Mycobacterium tuberculosis* complex strains

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Aim: Tuberculosis (TB), a disease caused by microorganisms of the *Mycobacterium tuberculosis* complex (MTC). Worldwide, 2 billion people are estimated to harbor latent bacilli, and may develop TB if their immune system becomes compromised. Recent molecular epidemiology studies have shown that dormancy and evolution of TB is strongly influenced by the MTC strain. Nevertheless, molecular features which allow the MTC strains to be adapted to dormancy remain unclear. Therefore, the aim of the present study was to quantify the expression of five cell-cycle (*dna*A, *smc*, *par*A, *par*B and *fst*Z) and two dormancy-related (*dos*R and *hsp*X) genes of *M. canettii*, *M. tuberculosis* H37Rv and *M. tuberculosis* Beijing (strains which display a low, medium and high virulence phenotypes, respectively) during exponential phase and under in vitro dormancy.
Methods: Real time RT-PCR was carried out in order to measure the gene expression in these mycobacteria.
Results: Differential gene expression was found in 1) *dna*A, which was expressed in a lesser extent (7 fold) during in vitro dormancy of *M. tuberculosis* Beijing, compared with the two other strains; 2) *dos*R gene, which was found to be upregulated through the exponential phase in *M. tuberculosis* Beijing, at 20 fold higher level; nevertheless, during in vitro dormancy, it was down-regulated at 50 fold compared with the two other strains; 3) *hsp*X, which was expressed in a lesser extent (70 fold) during in vitro latency of *M. tuberculosis* Beijing compared with the other strains.
Conclusion: *M. tuberculosis* Beijing has a reduced capacity to survive and to adapt to dormancy, compared to *M. tuberculosis* H37Rv and *M. canettii*. In parallel, *M. tuberculosis* Beijing has a limited chromosome replication during in vitro dormancy, compared with the two other strains of mycobacteria.

PS-94979-07   Spoligotyping of MDR-TB isolates from patients undergoing treatment in two regions of Russia

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Objective: To genotype serial multidrug-resistant (MDR) tuberculosis (TB) isolates from patients with pulmonary tuberculosis undergoing treatment with second-line drugs in the Orel and Vladimir regions of Russia.
Methods: As part of an ongoing 'Preserving Effective TB Treatment with Second-Line Drugs' study being conducted with CDC, spoligotyping was performed at CTRI in Moscow on 157 isolates from 54 patients from January to November, 2008. When available, the spoligotype of baseline and follow-up isolates from the same patient were compared to give an initial indication of possible re-infection during treatment.
Results: Beijing spoligotype predominated (140 isolates, 89%), while the Haarlem3 (10 isolates, 6%) and LAM9 (7 isolates, 5%) spoligotypes were less frequent. Serial isolates were available for 36 (67%) of 54 patients; 33 (92%) of these were found to have consistent spoligotypes throughout treatment. Isolates from 2 (4%) of the 36 patients had spoligotypes that changed during treatment (on 3rd and 6th month of treatment, respectively). In another patient, 11 of 12 *M. tuberculosis* isolates tested had the Beijing spoligotype while 1 isolate from the 5th month of treatment had LAM9 spoligotype.
Conclusion: Genotyping results showed the majority of *M. tuberculosis* strains belonged to Beijing spoligotype. Re-infection appears uncommon in this study. In settings with high prevalence of Beijing strains, more discriminating genotyping methods for identification of strains (clonality) are necessary. The change in serial spoligotypes in 3 patients highlights the potential value of genotyping follow up isolates, especially for evaluating apparently anomalous results.

POLICY AND PROGRAMME IMPLEMENTATION II

PS-95076-07   Analysis of the influence of the family health strategy on TB control in Vitoria City, Brazil

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Introduction: Family Health Strategy is defined as an strategy aimed to reorganize health system based on the principles of the Brazilian public health system of impartiality, integration and universality of the actions and social promotion. In Brasil, primary care health system is responsible for these actions.
Objective: To analyse the influence of the family health system on tuberculosis control at Vitoria City, Espirito Santo, Brasil.
Methodology: Based on the national notification database, a retrospective (1995–2005) analysis of tuberculosis cases at Vitoria City was performed. The mean incidence and mortality rates as well as rate reductions were calculated during the periods prior and after introduction of the Family Health Strategy. The significance of the difference between the rates was analysed based on the t-test ($P < 0.05$).
Results: During the periods before and after introduction of the family health strategy, the incidence rates of new tuberculosis cases were $69.52/100\,000$ and $56.76/100\,000$ population, respectively. The reduction rate was 18.35% ($P = 0.0011$). In addition, mortality rates were $4.9/100\,000$ and $3.87/100\,000$, respectively ($P = 0.0442$).
Conclusion: Family health strategy should be kept in order to support identification and investigation of the chronic coughers, treatment of the confirmed cases and preventive measures like routine immunization and chemoprophylaxis. All these actions will probably reduce tuberculosis morbi-mortality.

PS-94109-07   Situation of multidrug resistance tuberculosis in SAARC region and regional efforts to control it

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Aim: SAARC (South Asian Association for Regional Cooperation) is an association of eight countries, with diverse religious and cultural beliefs and practices. SAARC TB and HIV/AIDS Centre (STAC) has been supporting the National TB programmes in SAARC member countries, i.e., Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka in different ways to prevent occurring of MDR-TB in the region.

Objective: To review the MDR-TB situation in the SAARC region and analysis of containment efforts.
Study Design: A Record Based Descriptive Study.
Results: The estimated prevalence of MDR-TB among new TB patients in Afghanistan, Bangladesh, and Pakistan was 3.4%, 3.6% and, 3.4% respectively. Among re-treatment patients this figure was respectively 37%, 19.3% and 36.5%. It is estimated that 110 132 MDR-TB patients emerged in India in 2006, representing over 20% of the global burden. In Nepal repeated National surveys of drug resistance among newly registered TB cases revealed prevalence of 1996/97; 1.2%, 1998/99; 3.6%, 2001/02; 1.3% and 2006/2007 2.9%. Absolute number of MDR-TB patients reported from Bhutan and Maldives were 71 and 2 respectively up to 2007. In years (2004–2007) the total number of MDR-TB detected by the Central Laboratory Sri Lanka were 48. Three SAARC Member States namely Nepal, India and Bangladesh have initiated their DOTS plus project and other Member States are preparing for the same. Major activities carried out by the STAC to control MDR-TB in SAARC member countries were human resource development, advocacy programmes, strengthening epidemiological net working, research activities, developed regional manual for MDR-TB and providing laboratory support to the Member Countries.
Conclusion: MDR-TB and XDR-TB are emerging threats to TB control in the SAARC region. All member countries should strictly follow the DOTS strategy to prevent this unwanted outcome.

PS-94140-07   A disease management programme improves the quality of life (QoL) of COPD patients

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Background: COPD is a major cause of chronic morbidity and mortality worldwide.
Objective: To report the outcome of the QoL of a group of enrolled patients with COPD in Tan Tock Seng Hospital, NHG from a Chronic Disease Management Programme, TAP (The Airways Programme).
Method: TAP, a multidisciplinary team, enrolled the COPD patients and the disease severity was stratified according to the GOLD Guideline post-spirometry. The programme management includes: patient education with reinforcing medication compliance, follow-up adherence, telephonic management and home visit for some patients. QoL was assessed by using St George's Respiratory Questionnaire (SGRQ). Improvement of 4 units of SGRQ score indicates improvement in the patients' QoL.
Results: The total number of 279 patients were actively enrolled over a period of 9 months (April–Dec

2008). 27% ($n = 74$) of patients completed both baseline and 6 month SGRQ. Overall there is improvement and when the QoL is further defined according to the lung function, Stage 1 ($n = 1$), shows 25% improvement. Whereas in, Stage 2 ($n = 9$), 45%; Stage3 ($n = 21$), 54; and Stage 4 ($n = 3$), 27% shows improvement respectively.

Conclusion: These results suggest a disease management for COPD improves the QoL of most of Stage 2 and 3 COPD patients. For Stage 1 and 4 patients, continued effort in disease management of those patients is still necessary to improve the QoL.

PS-94143-07 Assessing patients' costs and access barriers with the tool to estimate patients' costs

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Tuberculosis is a disease that disproportionately affects the poor. TB programs therefore need to ensure that the economically and socially disadvantaged groups don't face barriers that keep them from seeking or adhering to treatment. We have developed and tested a tool to estimate the direct and indirect costs of TB patients before and during diagnosis and treatment. It provides evidence for subsequent interventions to increase equity in access to care and contribute to poverty reduction.

A literature review on patients' costs studies was conducted to determine at which stage patients incur what kinds of costs. The tool was finalized in collaboration with experts of the TB and Poverty working group. The tool is a generic questionnaire to be adapted to local settings. It was adapted to Kenya for its pilot in 2008. Results were analyzed and disaggregated by stage, type of cost and socioeconomic status of the patient. The findings were used to improve access to TB care in the two pilot districts and to improve the tool. 208 TB patients were interviewed at 9 health facilities in two districts in Kenya's Eastern Province. Total costs to TB patients were USD350, of which 85% were indirect, associated with lost work due to TB illness. Transport was the largest direct cost component (40% before/during diagnosis, 60% during treatment). HIV positive patients incurred on average 38% more direct costs during treatment. Women incurred higher costs as a proportion of personal income than men. Following the discussion of initial findings with the national TB program, the study's immediate impact was the decentralization of treatment services to five more sites. The Tool generated information for the local TB programme to identify non-clinical constraints faced by TB patients and their families. The tool is easy to use and adapt to local circumstances. The results of the tool allowed for immediate targeted actions to alleviate the economic burden of TB patients.

PS-95145-07 Active case finding for respiratory symptomatic and pulmonary tuberculosis cases in Carapicuiba City

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Introduction: Rapid diagnosis and completed treatment are considered the most effective means of controlling the transmission and reducing new cases of tuberculosis (TB). Carapicuíba has around 400 000 inhabitants and it's considered a priority city by National Tuberculosis Control Programme (NTCP) of Brazil due to its high TB incidence that is around 42 per 100 000 population and 24/100 000 Acid-fast bacilli (AFB).

Objective: Evaluating the detection of respiratory symptomatic (RS) and pulmonary tuberculosis (PTB) cases by active case finding (ACF) on public primary health units (PPHU).

Method: This is a descriptive study from January 2005 to December 2008 of a public health practice of ACF among individuals with respiratory symptoms aged >15 years attending one of the 12 PPHU for any reason. Brazilian NTCP defines respiratory symptomatic (RS) one has cough >3 weeks.

Results and discussion: During the period of studying we screened 914 605 individuals, it was found 9168 RS and 318 active PTB cases (Table). Current guidelines of Brazilian NTCP has expected a SR patients' rate of 1.0%. We found the same rate in our setting, although the AFB rate was around 16.0% higher than NTCP should expected. Screening for symptoms of TB is recommended as the first line of defense in situations with a high incidence of TB and smear microscopy with Ziehl-Neelsen techinique is the method recommended for routine application for the diagnosis of PTB cases due to its simplicity, rapidity, low cost and effectiveness in detecting infectious cases in developing places as Carapicuiba city.

Year	Active case finding	Respiratory symptomatic (RS)	RS rate (%)	Acid-fast bacilli (AFB)	AFB rate (%)
2005	183 375	2127	1.16	91	4.28
2006	283 476	2843	1.00	85	2.99
2007	266 423	2115	0.80	69	3.26
2008	181 331	2083	1.15	73	3.50
Total	914 605	9168	1.00	318	3.47

PS-94213-07   Progress in TB control in SAARC region

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Introduction: SAARC (South Asian Association for Regional Cooperation) is an association of eight countries, with diverse religious and cultural beliefs and practices. Tuberculosis is a global problem and the problem is higher in the SAARC region. However, remarkable progress has been made in this region in TB control after adopting DOTS strategy.

Study design: A Record Based Descriptive Study.

Results: A remarkable progress has been made for DOTS since its inception in 1993 in SAARC Region. By 1997, all member countries started adopting DOTS strategy. DOTS coverage within the region has steadily increased since 2000. Population coverage in 1997 was 11%, since then it has been increasing and reached 99.5% in 2006 and 100% in 2007. The case detection rate for new smear positive TB was 69.5% and for all type of TB cases is 73.7% in 2007.The treatment success rate for new smear positive patients registered under DOTS in 2006 cohort was 88.1%. All member Countries in SAARC achieved Global target of treatment success. Four of the 22 countries with the highest burden of TB namely India, Bangladesh, Pakistan and Afghanistan together, notified 0.8 million new smear positive cases in 2007, which represents 32% of total new smear positive cases notified in the world. Major activities carried out by the STAC to control MDR-TB in SAARC member countries are human resource development, advocacy programmes, strengthening epidemiological net working, research activities, developed regional manual for MDR-TB, Regional TB-HIV Co-infection Strategy and providing laboratory support to the Member Countries.

Conclusion: DOTS strategy is showing a better success in control of TB in the region. For the success to continue, the region must overcome the present challenges such as expansion of DOTS to hard to reach areas, sustainability of quality in diagnosis and treatment, tackling TB-HIV co-infection and emergence of MDR-TB and XDR-TB.

PS-94260-07   Sistema Unico de Suministros: herramienta que garantiza acceso a medicamentos e insumos de calidad

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Introducción : Los sistemas de suministro de medicamentos e insumos de laboratorio para el control de la tuberculosis funcionan de forma independiente. En 2007 el Programa Nacional de Control de la Tuberculosis (PNCT) enfrentaba problemas agudos en el suministro de insumos de laboratorio. Con recursos de la Misión USAID/República Dominicana, MSH/SPS realizó una evaluación de la situación del suministro para fundamentar las acciones correctivas.

Intervención : Por medio de un estudio descriptivo-cuantitativo se recolectó información en 185 laboratorios de diferentes niveles de atención. Los resultados del estudio permitieron a autoridades y técnicos del PNCT diseñar intervenciones para enfrenar los problemas encontrados.

Resultados : El estudio evidenció falta de procedimientos estandarizados en la cadena de suministro que contribuyeron a desabastecimientos periódicos. Se registraron interrupciones en el procesamiento y lectura de baciloscopias y cultivos, causando retrasos en la entrega de resultados y el inicio de tratamiento. Estos hallazgos han conducido a la formulación de procedimientos estandarizados para el suministro, elaboración de factores de cálculo para el uso y reabastecimiento de reactivos y articulación de un sistema único de información de la gestión de medicamentos e insumos de laboratorio.

Conclusiones y recomendaciones : Los sistemas de gestión del suministro de medicamentos e insumos suelen funcionar de forma independiente, generando ineficiencia y altos costos de operación. **Estudios rápidos pueden fundamentar las intervenciones que conducen a sistemas únicos y más eficientes.**

PS-94294-07   Tuberculosis control program management in major countries of the interiour of Sao Paulo State

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The aim of this study was to analyze the management of the tuberculosis control actions in counties of the interior of São Paulo State (Brazil), by means of a qualitative approach (content analysis, thematic modality) and a semi-structured interview involving the Coordinators of the Tuberculosis Control Program in seven priority cities. The statements taken pointed out serious entanglements regarding raise and maintenance of financial incentives to support Human Resources (HR) and means of transportation; inadequate and unprepared human resources; unfamiliarity concerning the destination of the budget appropriation for Tuberculosis Control and lack of autonomy to manage the resources; communication and interaction difficulties involving the project managers; lack of policies prioritizing the disease in the political

agenda; and priorization of appeals with political repercussion and need of partnerships. We conclude that the Project Coordinators work under pressure from the top and the bottom, occupying a two-way-transmitting position both in hierarchical level and in environmental relationship, not always disposing of adequate and sufficient resources.

PS-94295-07   Health services in TB control: family focus and community orientation in a city of Brazil, 2007

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Aim: To analyze, from the patient's perspective, the organizational characteristics and performance of health service providers in charge of TB control, targeting two different dimensions: family focus and community orientation in the city of São José do Rio Preto, São Paulo state, Brazil. The goals of the study are vindicated by the fact that tuberculosis is a public health problem worldwide and it has tremendous impact in Brazil and also by the fact that it is necessary to reorganize primary care services focusing on the family and community.

Materials and Methods: An epidemiological descriptive survey-like study was performed and 108 TB patients from São José do Rio Preto were surveyed by means of the Primary Care Assessment Tool (PCAT). This instrument was adapted and validated to be used in Brazil for TB care. The respondents answered each question according to a pre-determined scale, (Likert's scale) ranging from zero to five.

Results: In relation to family focus, the health service providers' concern focused on the patients' signs/symptoms but less attention was paid to other health problems affecting their family members, which hampered integral care. As for community orientation, the providers showed little concern regarding an active search for individuals with respiratory symptoms, workers' poor education, and a low search rate for individuals with respiratory symptoms and for the screening of individuals who have been living with TB patients.

Conclusion: It is necessary to broaden health workers' epidemiological views so that they will focus not only on the patient but also on preventive actions targeting the family and community. This fact highlights a pressing need to narrow the divide between patients, health care providers, families, and the community.

PS-94297-07   Tuberculosis treatment: the bond between health staff and sick person, Ribeirao Preto, Brazil, 2007

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Setting: The bond between tuberculosis (TB) patients and health staff is one of the key elements in disease control, since it presupposes accountability, comprehensiveness, humanization, and others.

Methods: An epidemiological descriptive study was performed and 100 TB patients from Ribeirao Preto were surveyed by means of the Primary Care Assessment Tool (PCAT). This instrument was adapted and validated to be used in Brazil for TB care. The respondents answered each question according to a pre-determined scale, (Likert's scale) ranging from zero to five.

Results: 81% of the interviewed patients are treated under DOT; 99% stated that they are always attended by the same professional during the appointments; 98% solve their doubts with the same professionals; 96% feel understood by professionals, who always respond to their questions clearly; more than 60% referred that they talk to health workers about other subjects besides TB; over 90% reported that they have enough time to clarify questions about the treatment; over 50% ask for doctor support when they present a health or social problem and need any assistance; more than 65% reported that the TB program professionals performance is very good.

Conclusion: The organization of TB care with fixed teams allows patient satisfaction, by optimizing the treatment with trained staff that follow and provide permanent evaluation and ensure treatment adherence, increasing the cure rates.

PS-94362-07   The bond in the tuberculosis actions in health services in the cities of Sao Paulo State, Brazil

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The aim of the study was to evaluate the bond as an organizational dimension of health services in actions

towards controlling tuberculosis (TB) in São José do Rio Preto-SP, either in the view of the patient, health professional or manager. This study to evaluate the performance of health service applied a questionnaire containing indicators whose development was based on the instruments of the Primary Care Assessment Tool and which was adapted to evaluate TB control in Brazil. One hundred and eight patients, 37 professionals and 15 managers were interviewed. To analyse 10 bond indicators, the analysis of variance—one way ANOVA—was used and the Kruskall-Wallis test was applied when it was not possible to use ANOVA. Then a post-test was applied for comparison of means. The performance of the indicators was verified to be non-favorable (means around 1 and 2), regular (means around 3) and positive (means around 4 and 5). In general, the bond dimension was assessed as satisfactory by patients (3.91), managers (3.95) and professionals (4.13). The indicators 'The TB patient is examined by the same health professional in the health service every time they have an appointment', 'the health professional explains the medications used for TB treatment' and 'the health professional asks the TB patient about all the used medications' were similar among the three actors. However, a great variability in opinion was identified between patients and managers regarding other bond indicators. Patients evaluated the health care team as very good (65.7%), whereas professionals and managers evaluated the care as good (48.6% and 60.0% respectively). The abandonment of treatment is still an obstacle for TB control. The investment in working conditions which promote the bond between the patient and the team is necessary to help the patient adhesion to the treatment.

PS-94399-07 Study of barriers in accessing nutritional care by tuberculosis patients in rural Bangladesh

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Objectives: To understand the perception of rural health providers regarding TB patients' barriers in accessing nutritional care. A second aim was to know the possible roles of those providers in helping TB patients in accessing to nutritional care.
Methods: A cross-sectional survey was conducted on 202 health care providers in rural areas of Mymensingh district to achieve the objectives.
Results: Majority (90%) of the providers were able to link between tuberculosis and nutrition and were aware (91%) of the necessity of adequate nutritional care during illness. They, however, perceived that the tuberculosis patients were unable to obtain adequate nutrition care due to lack of purchasing capacity

(80%), lack of nutritional knowledge and the sources to acquire the knowledge (42%), scarcity of nutritionally adequate food in the local market (25%) and food taboos (12%). The roles that the providers suggested that they can play includes helping the patients increase their purchasing power by raising fund through establishing social networks. They also suggested that with adequate training on nutrition, they would create awareness about the necessity of nutrition care and consuming nutritious food within community. In addition, they reported the importance of encouraging vegetable gardening and poultry rearing. Through frequent home visits, they would also provide nutritional care during illness.
Conclusion: Providers' awareness about nutritional care of TB patients and the willingness in playing role to improve nutritional status of the patients should be brought into consideration by policy makers to take further initiatives.

PS-94443-07 The performance of primary care in TB control in Ribeirao Preto, SP, Brazil

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Objective: To assess the performance of primary health care services in TB control in Ribeirão Preto, SP, Brazil considering the opinion of patients and health professionals.
Design: An epidemiological descriptive survey. The study was conducted with one hundred patients and sixteen health professionals using the Primary Care Assessment tool, which has been adapted and validated to be used in Brazil for TB care. Fifty assessment indicators were used (access to diagnosis, bond, and focus on family and community). The respondents answered each question according to a pre-determined scale (Likert's scale) ranging from zero to five. The indicators were analyzed individually and compared between different health units (HU) and between responses by patients and health professionals. Hypothesis and multiple comparison tests were done.
Results: In relation to access to diagnosis 80% of the patients sought for public health services; 83% of the cases were diagnosed at secondary and tertiary level health facilities; 59% of the patients sought for service facilities covering their area but only 6% were diagnosed within their coverage area. Relative to access to treatment, performance was found to be satisfactory or good. The bond between health professionals and patients was considered good or very

good with an improved performance at HU which had a smaller number of patients. As for focus on family, the health caregivers focused on the patients signs/symptoms.

Conclusion: It is necessary to enforce TB control actions at primary care units targeting access to diagnosis and focus on family and community.

PS-94446-07   TB patients accessibility to treatment in Ribeirao Preto, Brazil: health service assessment

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Objective: To analyse the accessibility of treatment in different health services in the city of Ribeirão Preto, Brazil, from the patient's perspective and focusing on sociocultural, economic and geographic barriers to care. The study of acessibility allows comprehension about how health services respond to patients' needs in order to promote adherence and quality of health assistance.

Materials and methods: An exploratory study of 100 TB patients on anti-tuberculosis chemotherapy between 2006 and 2007 was conducted using a structured questionnaire interview. The questionnaire is based on the Primary Care Assessment Tool (PCAT). This instrument was adapted and validated to be used in Brazil for TB care. The respondents answered each question according to a pre-determined scale (Likert's scale) ranging from zero to five.

Results: Health services received positive ratings regarding to relationship between health staff and patients, provision of information about TB and its treatment during health encounters, and agility to get medical consultation. Patients report long travel distances to the TB clinic resulting in transportation expenditure and need to lose the day of work due to health encounters, what highlights economic barriers to care, even when the treatment is free-cost. Health services have also shown deficiencies in the accomplishment of home visits to patients and in community involvement for discussion about TB control.

Conclusions: It is necessary to expand the inclusion of family and community in TB control actions and strength linkages with other equipments to minimize the impact of TB treatment in the patient's life context, mainly addressing socioeconomic barriers and improving patient-centre approach for health care.

PS-94449-07   Establishing a BSL-3 state TB reference laboratory in a secondary hospital in Cross River, Nigeria

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Background: Nigeria ranks 5th among 22 high burden TB countries. In 2007, the case detection rate was 31%, the treatment success rate 79%. HIV co-infection was estimated at 30%. The MDR/XDR-TB burden is unknown. The new MDR/XDR-TB surveillance system proposes a network of reference laboratories. We describe the establishment of the first state level BSL-3 TB reference laboratory in Nigeria in Calabar, Cross River.

Intervention: Processes included: Site selection through federal, state and national MDR-TB committee authorities; study tours and supra-national support; infrastructure assessment/renovation; staffing and training; development of infection control systems, Mand E, maintenance, referral and transport; link with MDR/XDR-TB treatment center.

Results: Unused consulting rooms were renovated into a TB molecular biology suite and a negative pressure BSL3 TB culture laboratory powered by complex HVAC systems. Problems of erratic power supply were overcome by a state dedicated high voltage line. Laboratory staff were trained and supranational quality assurance support provided by the NHLS and MRC in South Africa. Local maintenance capacity was built among state engineers. A sample/result transport system links 96 state DOTS centers and a community TB pilot district with the new reference laboratory. A hospital committee monitors best practice of infection control in laboratory and clinic. A computerized laboratory management system is linked with the LAMIS, a new electronic patient record system developed in Nigeria. The renovation of a naturally ventilated MDR/XDR-TB ward is in progress.

Conclusion: State government commitment, local TA and supra-national support made it possible to operate a state level BSL3 TB laboratory in a resource constrained setting. Implementation challenges should not serve as excuses to fail in the early detection and treatment of MDR/XDR-TB in Nigeria.

PS-94602-07   Making statistics meaningful at facility level

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Background: Health facilities are required to submit various reports weekly/monthly/quarterly to Department of Health (DOH) district offices/province/

national. Statistics compiled at these higher levels are used for various reasons such as evaluating different aspects and designing interventions, etc. Limited feedback is given to the facility where the data emanated from and the form in which it is presented is not meaningful. The lack of meaningful facility-level statistics may have an impact on the accuracy and timeous submission of reports (especially if forms are not user-friendly) and the general performance.

Aim: Making facility statistics meaningful.

Method: As part of a broad management of the TB crisis plan in KwaZulu-Natal, we designed simple tools to rapidly evaluate the situation at selected facilities in 4 districts. One of the tools was the Suspect Register tool. This captured information from the suspect register and was used to determine the number of suspects seen for the month, number of patients who were TB smear positive, number of missing results, TAT for smear results and time from obtaining results to initiating treatment. The case finding rate, smear positivity rate and treatment initiation rate were also calculated. The reasons for non-initiation of treatment of smear positive patients and the number could also be captured. These statistics could be generated by simple counting. Rates for the indicators are obtained using this tool and compared against programme targets.

Results: Facilities know immediately how they perform on a monthly basis and areas for improvement. Facility staff readily incorporated this tool into their normal activities after seeing the benefit. Subsequently, the Provincial DOH has modified their suspect register to incorporate the additional aspects of our suspect tool.

Conclusion: Meaningful critical statistics can now be generated at facility level.

PS-94606-07   Evaluation of the WHO Guidelines on the programmatic management of drug-resistant tuberculosis

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Aim: An evaluation of the WHO Guidelines for the programmatic management of drug-resistant tuberculosis among key stakeholders.

Methods: A set of close-ended questions (2 single, 2 multiple and 3 scaled/ranked reply options) and 2 open-ended questions were built into a questionnaire for self-completion in English, French, Russian or Spanish. Questions covered different aspects of previously published Guidelines. After piloting for content and construct, the tool was emailed to target end-users in countries with a high case-load of MDR-TB worldwide as well as a sample of other users.

Results: The questionnaire was sent to 248 persons (111 NTP managers, 137 practitioners) at the start of March 2009, with a reminder one week later. By 20 March, 40 (16%) completed questionnaires had been received from respondents working in all 6 WHO Regions (at least 4 from AFRO, 3 from AMRO, 7 from EMRO, 15 from EURO, 3 from SEARO, 5 from WPRO). Respondents used the Guidelines in different capacities (15 policy making, 16 programme management, 14 as TB practitioner, 13 public health specialists, 19 as trainer/lecturer). Median frequency of use of Guidelines in the previous year was 4–12 times. The three most useful sections of the guidelines were judged to be case definitions, recording and reporting; treatment strategies for M/XDR-TB, and management of contacts of MDR-TB patients. Top areas in which more guidance is requested are case-finding, laboratory diagnosis, and treatment strategies for M/XDR-TB. Nearly half (19; 48%) of the respondents suggested specific modifications for future revisions. Sixteen countries reported that national guidelines complied to WHO recommendations.

Conclusion: The next edition of the WHO Guidelines will incorporate the best available evidence on the subject. Information from this survey will be taken into account during the scoping process for the new Guidelines and when revising the content and format of the final document.

PS-94617-07   Evaluating the effectiveness of patient 'Enablers Package' in Ghana

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Aim: In 2003 the Ghana NTP started piloting the Enablers' Package to offset the operational cost for providing TB diagnosis and treatment incurred by TB patients, health staff and health facilities used for treatment as a pro-poor patient incentive. Countrywide coverage was achieved in 2006 through support from the Global Fund Round 5 Grant. This evaluation is to assess the impact of enablers package on TB treatment outcomes and health system.

Methods: National, regional and district quarterly and annual data were reviewed focusing on trends in TB case notifications and treatment outcomes. A structured questionnaire was administered to both patients and health facility staff to assess their opinion on the contributions of the incentives to TB treatment outcomes and the health system.

Results: TB treatment success rates have improved from 61% in 2003 to 85% in 2007. However, providing incentives has resulted in a small increase in TB case notifications. Through the enablers package the network of TB microscopy sites has increased from 211 in 2007 to 257 in 2008.

Conclusion: Since multiple interventions were implemented concurrently, it is difficult to fully attribute the

increase in TB treatment success rate to the enablers' package. However interviews with health staff and patients reveal that the enablers package has positively contributed to treatment adherence and led to an increase in TB treatment success rate largely due to the reduction of defaulter rate from 13.5% in 2003 to 3% in 2007. A comprehensive evaluation of the enablers' package is needed for further improvement.

PS-94774-07 Progress of Nepal multidrug-resistant TB programme on completion of three years: lessons learnt

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Objective: To review the progress of the MDR-TB management programme on completion of 3 years and to determine key challenges.

Background: The Nepal NTP started Green-Light Committee approved MDR-TB managemet programme in September 2005 using standardized treatment regimens. Project started initially in 5 treatment and 16 Sub centres covering all administrative Regions of the country. To improve access this project was extended further, currently it is offer services from 10 treatment and 34 sub centres.

Methods: Standardized treatment (Kanamycin, Ethionamide, Cycloserine, Pyrazinamide, Ofloxacin) is offered for Category 2 failures and other culture demonstrated Multiple Drug Resistance. Free daily treatment including prophylactic side effect drugs; Ranitidine and Pyridoxines are given by trained Health workers. Monthly medical reviews include smear and culture testing, and blood monitoring for Potassium and Creatinine.

Results: By end 2008, 494 patients were enrolled. The largest number of MDR-TB cases registered belongs to failures of CAT 2 (89%) followed by CAT I failures with culture and DST confirmed MDR (5.8%). Cure rate among 88 MDR patients registered during first year of the programme (Sept.–Dec. 2005) was 70%, while 9% of the patients failed the treatment, 7% died and 14% defaulted. Key challenges observed during the initial 3 years are lack of socio economic support for patients e.g. cost of transportation, food and accommodation and lack of infection control in the health institutions for reduction of transmission of MDR-TB to health care workers.

Conclusion: Nepal DOTS-Plus programme is well organized, delivering a standardized treatment with adequate initial sputum conversion rates. Two most pressing issues for the programme are to provide better socio economic support to patients and how to reduce risks of transmission of MDR-TB.

	2005*	2006	2007	2008	Total
N 1	79	136	116	109	440
N 2	4	10	12	3	29
N 3	1	2	2	0	5
N4	4	12	2	2	20
Total	88	160	132	114	494

N1 Smear positive CAT 2 failure
N2 CAT 1 Failure with culture & Drug Sensitivity Testing confirmed MDR TB
N3 MDR TB patient household Contact who is smear positive, with culture & DST confirmed MDR TB
N4 MDR TB patient who is smear positive, with culture & DST confirmed MDR-TB

Treatment Outcome: MDR TB cases registered 2005 - 2008

	Registered	Cured	Failure	Died	Default	Still on Treatment	T/O
2005 *	88	62 (70%)	8 (9%)	6 (7%)	12 (14%)	0	0
2006	160	92 (58%)	6 (4%)	13 (8%)	34 (22%)	13 (8%)	2 (1%)
2007	132	0	1 (1%)	13 (10%)	13 (10%)	105 (80%)	0
2008	0	0	0	5 (4%)	3 (3%)	106 (93%)	0

PS-94812-07 Improving drug management system by implementing electronic auto software linked with case finding

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Background: Pakistan ranks 8th amongst the 22 high-burden disease countries. Punjab Province has 90.8 millions. Accuracy in quantification for demand for procurement and distribution was always challenging. A study was designed to use electronic drug management system linked with case finding reports.

Objective: Improving capacity to quantify demand of ATT medicines for procurement and distribution drugs to districts.

Methods: Intervention study. Intervention; Electronic automated drug management system liked with case finding reports. During intra district meeting, case finding report of 35 district, unit cost of drugs and stock status of drugs in districts ware entered in electronic software linked with drug management system. It autometically quantified demand with cost for Q3 2007 to Q2 2008 and distribution plan for Q3 to 4 2008. Medicines were distributed to districts according to plan. Intervention group; 35 districts who received medicines in using electronic automated system. Non Intervention control group; 35 districts who received medicines using paper based system. Data was collected on questionnaire.

Results: Timely and accurately quantified demand submitted for procurement in interventional group and control group 100% and 80% ($P = 0.000$) respectively. Buffer stock at provincial and district level was present in interventional group and control group 100% and 75%, respectively. Accuracy and

timely delivery of medicines to districts was 100% and 80% ($P = 0.000$) in intervention and control groups respectively. Time anti-TB drugs were out of stock at provincial in intervention and control group was 0% and 10%, respectively ($P = 0.01$). Time anti-tuberculosis drugs were out of stock at district level in interventional and control group was 0% and 15% ($P = 0.000$) respectively.

Conclusion: Electronic drug management system is significantly useful for timeliness accurate quantification for procurement and distribution of medicines.

PS-94995-07 Knowledge, attitude and practice about informed consent in patients with respiratory disease

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Setting: At present, medical care of chronic diseases represents a challenge for the doctor-patient relationship, and this is reflected in the quality of care and treatment compliance and success. An example of this situation is the Informed Consent process, which is considered simply as an administrative requirement and not as a tool for the doctor-patient life decision making process.

Objective: Assess the knowledge, attitude and prac-tices of post-graduate specialist physicians regarding the application of the Informed Consent in the care of patients with respiratory conditions at the National Institute of Respiratory Disease.

Method: A descriptive cross-sectional study with a CAP survey (acronym in Spanish for Knowledge, Attitude and Practice) for residents who are completing their medical specialization at the National Institute of Respiratory Diseases. February 2008.

Results: 53 physicians from five specialties: Pulmonology, Pediatric Pulmonology, Surgery, Otorhinolaryngology and Immunology were interviewed. Knowledge of the IC is limited; only 50% of the physicians responded positively; however, the need to apply the IC is reflected in better attitude and practice scores. In spite of the fact that the Institute is a specialty institution on pulmonary diseases, the physicians who were best qualified belonged to the Departments of Otorhinolaryngology, Immunology and Surgery.
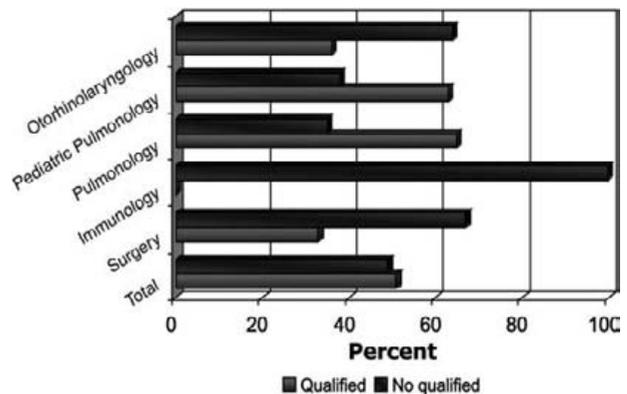
Figure Knowledge, attitude and practice about informed consent in patients with respiratory disease by specialists of a hospital Mexico. Physicians who were best qualified belonged to the Departments. Qualified = 60% or more KAP.

Conclusions: Progress and modernization of technology oversteps bioethical commitment and humanism. In the study we observed that physicians who are under postgraduate education programs lack the basic knowledge required to make responsible life decisions regarding medical procedures. The lack of communication between physicians and patients results in uncertainty, distrust and problems in the treatment of patients. There is a need to bring health staff back to humanism and commitment, particular at this point in time where there is an increase of chronic diseases that require greater trust in medical care.

TB IN HIGH-BURDEN COUNTRIES II

PS-94052-07   An application of capture-recapture to evaluate tuberculosis surveillance in Pernambuco, Brazil, 2007

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Background: Capture-recapture methods offer an inexpensive alternative to complete enumerations in the evaluation of disease surveillance. In 2007, the state of Pernambuco in Brazil, one of 22 high-burden countries for tuberculosis (TB), reported 46 TB cases per 100 000 persons. However, concerns regarding underreporting have led to uncertainty about the performance of TB surveillance in this state. The objective of this study was to estimate the completeness of coverage of the TB surveillance system in Pernambuco, Brazil in 2007 using capture-recapture methods.

Methods: We used Link Plus, a probabilistic matching program, to link reports of TB among persons with AIDS in the state's TB surveillance system to reports of TB in the state's AIDS registry. Using log-linear modeling, we obtained the maximum likelihood estimate (MLE) for the true number of TB cases among persons with AIDS. We calculated the quotient of the number of TB cases reported to the TB surveillance system and the MLE to estimate the completeness of coverage of TB surveillance.

Results: Three hundred ninety TB cases among persons with AIDS were reported to the TB surveillance system in 2007. One hundred forty-eight TB cases were reported to the AIDS registry. One hundred twenty-seven records were linked between the TB surveillance system and the AIDS registry. The MLE was 454 TB cases (95%CI: 351–588). Completeness of coverage was 86%.

Conclusions: Coverage of TB surveillance in Pernambuco was good. Nonetheless, 14% of the estimated true cases were not reported. In the absence of a gold standard comparison, this application of capture-recapture methods provides valuable and efficient information about the performance of TB surveillance in Pernambuco. These data can assist policymakers with the allocation of TB control resources, including for enhanced surveillance to improve case reporting.

PS-94090-07   Epidemiology of childhood tuberculosis in Kenya, October 2006 to September 2007

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Background: Pediatric tuberculosis (TB) has historically garnered limited attention from national TB programs because diagnosis is challenging, children rarely infect others, and if TB is diagnosed early, treatment is usually successful. However, it is not known whether these tenets are true in countries where HIV prevalence is high. We describe TB and associations with death among children in Kenya.

Methods: We collected demographic and clinical registry data on children aged <15 years whose TB treatment was initiated during October 2006–September 2007 in two provinces. We tested associations with outcome using bivariate analysis.

Results: TB treatment was initiated for 987 children: median age was 5 years; 520 (53%) were male. Pulmonary TB was diagnosed for 689 (70%) children: sputum smear results were positive for 77 (11%); the remaining cases were diagnosed clinically. Final outcomes were known for 830 of the 987 children, 40 (5%) of whom died during TB treatment. HIV test results were available for 670 (68%) children; 371 (55%) tested positive. Of 323 HIV-infected children with TB whose outcomes were known, 25 (8%) died during TB treatment, compared with 9 (4%) of 257 patients who had TB only (relative risk = 2.2, 95% confidence interval = 1.1–4.7).

Conclusions: In Kenya, pulmonary TB is the most common form of pediatric TB, but diagnosis is rarely confirmed by laboratory testing. HIV infection in children with TB is common, and our data suggest that children with both TB and HIV have twice the risk of death compared to children with TB only. Expanded HIV testing, which results in early diagnosis and treatment, and the use of validated procedures for the clinical diagnosis of TB in children may improve survival.

PS-94091-07   Effect of drug resistance on treatment outcome among MDR-TB patients in KwaZulu-Natal Province, South Africa

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Setting: A prospective, observational study of consecutive patients initiating MDR-TB treatment at

King George V Hospital, KwaZulu-Natal Province, 2/2006–10/2006.

Objectives: The overall objectives of PETTS are to determine the rate of, risk factors for, and consequences of acquired resistance to SLD in MDR-TB patients. The focus of this analysis is to determine the effect of SLD-resistance on treatment outcome among patients with MDR-TB.

Methods: Patients diagnosed with MDR-TB by the National Health Laboratory Service were started on SLD treatment and submitted sputum for culture and repeat drug susceptibility tests (DST). Consecutive, consenting adults were enrolled and followed with monthly sputum cultures. For patients with subsequent positive cultures during SLD treatment, the series of cultures was sent to CDC for repeat DST and genotyping. Both laboratories perform DST by the proportion method on Middlebrook 7H10 agar.

We defined MDR-TB as resistance to at least INH and RIF but no fluoroquinolones (FQ) or injectable SLDs, and XDR-TB as resistance to at least INH, RIF, any FQ, and an injectable SLD. Favorable outcome was defined as cure or successful treatment completion. Unfavorable outcomes included death, default, and treatment failure after 24 months. Both MRC and CDC IRBs approved this research, which was funded in part by USAID.

Results: 197 patients were enrolled in 9 months. 10 (5.1%) had XDR-TB and 11 (5.6%) had resistance to ≥1 injectable SLD or a FQ but not both. Overall, 96 (48.7%) patients were cured, 9 (4.6%) completed, treatment failed in 23 (11.7%), 30 (15.2%) died, 38 (19.3%) defaulted, and 1 transferred out. Compared with MDR-TB, XDR-TB increased the risk of a poor outcome, but resistance to FQs or injectable SLDs without resistance to both did not (Table).

Resistance pattern	Total n	Outcome Unfavorable n (%)	Outcome Favorable n (%)	Relative risk (95%CI)
Total	196	91 (46.4)	105 (53.6)	
'Plain' MDR-TB	175	80 (45.7)	95 (54.3)	Ref
Injectable SLD or FQ, not both	11	4 (36.4)	7 (63.6)	0.8 (0.4–1.8)
XDR TB	10	7 (70.0)	3 (30.0)	1.5 (1.0–2.4)

Conclusions: Resistance to one of the classes of drugs for treating MDR-TB, FQs or injectable SLDs, did not worsen treatment outcomes as much as resistance to both.

PS-94099-07   PTB among women attending family planning and maternal and child health clinics in Dar es Salaam

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Background: Tuberculosis (TB) case detection in women through passive case finding has remained low in many parts of the world. Little is known on the effect of TB screening among women attending family planning (FP) and maternal and child health clinics (MCH). This study was conducted to determine the contribution of screening for TB all women with cough regardless of duration attending FP and MCH clinics in Dar es Salaam.

Methods: We conducted a cross sectional study in all three municipal hospitals of Dar es Salaam between October 2007 and June 2008. All women with cough attending FP and MCH clinics were screened for TB by smear microscopy. Pearson's χ^2 was used to compare group difference for categorical variables. Differences were considered statistically significant if $P < 5\%$.

Results: We enrolled a total of 749 TB suspects. Five hundred and twenty nine patients (70.6%) were from MCH clinics. Mean (SD) and median age was 27.6 (5.2) and 27 years respectively. Six hundred and sixteen (82.2%) had coughed for <2 weeks as compared to 133 (17.8%) who had coughed for ≥2 weeks. Of the 616 TB suspects with cough < 2 weeks, 14 (2.4%) were smear positive TB patients, and of the 133 suspects with cough ≥2 weeks, 13 (10.2%) were smear positive TB patients, and the difference was statistically significant ($\chi^2 = 17.6$, $P = 0.001$). Among 749 patients, 430 (57.4%) had visited health facilities for care prior to their diagnosis.

Conclusion: Expanding TB diagnosis services to MCH and FP clinics increases TB case notification in women.

PS-94153-07   Tuberculosis services and treatment outcomes: comparison of private and public healthcare facilities

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Background: The World Health Organization recommends that national tuberculosis (TB) programs encourage private health providers to follow the International Standards for Tuberculosis Care. We compared public and private facilities in terms of services and treatment outcomes for TB patients in Thailand.
Methods: We collected data prospectively on TB patients treated at 59 public and 26 private facilities in four provinces and the national infectious diseases hospital during 2004–2006. We analyzed services and outcomes among new pulmonary TB patients according to facility type. Differences were assessed using χ^2 tests ($P < 0.05$). Multivariable logistic regression was used to determine factors associated with poor TB treatment outcomes (death, treatment failure, treatment interruption).
Results: Of 7526 patients, 6,814 (90%) were treated in public and 712 (10%) in private facilities. Significantly more public-sector patients had at least two sputum smears examined by microscopy (43% vs. 18%), were prescribed a standard TB regimen (95% vs. 80%), and received directly observed therapy (87% vs. 23%). Treatment outcome was classified as poor for 237 (33%) private-sector patients and 1673 (25%) public-sector patients ($P < 0.01$). Among patients with poor outcomes, 218 (92%) private patients interrupted treatment compared with 673 (40%) in public facilities ($P < 0.01$). In private facilities, poor treatment outcomes were associated with being male (adjusted odds ratio [AOR] = 1.8; 95% confidence interval [CI] = 1.3–2.5), receiving treatment in Bangkok (AOR = 1.9; 95%CI = 1.3–2.9), and having nationality other than Thai (AOR = 2.5; 95%CI = 1.4–4.3).
Conclusions: In Thailand, public facilities have provided better TB diagnostic and treatment services, and have had better patient outcomes. Private sector initiatives are needed to address high rates of treatment interruption and to increase use of microscopy, standardized TB regimens, and directly observed treatment.

PS-94462-07   Threat of MDR-TB in Mosango, a remote and rural area of the Democratic Republic of Congo

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During the last September, National Tuberculosis Program/DRC was notified by the Chief Medical Officer of the Mosango health district about the suspicion of 2 MDR-TB in the inpatients wards of the Mosango Hospital located at 420 km of Kinshasa the capital city of DRC. Mosango Hospital is the third largest tertiary hospital in DRC. In the context of HIV prevalence estimated at 8% within the health district, the NTP has estimated that was important to document the emergence of MDR-TB in this health district and to determine the specific resistance patterns associated with MDR in order to exclude a nosocomial transmission. Sputum specimens of MDR-TB suspected patients were collected in Falcon tubes containing 1% of CPC and in alcohol tubes to ensure an adequate recovery of *Mycobacterium tuberculosis* respectively on Lowenstein-Jensen (LJ) medium and the detection of Rifampicin (RMP) and Isoniazid (INH) resistances by using MDR-TB plus assay. Of the 9 specimens collected among MDR-TB suspects, 4 (44.4%) MDR-TB cases were detected using culture on LJ. Three MDR-TB cases were inpatients at Mosango Hospital and 2 died within 4 months of treatment. The sequencing of these MDR-TB strains have shown 4 different *rpoB* patterns already documented elsewhere. The risk of death with standard short-course chemotherapy was highest when there is resistance to both INH and RMP. Laboratory investigation suggests that MDR-TB is present in Mosango with no evidence of nosocomial transmission.

PS-94468-07   Third consecutive 2-year tuberculosis drug resistance survey in children in the Western Cape

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Aims: To determine the prevalence of drug resistance (DR) and HIV-co-infection among children with culture-confirmed tuberculosis (TB), and to compare results with two previous consecutive DR surveys.
Methods: Prospective surveillance was done from March 2007 through February 2009 at Tygerberg Children's Hospital, Cape Town, South Africa. Drug-susceptibility testing (DST) was done on one isolate from each child <13 years with culture-confirmed TB. DSTs were done for isoniazid and rifampicin, and if multidrug-resistant, to ethambutol and second-line drugs. HIV status was documented. Gene sequencing was done to confirm *rpoB* gene mutations conferring resistance to rifampicin in doubtful cases.
Results: 282 children, 149 (52.8%) boys (median age: 26 months), were diagnosed with tuberculosis. DST results were available in 279 (98.9%): 43 (15.4%) had isoniazid and/or rifampicin resistance, 39 (14.0%) were INH-resistant including 24 (8.6%) with MDR. The prevalence of DR was higher, although not significantly so, compared with previous DR surveys

(2003–2005 and 2005–2007), where the prevalence of any isoniazid resistance was 41/320 (12.8%) and 41/285 (14.4%) and MDR-TB was 19/320 (5.9%) and 19/285 (6.7%). Ethambutol resistance was present in 11/22 (50.0%) MDR-TB cases. Two isolates were resistant to ofloxacin; none had XDR-TB. HIV infection prevalence remained high; 26.3% vs. 28.2% vs. 30.2% in the 1st–3rd surveillance period.

Conclusions: Drug resistance and HIV infection among childhood tuberculosis cases remain high despite no significant increase in 6 years. This calls for urgent measures for the prevention of DR TB transmission. Ethambutol resistance is common amongst MDR-TB cases and ethambutol should therefore not be relied on in an MDR-TB treatment regimen.

PS-94642-07   Beijing genotype is not associated with treatment failure among smear (+) pulmonary TB in Vietnam

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Background: The success of DOTS has been threatened by anti-tuberculosis (TB) drug resistance, especially multidrug-resistant (MDR-TB). Evidence on animal and on human studies found that the Beijing TB genotype is strongly associated with MDR-TB. Beijing genotype was attributed to failure (and relapse) in Vietnam. In this study, we would like to determine whether Beijing genotype is a risk factor for failure also TB drug resistance regardless to MDR-TB.

Methods: Prospective study in three adjoining rural district in Vietnam. All smear positive pulmonary TB were requested for sputum submission before starting of TB treatment, repeated sputum submission were done at 5th month and at the end of treatment. First-line TB drug susceptibility testing (DST) and genotyping by RFLP were performed to determine initial and acquisitive drug-resistant status also TB genotype before and after treatment.

Results: Data from 1070 patients (88.2% among DST and genotyped patients) were analyzed. Failure rate confirmed by culture positive at fifth month or at the end of treatment was 2.1% (95%CI 1.3%–3.1%). Polydrug resistance was associated with failure (ORadj: 3.7; 95%CI 1.3–10.9) whereas Beijing genotype was not a risk factor for failure (ORadj: 1.0; 95%CI 0.4–2.8). Acquisition of drug resistance observed in three patients, one from full susceptible to monodrug resistance due to non-Beijing genotype; one from full susceptible to polydrug resistance and one from polydrug resistance to MDR-TB due to Beijing genotype. Beijing genotype was 4.4 fold higher in acquisitive

drug resistance versus non-Beijing, but not significant (95%CI 0.22–161.6). Two patients changed *Mycobacterium tuberculosis* genotype at failure; this suggests re-infection by different genotype during TB treatment.

Conclusion: In this study, Beijing genotype does not how association with failure and acquisitive drug resistance among smear-positive pulmonary tuberculosis.

PS-94655-07   Nosocomial spread of XDR-TB in rural South Africa, 2005–2006

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Background: Extensively drug-resistant tuberculosis (XDR-TB) has been reported from every province in South Africa. Since 2005, 414 XDR-TB cases have been diagnosed in KwaZulu-Natal province. Although primary transmission of XDR-TB strains has been documented, it remains under-recognized as a factor in the continued spread of this epidemic in high HIV prevalence settings. We sought to determine the role of nosocomial transmission in the expansion of the XDR-TB epidemic in rural Tugela Ferry, South Africa.

Methods: Retrospective review of XDR-TB patients diagnosed from 1/05–12/06. We examined medical records to determine prior hospitalizations and exposure to known XDR-TB cases. The number and duration of exposure was calculated based on in-hospital overlap on congregate wards. Infectious period was defined as 1 month prior to diagnostic sputum to study end or death.

Results: From 1/05–12/06, 246 XDR-TB cases were diagnosed in Tugela Ferry, of which 148 (60%) had records available. Prior to their own XDR-TB diagnosis, 115 (78%) patients were hospitalized at the same time as at least one known XDR-TB case. Hospitalized patients were exposed to a median of 6 (IQR 3–8) known XDR-TB cases, resulting in a median of 40 (IQR 18–76) patient-days of exposure. At least 1 documented XDR-TB patient was on the wards during 661 of the 730 days (91%) in the study period. Of the 148 known XDR-TB patients, 80 (68%) were smear positive and 131 (89%) exposed other hospitalized patients. Each known XDR-TB patient exposed a median of 5 (IQR 3–8) patients for a median of 32 days (IQR 14–62).

Conclusion: The substantial temporal overlap amongst hospitalized patients with confirmed and eventual XDR-TB strongly supports the notion that nosocomial transmission is a major driver of this epi-

demic. Molecular genotyping is needed to confirm these epidemiologic links. These findings highlight the need for urgent implementation of infection control measures.

PS-94667-07   *M. tuberculosis* transmission is not related to household genotype in a highly endemic setting

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Among different strains of *Mycobacterium tuberculosis*, Beijing has been identified as an emerging genotype. Enhanced transmissibility provides a potential mechanism for genotype selection. This study evaluated whether the Beijing genotype is more readily transmitted to children in household contact with an adult tuberculosis (TB) index case than other prevalent genotypes. We conducted a prospective, community-based study at 2 primary health care clinics in Cape Town, South Africa from January 2003 through December 2004. Bacteriologically confirmed new adult pulmonary TB cases were genotyped by IS*6110* DNA fingerprinting; household contacts less than 5 years were traced and screened for TB infection and/or disease. A total of 187 adult index cases were identified from 174 households with children aged less than 5 years. Of 261 child contacts aged 0–5 years; 219 (83.9%) were completely evaluated and the index case successfully genotyped. *M. tuberculosis* infection (Mantoux tuberculin skin test $\geq$10 mm) was documented in 118/219 (53.9%) children; 34 (15.5%) had radiographic signs suggestive of active TB. There was no significant difference in the ratio of infected children among those exposed to Beijing (51/89; 57.3%) compared to non-Beijing genotypes (55/115; 47.8%; OR 1.5, 95%CI: 0.8–2.7). Genotyping was successful in 6 children diagnosed with active TB; only 2 had IS*6110* fingerprints that were identical to the presumed index case. We found no significant association between *M. tuberculosis* genotype and transmissibility within the household. However, undocumented *M. tuberculosis* exposure may have been a major confounding factor in this high burden setting.

PS-94713-07   Prevalence of tuberculosis in Vietnam

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Background: Despite having reached the WHO performance targets since 1997, Vietnam has seen no decrease in tuberculosis case notification rates. We performed a nationwide prevalence survey to estimate the burden of tuberculosis in the country.
Methods: We invited all inhabitants aged $\geq$15 years who were present and had lived for at least 3 months in 70 randomly selected population clusters for screening by interview and chest X-ray. All participants with productive cough for more than 2 weeks and/or a history of tuberculosis within 2 recent years and/or X-ray abnormalities consistent with tuberculosis were considered as TB suspect and had 3 sputum smears examined; one morning sputum sample was cultured on LJ medium. Case definition and classification was done following the WHO criteria.
Results: Of 94179 participants (90.6% of 103924 eligible persons), 7498 (7.96%) were identified as suspects in the fields. Among these, for 3817 (50.9%) this was based on the interview, for 2926 (39%) on the X-ray, and for 755 (10.1%) on the interview and the X-ray. At least one sputum examination was done for 7648, and culture for 7298. Final results showed 174 TB cases AFB (+) and 232 barteriologically confirmed cases.
Conclusion: Prevalence of tuberculosis per 100000 population in Vietnam was estimated as 145 (95%CI 110–180) for all forms of smear positive, 114 (95%CI 88–140) for new smear positive and 189 (95%CI 152–226) for barteriologically confirmed cases.

PS-94907-07   The second nation-wide survey of *M. tuberculosis* drug resistance in Mongolia, 2007

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Objective: To determine the prevalence of resistance to major (streptomycin [SM], isoniazid [INH], rifampicin [RMP], and ethambutol [EMB]) anti-tuberculosis drugs among tuberculosis patients new and previously treated cases in Mongolia.
Methods: Sputum specimens were collected from all smear-positive tuberculosis patients identified from 1 December 2006 to 1 August 2007 in Mongolia. Drug susceptibility testing was performed on sub-cultured

strains from primary isolates, using Lowenstein-Jensen medium. Drug susceptibility was determined using the proportion method for concentrations of the drugs as follows: 0.2 μg/ml for INH, 4 μg/ml for SM, 40 μg/ml for RMP, and 2 μg/ml for EMB.

Results: Of 850 isolates obtained from individual patients, 652 from new cases (378 males and 274 females, age 32.2 ± 12.9) and 198 from previously treated cases (125 males and 73 females, age 35.8 ± 12.7), were tested for susceptibility to four primary anti-tuberculosis drugs. Of 652 isolates tested from new TB patients, 19.2% were resistant to any one of the anti-tuberculosis drugs, 12.6% to (INH), 2.3% to (RMP), 1.4% to (EMB), 12.1% to (SM) and 1.4% were multidrug-resistant (MDR). Of the 198 previously treated patients, 47.5% were resistant to any one of the drugs, 37.4% to INH, 31.3% to RMP, 22.7% to (EMB), 33.3% to (SM) and 27.8% were MDR. Of 26.8% (175/652) all of new TB cases was smokers, among them 8% (14/175) was female.

Conclusion: MDR-TB was low in the new tuberculosis cases, but it was high among the previously treated cases. Therefore it is increasing need to improve DOTS quality and expanding DOTS Plus programme in Mongolia. The 26.8% were smokers all of new cases, it was high.

PS-94980-07   Increasing incidence of nontuberculous mycobacteria at a medical center in Taiwan, 2000–2008

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Background: In Taiwan, a country with high tuberculosis burden, the knowledge about the isolation prevalence of nontuberculous mycobacteria (NTM) is limited.

Methods: This study was retrospectively conducted at National Taiwan University Hospital (NTUH) over a 9–year period.

Results: 283 394 clinical samples were received for mycobacterial culture and a total of 23 499 specimens with positive mycobacterial cultures. *Mycobacterium tuberculosis* was isolated from 14 295 (5.0%) specimens (3695 patients), and NTM were isolated from 9204 (3.2%) specimens (4786 patients). Figure A showed the annual distribution of the isolation of NTM and *M. tuberculosis*. *M. avium* complex (n = 2761, 30.0%) were the most frequently isolated organisms, followed by *M. abscessus* (n = 1609, 17.5%), *M. fortuitum* complex (n = 1200, 13.0%), *M. chelonae* complex (n = 885, 9.6%), *M. kansasii* (n = 515, 5.6%) and *M. gordonae* (n = 508, 5.5%). Some rare strains such as *M. celatum* (n = 3), *M. conceptionene* (n = 3), *M. neoaurum* (n = 2), *M. arupense* (n = 1), *M. mageritense* (n = 1), *M. asiaticum* (n = 1) and

M. immunogenum (n = 1) were identified during this survey. Figure B displays the annual incidence of NTM disease, and the isolates of NTM, MAC, and RGM. 1105 patients had NTM diseases and the most common disease was pulmonary disease (n = 894, 76.8%), followed by soft tissue infection (n = 122, 11.4%), disseminated infection (n = 79, 7.1%), and peritonitis (n = 19, 1.7%).
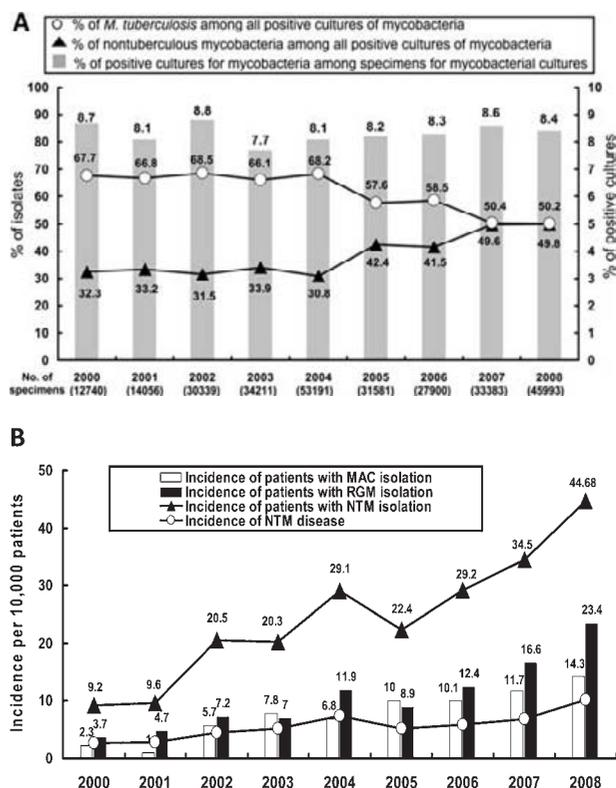
Conclusions: There was an increase in the number of NTM isolated from clinical samples in Taiwan. MAC and RGM were the most frequent species of clinical isolation and newer strains emerged due to the improvements of diagnostic methods.

PS-95013-07   National anti-tuberculosis drug resistance study in Tanzania

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Aim: To assess the prevalence of drug resistance in Tanzania.

Design: Cross sectional survey in a national representative sample of new-smear positive TB-patients.

Methods: New smear-positive patients were sampled from 40 TB-diagnostic centers (proportional to patients load). Each center enrolled 30 consecutive new patients. Patients provided an extra sputum sample after being diagnosed through routine procedures. Samples from retreatment patients were collected simultaneously. The Central Tuberculosis Reference Laboratory performed culture (LJ medium) and sensitivity testing (proportion method).

Results: Between July 2006 and August 2007, 1167 patients (1019 new) were included. Of these, 929 new patients and 128 retreatment patients had a positive culture. Sensitivity results were valid for 911 (89%) new patients and 127 (86%) retreatment patients. MDR was seen in 11 (1.2%) of the new patients and 4 (3.1%) in the retreatment patients. Mono resistance to rifampicin was not seen, while mono resistance to isoniazid was seen in 4.0% and 9.4% of new and retreatment patients, respectively. Resistance to any drug was seen in 77 (8.5%) of the new patients and 25 (19.7%) of the retreatment cases. See Table.

	New patients valid sensitivity results $n = 911$			Retreatment patients valid sensitivity results $n = 127$		
Monoresistance	Poly-resistance	MDR		Mono-resistance	Poly-resistance	MDR
Isoniazid (H): 36	HS: 9	HR: 1		H: 12	HS: 3	HR: 0
Rifampicin (R): 0	HE: 2	HRS: 2		R: 0	HE: 5	HRS: 0
Streptomycin (S): 16	SE: 0	HRE: 0		S: 1	SE: 0	HRE: 0
Ethambutol (E): 2	HSE: 1	HRSE: 8		E: 0	HSE: 0	HRSE: 4

Conclusion: The prevalence of MDR among both new and retreatment cases in Tanzania is low. In a setting with ample drug supply this is obtained by a strong performance of the NTLP and the absence of a private sector for TB treatment. A proper functioning routine surveillance system needs to be in place to monitor future trends in drug resistance.

PS-95064-07   Joint effect of tobacco use and body mass on tuberculosis deaths in Mumbai, India

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Setting: Tuberculosis (TB) is a major cause of morbidity and mortality in developing countries. Tobacco use and under-nutrition are major public health concern in India and using prospective study we studied the joint effects of low-BMI and different forms of tobacco use on TB mortality.

Design: A cohort of 148 173 (59 515 women, 88 658 men) individuals ⩾35 years were recruited in Mumbai in years 1991 to 1997 and were followed up to ascertain the vital status from 1997 to 2003. Causes of deaths were determined using municipal corporation death records. Multivariate analysis was performed and adjusted hazard ratios (HRs), 95 percent confidence intervals (CIs) were estimated for various BMI categories (normal, thin, very thin, extremely thin, overweight and obese) and tobacco categories (never user, smokeless tobacco users, and smokers).

Results: Of all cohort members, a total of 884 tuberculosis deaths were observed. Compared to overweight never tobacco users, elevated risk of death was observed across all the under-weight categories; further, the risk increases from never tobacco users to tobacco users, among both men and women. Extremely thin male; never-tobacco users as well as smokers were at over 25 times and 36 times increased risk of tuberculosis deaths as compared to the reference category. The risk pattern remained unchanged even after excluding TB deaths occurred within 1st two years of follow-up. Bidi smokers had the highest risk of tuberculosis death across all the underweight categories compared to the reference category. Extremely thin bidi smokers were at 41 times increased risk of TB deaths, while cigarette smokers were at 22 times increased risk.

Conclusion: This study shows that all forms of tobacco use (mainly bidi smoking) and low-BMI have strong joint impact on TB mortality.

PS-95425-07   Diabetes mellitus in MDR-TB in the Philippines

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Background: The prevalence of diabetes mellitus (DM) is 4% in the general population in the Philippines. DM was a significant risk factor for pulmonary tuberculosis as reported in the 2007 nationwide TB prevalence survey.

Aim: To determine the prevalence of DM in MDR-TB patients and study the significant demographic features, treatment history and clinical outcome of MDR-TB patients with DM from those without.

Methods: This is a retrospective study of the cohort of MDR-TB patients treated from 1999 to February 2008. Univariate and multivariate analysis were done to determine the significant characteristics of MDR-TB patients compared to non-diabetics. The treatment outcome in the two groups was compared using χ^2 for trend.

Results: The prevalence of DM was 12.5% of the 1475 MDR-TB patients studied. DM was. 25.6 and 11.8 times more likely in those >50 years and those 30–49 years, respectively, compared to younger patients; 2.1 and 1.9 times more likely in those with >3 and 2 previous treatments than those without

previous treatment. Treatment outcome was available in 820 patients including 88 patients with diabetes. There was no significant difference in treatment outcome in those with and without DM. ($\chi^2 = 3.9$. $P = 0.27$). The data available did not allow for testing the impact of uncontrolled DM on outcome of anti-TB treatment as all patients were provided adequate treatment for DM.
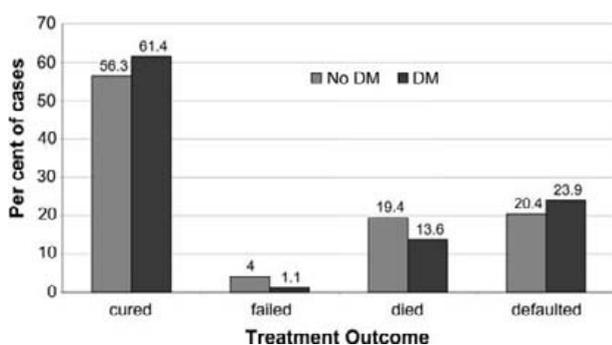
Conclusion: The prevalence of DM was 12.5% in MDR-TB patients and is consistent with the finding that it is a significant risk factor for TB. DM should be ruled out in MDR-TB patients particularly in those >30 years and among those with >2 previous treatments where they are more likely to occur. By doing so, management could be done concurrent to the anti-tuberculosis treatment to prevent any potential adverse effect of uncontrolled DM on anti-tuberculosis treatment outcome.

PS-95479-07 Drug resistance surveillance in Mozambique

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Background: No Drug Resistance Surveillance (DRS) data were available in Mozambique after the last survey conducted in 1998/99 in a sample not fully representative of the country due to accessibility problems in some areas. The MDR-TB prevalence among new cases was 3.4%. In 2007/08 the DRS was performed nationwide according to WHO guidelines to determine the prevalence of drug resistance (DR) in Mozambique and to examine the association between DR and HIV infection.
Design: All Regions were involved. All sputum smear positive consecutive patients diagnosed by the units identified by systematic random sampling underwent culture and Drug Susceptibility Testing (DST) for the first-line drugs. Culture and DST were performed at the National Reference Laboratory (NRL) in Maputo and retested at the SRL, in Milan, Italy. HIV testing was also performed on patients who accepted to be tested. Genotyping analysis was also performed on all retested strains.
Results: Out of 1398 sputum smear positive samples collected, 1199 were culture positive.

DST results are available for 1126 cases: 1100 (97.7%) were New Cases (NC) and 24 (2.1%) Previously Treated Cases (PTC). The prevalence of DR detected is summarized in the Table.

	NC n (%)	PTC n (%)	OR	95%CI
Total tested	1100 (100)	24 (100)		
Fully susceptible	979 (89.0)	18 (75.0)	0.3	0.15–1.00
Monoresistance	66 (6.0)	2 (8.3)	1.4	0.22–5.35
INH	30 (2.7)	0		
RMP	2 (0.2)	2 (8.3)	48.9	4.90–487
SM	34 (3.1)	0		
EMB	0	0		
MDR	38 (3.4)	3 (12.5)	4.0	0.91–12.84
Any resistance	121 (11.0)	6 (25.0)	2.7	0.96–6.73
Any INH	87 (7.9)	4 (16.7)	2.3	0.67–6.6
Any RMP	40 (3.6)	5 (20.8)	6.9	2.21–18.87
Any SM	80 (7.3)	3 (12.5)	1.8	0.42–5.70
Any EMB	15 (1.4)	2 (8.3)	6.5	0.96–27.1

INH = isoniazid; RMP = rifampicin; SM = streptomycin; EMB = ethambutol; MDR = multidrug resistance.

Overall, the prevalence of TB-HIV co-infected patients was 36.4% ranging from 6.7% to 68.4% in the different Regions. HIV positive cases yielded an higher probability to be infected by rifampicin (RMP) resistant strains: any resistance to RMP: OR 2.4 (95% CI 1.18–4.93.); MDR: OR 1.9 (95% CI 0.88–3.98).
Conclusions: The prevalence of drug resistance and MDR-TB detected in a representative sample doesn't appear to be different from that detected in the 1998/99 previous survey. Previous treatment is a definite risk factor for the DR and MDR. The potential association of HIV seropositive status and increased risk of RMP resistance identified by previous studies need to be confirmed. Genotypic analysis showed no recent transmission.

PS-95487-07 Evaluation of the tuberculosis surveillance system, city of Rio de Janeiro, Brazil, 2001–2006

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Introduction: The objective of the tuberculosis (TB) surveillance is to describe cases in the population and direct measure to interrupt transmission. In 2006 the

incidence of TB in Brazil was 38.9/100 000 pop, and in the city of Rio de Janeiro (RJ), 104/100 000 pop.

Objective: To evaluate the TB surveillance system in Rio de Janeiro during 2001–2006.

Methods: We used the CDC Updated Guidelines for Evaluating Public Health Surveillance Systems. We evaluated quantitative and qualitative attributes and utility. We used data of the Brazilian National Notifiable Diseases Reporting System, information collected on-site and self-applied standardized questionnaires from the staff of the RJ municipal TB control program. SINAN standards were used to characterize data completeness.

Results: The database contained 52 428 reports. The system required two instruments for reporting and following cases, with a total of 63 variables. Variable completeness was excellent for the reporting form and fair for the follow-up form. Data are consistent for extrapulmonary and AFB-negative or non-tested cases, and new cases not taking ethambutol. System sensitivity, based on the 10% increment method, was satisfactory, with median = 88%. Representativeness estimated by the detection matrix method showed 96% of cases in persons >15 of age (expected, 95%). In 2006, 74% of cases completed treatment on schedule; 78% of new cases began treatment on the day of diagnosis; cure rate was 55% and abandonment rate was 12%.

Conclusions: The surveillance system is useful. The system-recommended method for sensitivity calculation may not reflect the reality of the surveilled population. Complexity, incompleteness of follow-up data and suboptimal timeliness are challenges to surveillance and control in this high incidence large metropolitan area. Monitoring and evaluation of the surveillance system should be undertaken routinely to enhance impact on TB control in RJ.

PS-95522-07 Phenotypic and genotypic resistance in *M. tuberculosis* in Mali

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Background: Tuberculosis, one of the emerging diseases in the era of HIV/AIDS, is a major public health problem in developing countries. Diagnosis and treatment remain difficult due to lack of infrastructure and skilled personnel. Furthermore, the spread of drug-resistant *Mycobacterium tuberculosis* is a threat to the control strategies in place in developing countries.

Aim:
- To evaluate the drug resistance profile of *M. tuberculosis* with regards to streptomycin, ethambutol, isoniazid and rifampin in the city of Bamako (Mali) during one year period using MGIT 960.
- To examine the genetic polymorphism in genes associated with resistance to streptomycin, ethambutol, isoniazid and rifampin by nucleotide sequencing.

Method: Five thousand specimens were collected during a one year period in 6 referral health centers in the District of Bamako (Mali). Positive and negative sputum obtained after microscopy will be processed by the MGIT 960 (Becton Dickinson). Polymerase Chain Reaction and nucleotide sequencing were performed on positive cultures after incubation with streptomycin, isoniazid, ethambutol and rifampin.

Results: This study allowed to determine the level of resistance to tuberculosis drugs in the District of Bamako and to propose a new therapeutic scheme. The study also uncovered other (new) point mutations that are associated with resistance to tuberculosis drugs used in Mali.

Conclusion: Prevalence of drug-resistant *M. tuberculosis* has not yet been studied at a large scale in Mali. Results of this study allowed adjustment of the tuberculosis therapeutic regimen.

PS-95556-07 Missed opportunities for tuberculosis diagnosis among patients attending an emergency unit in Brazil

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Background: Chronic cough is often the presenting symptom of patients with tuberculosis (TB) and other prevalent respiratory diseases. It is reported that the prevalence of prolonged cough in the Brazilian general population is 1% and up to 4–5% among patients seeking for medical help for any reason. This prevalence is used for estimating the number of expected new cases of TB in specific regions.

Objective: To estimate the prevalence of chronic cough (>3 weeks) among patients attending non-hospital emergencies and outpatient clinics and to analyze their final diagnosis.

Setting: One emergencies medium-complexity clinic in Curitiba, a city with 1 800 000 inhabitants in the South of Brazil, with a temperate climate and a high prevalence of allergic respiratory diseases.

Methods: Patients attending the unit in December 2008 (summer) were invited to answer a questionnaire

applied by previously trained medical students, regardless of the reason for medical consultation.

Results: Among 215 interviewed patients, 35 (16%) presented cough, of whom 17 (8%) had cough for more than 3 weeks. Out of 17 patients with chronic cough, 11 (65%) sought for the clinic for another reason; 9 (53%) were smokers, 3 (8%) ex-smokers, 2 (12%) had a history of respiratory allergy and 2 (12%) had COPD. Among those with chronic cough, the final diagnoses is displayed in the table below. TB was suspected in only one patient. Although all were referred to primary care clinics as part of this investigation project for exclusion of possible TB, none did so.

Final diagnoses	N	%
Viral infection	5	29
Osteoarticular diseases	5	29
Gastrointestinal symptoms	3	18
Asthma	1	6
Cranioencephalic trauma	1	6

Conclusion: Chronic cough was more prevalent than expected among patients attending an emergency unit. Training of nurses and physicians for TB suspicion is important because patients with other symptoms/diseases may present chronic cough. More importantly, medium-complexity units should be equipped with supplies to collec sputum for AFB analysis on-site, in order not to miss TB diagnosis opportunities.

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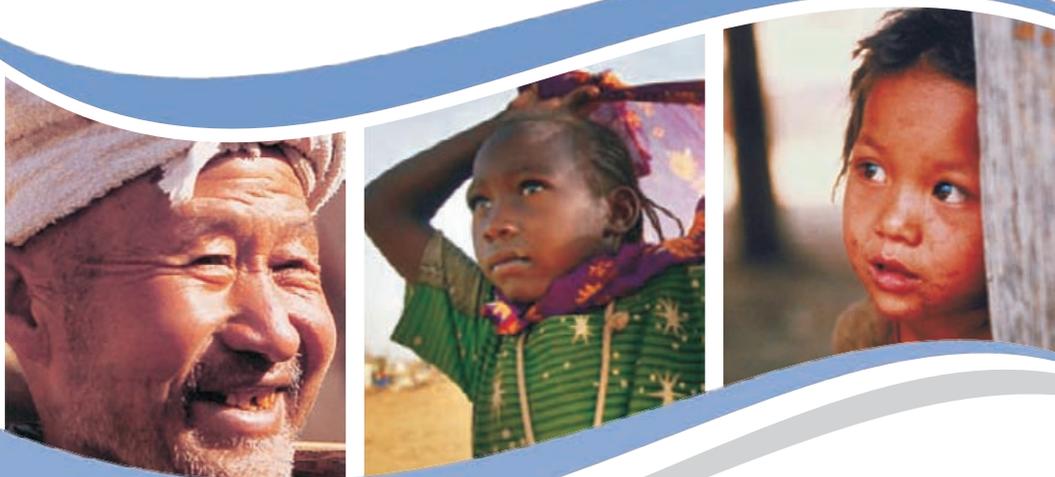
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1. World Health Organization. The use of liquid medium for culture and DST.
   WHO <http://www.who.int/tb/dots/laboratory/policy/en/index3.html>