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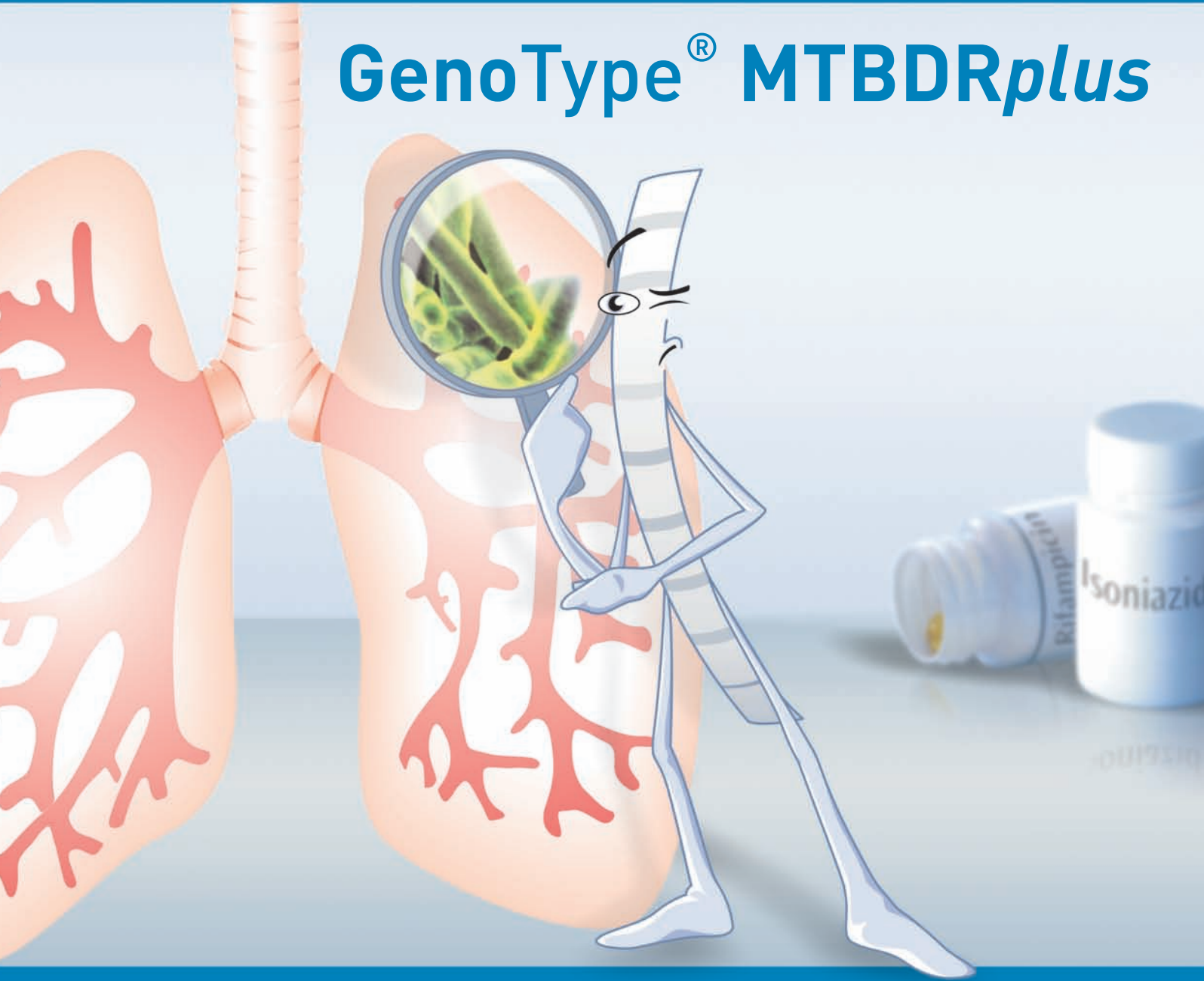
ABSTRACT BOOK

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The International Journal of Tuberculosis and Lung Disease

SUPPLEMENT

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PLENARY SESSIONS

SATURDAY, 18 OCTOBER

Health systems and human resources: contribution of the Global Fund to Fight AIDS, TB and Malaria

R Atun. Global Fund to Fight AIDS, TB and Malaria.

Established in 2001, the Global Fund has quickly become a major driving force in the global fight against HIV, TB and malaria. As of June 2008, the Global Fund has committed US\$10.7 billion to support over 550 programs in 136 countries. Almost US\$6 billion have been disbursed, with distribution of 58 million impregnated bed nets, access to high quality TB control for almost 4 million people and provision of ARVs for 1.75 million people living with HIV. Improved health is not just a consequence of development: it is also a prerequisite. Supporting programs that address the three diseases in ways that strengthen public, private and community health systems is critical to achieving this goal. In 2007, the Global Fund Board reaffirmed the Fund's strategic approach of 'investing in activities to help health systems overcome constraints to the achievement of improved outcomes in reducing the burden of HIV/AIDS, TB and malaria', and approved policies to broaden the scope of Global Fund support to health system strengthening. To date, an estimated 35% of Global Fund resources have been used to strengthen health systems that have benefited from direct funding of health systems components, positive externalities of support provided to disease targeted programs for the whole health systems, and reduction in the burden of major diseases—which by reducing the workload for health workers for TB, HIV and malaria releases the capacity to manage other conditions. The Global Fund has supported the development of human resources in partner countries to strengthen health systems. To date, 6 million health workers have been trained in Global Fund supported programs to address the lack of skilled health workers and augment existing capacity. In some countries, the Global Fund has helped fund recurrent costs of worker salaries, ensuring predictable financing and thereby enhancing recruitment and retention of the health workforce. By investing in health infrastructure, new technologies and pharmaceuticals, the Global Fund has supported country initiatives to create favorable work environments for health staff. The

Global Fund recognizes the centrality of human resources for health systems strengthening and will continue to support countries to address this major bottleneck to achieve global targets for HIV, TB and malaria control.

SUNDAY, 19 OCTOBER

Addressing HIV-TB and health systems strengthening in the context of universal access

M R Dybul. US Office of the Global AIDS Coordinator, Washington, DC, USA.

More than 25 million of the estimated 33 million people living with HIV/AIDS live in resource-limited areas characterized by weak and under-staffed health systems. HIV/AIDS places a growing strain on the already limited capacity of health care systems and workers in these countries. The challenges posed by the HIV/AIDS pandemic are compounded by the struggle to acquire the capacity, knowledge and skills to deliver prevention, treatment and care to people infected with and affected by HIV/AIDS. The link between HIV and TB is a grave threat, but it also provides new opportunities. Over the past few years, massive investments in international health programs represent a new era in development, one characterized by partnerships. These partnerships are enabling us, for the first time in history, to build the infrastructure we need to care for chronic disease, and we must make sure that chronic care infrastructure built for HIV is used to respond to TB and other diseases. How this is executed will vary significantly by country and needs to be adapted to realities on the ground. Whatever the modality, it is important to delineate the critical responsibilities for both TB and HIV programs in responding to the co-epidemics. Barriers to collaborative HIV and TB activities have too often resulted in inaction. This is unacceptable as governments and international partners continue scale-up to universal access. Key interventions include: support for policy reform to promote task-shifting from physicians and nurses to community health workers; development of information systems; human resources assessments; training support for health workers, including community health workers; retention strategies; and twinning partnerships. These health systems strengthening strategies are critical tools for the expansion of HIV-TB activities such as TB screening of clients attending HIV services, TB infection control and isoniazid preventive therapy.

SYMPOSIA: SATURDAY 18 OCTOBER 2008

NEW DIAGNOSTIC STRATEGIES: IMPACT ON CLINICAL MANAGEMENT

What is entailed in the implementation of LED fluorescent microscopy in disease-endemic countries?

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LED fluorescence microscopy (FM) holds great promise for case detection in low-income settings because of the far more suitable type of lamps (extremely long-lived, no ultra-violet radiation, low power consumption suitable for battery use). User non-acceptance has been the main obstacle to decentralisation of FM in the past, and this may now be resolved for at least one of the commercialised modules using transmitted excitation light. Its performance was comparable to mercury vapour lamp (HBO) FM in Bangkok and Benin reference laboratories. The same modules led to 20% proportionally increased detection and enthusiastic, continued use in Dar es Salaam health centres, where HBO FM introduction had failed earlier. Besides the considerably improved smear-positive TB detection, FM offers further attractive advantages. Immersion oil, xylene and thus damage to objectives can be avoided; auramine dye has a uniform composition, contrary to basic fuchsin (BF), and is thus more straightforward in its use. At one tenth of the optimal BF concentration, it is cheaper to use. However, good decolourisation needs large amounts of acid alcohol, which may cause logistic problems. Other questions need to be answered before widespread introduction of FM in low-income countries can be undertaken. Training takes longer before experience in differentiating artefacts is acquired; internal quality control needs to be more strict; the best background staining needs to be determined for epi- versus transmitted fluorescence; new guidelines for mass use need to be made, i.e., concerning shelf life of auramine solution, confirmation of doubtful positives, quantification scale for different magnifications, and an appropriate rechecking system.

Rationale of using molecular methods in diagnosing MDR- and XDR-TB cases and their impact in disease control

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Conventional methods for isolation, identification, and drug susceptibility testing of *Mycobacterium tubercu-*

losis bacteria are slow and technically difficult. It may take 3 months or longer to obtain drug susceptibility results. During this delay, patients may continue to be infectious and may be on inappropriate regimens which can amplify drug resistance. The impact of this delay is greater for patients with MDR-TB and XDR-TB as well as for persons co-infected with HIV and TB. Indeed, there are many reports of HIV-TB patients dying before the results of drug susceptibility tests became available. A variety of rapid molecular methods have been developed for the identification of strains resistant to rifampin and isoniazid, such as molecular beacons, DNA arrays, and line probe hybridization assays. Two commercially available line probe assays have been evaluated in high-resource and low-resource settings; display excellent sensitivity, specificity, and accuracy; and show great promise for detecting drug-resistant *M. tuberculosis* bacteria directly from sputum specimens within 1 to 2 days of specimen collection. These assays will allow earlier laboratory confirmation of TB and of drug-resistant TB, which should lead to earlier initiation of appropriate treatment, better patient care and outcomes, greater opportunities to interrupt transmission, and improved public health interventions.

TB diagnostic technologies: towards closing the gaps

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Microscopy is still the backbone and benchmark of laboratory diagnostics in TB, but it is well recognized that better technical approaches are urgently needed to overcome limitations in test sensitivity, time to result and ease of use. The ultimate alternative products are expected to provide rapid testing in primary care settings. To this end a number of opportunities are being followed up, ranging from identification of novel biomarkers for various stages of disease to the development of enabling technologies suited for implementation in the different sectors of the health care system in developing countries, i.e., from the reference laboratory down to the health post in rural areas where the biggest gaps exist. It has become widely accepted that resolution of open issues in TB diagnostics can only be achieved by systematic and novel research approaches. Among these are the seroprofiling of the whole *M. tuberculosis* proteome using antigen arrays, discovery of marker molecules in sputum and urine employing most advanced mass spectrometry, and the development of biochemical labelling systems now providing unprecedented sensitivity increase in point-of-care immunoassays. Rapid molecular TB assays are also in the advanced pipeline. The recent introduction and WHO endorsement of technologies such as liquid culture, rapid speciation and molecular DST

demonstrate that our current approaches are effective and already show their impact. However, it is also clear that those achievements—all based on private-public-partnerships—were only made possible by implementing a strong industry-type quality and project management system as an ultimate prerequisite for successful product development. Using available, leading edge tools in biomarker discovery, detection technology and project management, we are now in a good position to further narrow and even close current gaps in TB diagnostics.

CHEST RADIOGRAPHY IN THE DIAGNOSIS OF TUBERCULOSIS AND OTHER LUNG DISEASES FOR CLINICAL AND EPIDEMIOLOGICAL PURPOSES

Quality assurance of chest radiography

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Chest radiography (X-ray) is very widely used in TB screening and diagnosis in both clinical and study settings. However, the quality of X-ray examinations is often questionable, and most TB program managers recognise the problem of quality as well as the inadequate capacity of X-ray diagnosis. However, because X-ray facilities are usually provided through general health services and chest X-ray is not given due importance in public sector TB services, few TB programmes have tackled issues related to quality of X-rays. This is in clear contrast with the decades of efforts to establish quality assurance system on laboratory services for smear microscopy. However, with the implementation of the Stop TB strategy, which aims to provide quality care to all TB patients—sputum smear-positive as well as negative—chest X-ray examination is becoming an essential early step in the TB diagnostic algorithm. As TB care provision expands through decentralised and integrated services, assisting radiographers and technicians working in small or medium-sized district hospitals where resources are often limited has become critical to optimise and improve diagnostic imaging. TB programmes have the potential to contribute to strengthening certain aspects of general health service. The current situations will be reviewed in comparison with bacteriological examinations. Recent attempts to improve the quality of X ray, including training, quality assurance workbooks, and introduction of a scoring system, will be discussed. Utilisation of a handbook being developed by TBCAP and introduction of equipment such as auto processors and digital systems will also be discussed in the session.

CRRS: a training course on recording chest radiographs

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Objective: The interpretation of chest radiographs is highly dependent on the reader. For more reliable reproducible results in epidemiological surveys, the Chest Radiograph Reading and Recording System (CRRS) was developed.

Methods: The CRRS system incorporates a 3-day intensive radiology training course with experts in the radiology of tuberculosis and other lung, disease followed by an end of course validation examination. This provides the necessary training to read chest radiographs in a systematically recordable fashion according to the CRRS system.

Results: The course aims to train investigators to produce high quality recordings of radiographs for epidemiological surveys. The course also informs on the best technical methods available to conduct radiographic surveys in a wide range of settings.

HIV CARE AND TREATMENT: SCALE-UP LESSONS FOR HEALTH SYSTEMS STRENGTHENING

Task shifting to scale up ART

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Background: In 2006, the World Health Organization (WHO) reported a severe shortage of health care workers in 36 sub-Saharan African countries and in other non African countries. Task shifting has been proven as one strategy to effectively scale up ART. In concert with this effort, WHO commissioned a study that aimed to determine the extent to which tasks traditionally performed by doctors and nurses were shifted to non-doctor cadres to evaluate their clinical outcomes and to determine the acceptability of this model to staff and to people living with HIV. Two sister-affiliates of Partners In Health, a non profit organization, were involved in this study: Zanmi Lasante (ZL) in Haiti and Inshuti Mu Buzima (IMB) in Rwanda.

Methods: A mixed of qualitative and quantitative methods to perform a cross-sectional observational study in five ZL sites in Haiti and two IMB sites in Rwanda were used. A list of tasks performed in HIV care developed by WHO was field-tested and adapted during focus groups. A mapping exercise was conducted in two clinics in rural Eastern Rwanda and three in Central Haiti.

Findings: Nurses performed 92% of the 139 HIV-related clinical tasks at ZL. CHW contributed to over half of those tasks. Non-clinician cadres identified tasks that they would be willing to take on. At ZL, 12-month survival of patients ever started on ART was reported as 90% and more. The programs showed extremely low rates of default, at less than 5% at 24 months. Analysis of qualitative interviews revealed that task-shifting was acceptable to staff and clients at all sites.

Conclusion: Task-shifting exists as a successful model for the scale-up of HIV care in Haiti and Rwanda with good outcomes and low rates of default. Where human resources for health are limited, task-shifting from doctors to nurses and CHWs may be undertaken as a strategy for rationally distributing human resources and strengthening the overall health systems.

PPP for integrated laboratory services strengthening

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Background: The 15 focus countries supported through the President's Emergency Plan for AIDS Relief (PEPFAR) are home to half of the world's estimated 33 million HIV-positive people and 90% of TB patients co-infected with HIV. Because of the expanding needs for quality laboratory services in the severely affected countries, it is critical to establish effective public-private partnerships (PPP). These arrangements greatly enhance local and international capacity to deliver quality laboratory services through a coordinated and standardized approach.

Issues: Successfully addressing the challenges faced in strengthening laboratory services (Infrastructure; Human resources; Training; Quality Management; Supply Chain Management) requires the development of national strategic plans for tiered laboratory systems led by strong country leadership and implemented by multiple partners. CDC/PEPFAR has prepared guidance documents for national strategic planning that provide a roadmap for establishing integrated laboratory networks. Engagement of the private sector plays a critical role in supporting this endeavor.

Action steps: CDC/PEPFAR has moved forward in establishing key PPPs that impact laboratory strengthening. PEPFAR and Becton, Dickinson (BD) have established an \$18 M (USD) partnership for work in several countries to support laboratory strengthening tailored to the individual country, including provision of short- and long-term technical assistance. Also, a country-specific PPP has been developed between the Tanzania MOHSW, the Abbott Fund, CDC-Tanzania, APhL and CUH2A. This partnership has already resulted in significant modernization of two national

hospital laboratories with work continuing on upgrading 23 regional laboratories throughout Tanzania. **Conclusions:** Current activities have demonstrated that well-coordinated partnerships, with clearly defined participant roles greatly enhance successful implementation of complex laboratory strengthening projects.

'THATs IT' integrated TB-HIV care: bridging programmes, strengthening systems

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The 'That's it' project (short for TB, HIV, Aids, Treatment, Support and Integrated Therapy) aims at expanding the delivery of ART for TB patients in South Africa using lessons learnt from a best-practice model developed by the Medical Research Council and partners in a rural TB hospital in KwaZulu-Natal. The integration of TB and HIV services, despite integration at policy level, remains a challenge operationally at facility level. TB services are rendered at primary care outlets, and HIV services are provided more centrally in South Africa. At least 60% of all TB patients are co-infected with the HIV virus, which alters the course of the disease. TB is often associated with the terminal stages of HIV infection. Health systems are challenged to scale up activities to ensure early diagnosis of TB, increase counseling and testing activities, to implement regular TB screening for HIV positive patients, to improve clinical care including prevention, prophylaxis and treatment with anti-retrovirals and improve systems relating to infection control. The aim of the That's it project is to identify and address all these challenges in resource-limited settings in four provinces in rural South Africa. The project's activities include laboratory, logistics, infrastructure, HR and referral linkages as well as training. Through the implementation of unique community outreach programmes and positive branding, it aims to educate communities and destigmatise the dual epidemic. Departmental TB programme indicators have shown considerable improvement through this collaborative support programme and 'one-stop' shop initiative. Apart from targeting health services outlets the programme targets schools, businesses, community organizations and family members.

A rising tide: strengthening the HIV/AIDS supply chain benefits essential health commodities

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Objective: Created under PEPFAR, SCMS procures essential medicines and supplies at affordable prices,

helps strengthen and build reliable, secure and sustainable supply chains, and fosters collaboration among key stakeholders. Although dedicated to supporting HIV/AIDS programs and services, achievements to date have had a positive effect on other public health supply chains.

Results: SCMS strengthens existing systems to avoid duplication. In Guyana, SCMS supports the Ministry of Health managing the procurement and distribution of all public sector and donated health commodities. In Rwanda, SCMS works with the central medical store (CAMERWA) that manages more than 800 essential health products. In both cases, efforts to consolidate the HIV/AIDS supply chain have benefited the full range of health products managed in these national structures and supported their sustainability. SCMS helped improve processes and systems and built staff capacity. Tangible results were reported, including greater efficiency and speed in handling and distribution of commodities, improved inventory control, and increased storage capacity. In Mozambique, individual organizations previously procured and held their own buffer stocks, creating inefficiency in the national system. The US Government consolidated procurement of all ARVs purchased by PEPFAR through SCMS. Increased collaboration fostered a centralized system with national buffer stock, resulting in few to no stockouts. The ARV program is now being expanded to rapid test kits, OIs, STIs and other essential drugs.

Conclusion: These examples illustrate how intervention specific to HIV/AIDS can 'raise all boats' in health systems. Further efforts must be made to leverage interventions and share best practices and lessons learned to benefit all health commodities.

THE BACKBONE OF STRENGTHENING THE DISTRICT HEALTH SYSTEM: CLINICAL MENTORING

Experience in clinical mentoring

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In its traditional sense, clinical mentorship describes an ongoing relationship between two providers, one senior and one junior, and elaborates on both the interpersonal as well as professional aspects of this relationship. The International Center for AIDS Care and Treatment Programs (ICAP) has broadened this concept into one that speaks to growth and transformation of not only individual providers, but also teams of providers, as well as health care systems. This reconceptualized framework is called Clinical Systems Mentorship (CSM); it focuses on enhancing quality of

care and building capacity in resource limited settings. This presentation will discuss how implementing CSM on the platform of HIV-TB care and treatment activities can globally strengthen health systems through skills transfer and attentive, focused follow-up. The range of activities included in CSM with special attention to development of the District Health Team, will be described. Specific skill sets, and strategies for their transfer and follow-up, as well as examples of CSM implementation and lessons learned, will be presented.

Clinical mentoring in the Eastern Cape

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I-TECH began a technical support and clinical mentoring engagement with the Eastern Cape Province of South Africa (SA) in 2004, prior to the public sector antiretroviral therapy (ART) rollout. Few clinicians in the public sector had experience managing patients on ART. Following an initial phase of didactic training, it became clear that physicians at district hospitals were in urgent need of advanced mentoring in clinical decision making skills regarding management of opportunistic infections and complicated immune reconstitution syndromes, drug toxicities, and interactions. We hypothesized that the early excessive mortality after ART initiation reported in resource poor countries could be in part attenuated by supporting care providers at district hospitals. The effort is two pronged: 1) to intensively mentor a few local key clinicians to support long-term sustainability; and 2) to provide less intensive on site clinical mentoring at numerous care sites throughout the Province supplemented by ongoing support via email and phone consultations. Because clinical mentors travel throughout the Province, they have a unique opportunity to document system of care and infrastructure challenges that government may not be aware of. A number of mentoring and assessment tools have been developed including a growing clinical case library (<http://www.ucsditech.org/>) suitable for small group and individual trainings, a clinical decision making assessment tool, a qualitative clinical site assessment form, and a telemedicine program requiring no more than internet access. The program evaluation model emphasizes: 1) quantitative assessment of clinical knowledge and decision making skills through mentee performance on structured clinical scenarios; and 2) qualitative assessment of health systems integrity through multidimensional assessments by mentors.

IMAI mentoring in India

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Issue: The WHO Integrated Management of Adults and Adolescent Illness (IMAI) approach was pilot tested in two high prevalence districts of Karur, Tamil Nadu and Davangere, Karnataka. 159 doctors and 448 paramedical staff were trained with the IMAI approach. Post-training mentoring visits were made to one-third of the total district healthcare facilities.

Description: The mentoring team comprised a senior clinician, nurse or counselor and district administration officer. Individual, group and team mentoring occurred at each visit focusing on core competencies to improve provision of essential care for HIV. Team mentoring consisted of facilitating problem solving and finding local solutions, while the administrative officer looked into other administrative and supply issues. Short-term goals were assigned to the team to complete for the next mentoring visit.

Lessons learned: A variety of technical and administrative issues limits the practice of knowledge and skills learnt during training. Mentoring visits reinforce technical learnings, and support iterative improvement of skills acquired. Use of the local district administrative officers as mentors improves the feedback to programme managers while enabling on-site problem solving. Examples of local troubleshooting include ensuring availability of occupational safety equipment, drugs and supplies.

Next steps: To ensure sustainability of mentoring, local district clinicians will be trained to become mentors. Apart from mentoring visits, these mentors will be conducting CMEs during the monthly review meeting of health care providers in District Collectorate.

Clinical mentoring and TB-HIV in Zambia

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Background: Zambia is undergoing rapid scale-up of HIV care and treatment. From 2004 through early 2008, more than 156 000 adults and children initiated HIV treatment. Zambia's capital city, Lusaka, reports over 16 000 TB patients annually, approximately 70% of whom are HIV-infected. Progress in integrating TB and HIV services have been made despite significant health care worker shortages. Lusaka health district has used task shifting, primarily with clinical officers (non-physician clinicians) as one way to increase access to HIV care and treatment, but this ap-

proach requires careful mentoring to ensure continued high quality patient care.

Objective: To set up a TB and HIV clinical mentoring and evaluation system for clinical officers in Lusaka, Zambia.

Methods: Two Lusaka health centers were selected for intensive clinical mentoring in TB-HIV care. In addition to a standard TB-HIV training package provided to all Lusaka health centers, these centers received twice-weekly supportive supervision using one-on-one mentoring, review of patient files, and clinical staff meetings. In addition, clinicians were trained to use TB diagnostic worksheets and TB referral forms to standardize diagnostic work-ups and enhance communication between TB and HIV care programs.

Results: Close mentoring resulted in standardization of TB diagnosis and management. Program monitoring through file review provided feedback on program efficacy.

Lessons learned: Clinic staff turn-over required re-training and mentoring of new staff. Frequent follow-up to ensure that practices were followed was vital. Clinical mentors were often diverted from mentoring activities due to high demand to provide patient care.

DO OR DIE: MDR-TB AND HEALTH SYSTEMS STRENGTHENING

Results from pilots of the new MDR-/XDR-TB country assessment tool

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Background: MDR-/XDR-TB represent a global threat to TB control. No standard tool is available to help countries to develop national strategies to control MDR/XDR-TB and prepare GLC /GFATM applications to address drug resistance.

Methods: An MDR/XDR-TB country assessment tool has been designed in collaboration with WHO/ Stop TB Partnership taking into account existing guidance on the management of MDR-/XDR-TB (WHO guidelines, GLC/GFATM application instructions). The tool has been developed for evaluating capacity to prevent, diagnose, and treat MDR-/XDR-TB, with several purposes: 1) preparing national/sub-national plans; 2) providing baseline information; 3) preparing GLC/GFATM applications; 4) guiding requests for technical assistance; and 5) guiding donor investment in MDR-/XDR-TB interventions. A weighted scoring system is used to help quantify the gaps within each area of TB control.

Results: The tool has been created to help countries answer questions related to their capacity to: 1) prevent MDR-/XDR-TB through a strong DOTS programme; 2) diagnose and treat people with drug-resistant TB to identify gaps and fill them through an adequate action plan. The tool uses the elements of the Stop TB Strategy to collect data on potential contributing factors to weaknesses identified, to prioritize and tackle them. The tool has been pre-tested in Ukraine and will be tested in Tanzania too.

Conclusions: A standardized assessment tool is needed to support the global effort to prevent and contain MDR-/XDR-TB and is useful at national/sub-national levels to develop specific elements of an MDR-/XDR-TB control strategy. The eventual goal is to incorporate the tool into national TB programme assessments.

Extremely drug-resistant TB in South Africa: challenges facing health care workers

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Calls have been made for the enforced detention of patients with extensively drug-resistant tuberculosis (XDR-TB), leading to ethical and legal dilemmas. A careful balance needs to be struck between community rights and human rights of the individual patients, taking constitutional rights such as dignity, equality and freedom into account. Experts have also informed the Department that a return to the use of capreomycin and para-amino salicylic acid needs to be done carefully, given that they are toxic. If patients default on these drugs and the bacilli become resistant, no other drugs would be available to treat pan-resistant TB. This implies that it may be necessary to hospitalize patients diagnosed with XDR-TB for a period of 24 months. The Western Cape Province, of South Africa, with TB incidence rates of 1000/100 000, are amongst the highest in South Africa, and register some 800 new multidrug-resistant (MDR-TB) patients annually. HIV-TB co-infection rates are variable but as high as 70% in some areas of Cape Town. Between November 2006 and January 2008, 81 patients were notified with XDR-TB, including 2 children. There are many challenges to be faced when hospitalising XDR-TB patients for extended periods of time not to mention those challenges faced when patients refuse hospitalisation or abscond from the facility.

STRENGTHENING HEALTH SYSTEMS THROUGH TB PROGRAMMES: LESSONS LEARNT FROM THE FIELD

Health system challenges to TB control: health financing and the primary care systems

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It is widely understood that TB control relies on the entire health system. This presentation provides examples to illustrate how health system factors challenges TB care and how the health system approach can benefit the interventions of TB services. China is taken as an example because it is the No 2 high burden country under profound social and health reforms. A number of health system issues are highlighted, including health financing, primary health care, human resources and health sector reforms. Original research evidence on TB case management, decentralisation, financial incentives, rural-to-urban migrants, and national TB policy evaluation will be discussed in a health system framework. Research evidence includes 1) how the privatisation and marketisation reform of primary health care weakened China's primary health care system and affected patient access and case management at community levels; 2) how the revenue-driven operational style of public hospitals and TB dispensaries financially limited migrant TB patients' access to TB care despite the free treatment policy and hospital referral policies; and 3) why providing financial incentives to TB patients and providers did not improve the access to TB care. Recommendations will be provided on how to take account health system considerations in TB programme intervention and research activities.

Co-presented with Qiang Sun.

Linking public hospitals with the TB control system in China

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Settings: Currently the major PPM DOTS policy is strengthening the reporting and referring TB cases/suspects from general hospitals and tracing reported TB cases/suspects by TB dispensaries based on the Internet Based Communicable Diseases Reporting System (IBCDRS) launched in 2004.

Objective: To evaluate the implementation progress and adding value of case finding of this PPM DOTS policy in China.

Method: To analyse the data from monthly reports reported from all TB dispensaries focus on collecting

information of TB cases/suspects reported by general hospitals, traced and verified TB cases/suspects by TB dispensaries.

Results: As shown in the table, the number of TB cases/suspects reported from general hospitals and the arrival rates has been increased significantly year by year. The case finding contribution of this policy has been increased from 18.3% to 34%.

Conclusion: The collaboration between the general hospital and TB dispensary through implementing this policy is significant and obviously effective on increasing case finding. However, the overall arrival rate of TB cases/suspects is 76.8%, which tell us that there is potential to improve the reporting, referring and tracing approaches for increasing case finding and accessibility of DOTS service among the TB cases/suspects detected in general hospitals.

Year	Active TB cases registered in NTP System	SS+ TB cases registered in NTP System	Reported TB cases/suspects from general hospital	Arrived TB cases/suspects reported by general hospital (%)	Confirmed active TB cases and its contribution to NTP's CDR (%)	Confirmed SS+ TB cases and its contribution to NTP's CDR (%)
2004	791 779	442 241	464 385	273 582 (58.9)	156 493 (19.7)	81 038 (18.3)
2005	948 591	563 871	681 507	434 219 (63.7)	243 688 (25.7)	127 488 (22.6)
2006	974 678	548 185	812 806	575 898 (70.9)	325 426 (33.4)	160 154 (29.2)
2007	1 012 355	537 060	923 506	709 497 (76.8)	384 993 (38.0)	182 429 (34.0)

Models of linking private providers with the TB control system (PPM) in South Asian countries

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Background: Bangladesh is committed to engaging all providers in TB control. The NTP, three NGOs and the University of Leeds jointly developed a public-private partnership (PPP) model to link Private Medical Practitioners (PMPs) with urban TB control in Bangladesh. The implementation of the PPP has been on-going since 2003.

Aim: To develop and assess a PPP model for linking PMPs to the National TB Control Programme (NTP).

Methods: Action research. Data were collected from 4 sites in Dhaka, 3 in Chittagong and 2 in Sylhet.

Results: Systematic implementation has led to effective involvement of PMPs, achieving increased case detection. In the study areas, case finding has almost doubled: the treatment success rate has exceeded 90%.

Conclusions: There is considerable potential for developing partnerships between the NTP and PMPs in confronting challenges of TB care in Bangladesh.

PATIENT AND PROVIDER EDUCATION: SUCCESSFUL MODELS FOR STRENGTHENING TB PROGRAMMES AND PUBLIC HEALTH SYSTEMS

Contact tracing training in the South Pacific

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Pacific islands discussed in this presentation refer to 20 Pacific island countries and territories (PICT) with a total population of just over 3 million people. The overall TB rate increased from 49 to 53 per 100 000 population between 2000 and 2006 with TB rates varying widely between countries from less than 10 per 100 000 in Cook Islands (~15 000 pop) to 400 per 100 000 in Kiribati (~93 000 pop). More than 30% of TB cases are found in the age group 0–24 years suggesting ongoing active transmission in the community. PICTs endorsed and implemented DOTS strategy in 2000 and achieved over 85% treatment success rate and 70% case detection rate in 2005. Despite good performance, active transmission of the disease continues to increase. To date, no formal contact investigation has been performed in any country and there are no standard treatment protocols on INH prophylaxis. Given the increasing incidence of TB in children in the island communities and the lack of a standardized approach to contact investigation, a well designed approach was recommended beyond DOTS in selected countries where DOTS programs are well established and where resources are available. In October 2007, a pilot training course was conducted to teach contact investigation skills to participants from 10 Pacific island countries. Participants who attended the course helped establish guidelines and recommendations for the region. Course evaluations indicated participants gained knowledge and skills that could help them implement contact investigation. This course could be taught in other resource limited regions to implement contact investigation.

Integration of HIV and TB services and training tools: practical applications from South Africa (iTEACH)

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The South African (SA) province of KZN has one of the highest rates of HIV-TB co-infection worldwide. In May 2004, SA began providing antiretroviral (ARV) therapy within the public sector, in parallel to an existing National TB Programme with historically low

TB treatment success rates. In 2005, the Integration of TB in Education and Care for HIV/AIDS (iTEACH) Programme was launched at a government hospital in KZN to identify barriers to effective HIV and TB services and to develop interventions to expand antiretroviral (ARV) access and improved TB outcomes. Identified challenges included limited knowledge of TB guidelines amongst doctors, low TB bacteriologic coverage (35%), slow turnaround times (5d) for TB sputum smears, HIV counselors without TB training and low rates of inpatient HIV testing. Additionally, there was no inpatient ARV programme or referral system to the outpatient ARV clinic despite $\geq 50\%$ of medical patient having AIDS defining illnesses. In April 2007, iTEACH introduced the 'TB Warrior Programme', using 2 former HIV lay counselors to work directly with the medical housestaff, lab and patients. Every day the warriors obtain a list of TB suspects from doctors, hand carry sputum specimens to the lab, retrieve lab results and deliver them back to the bedside. They provide patient TB education, HIV counselling and testing (VCT) to all TB suspects and assist in tracing of patients post-discharge whose culture results confirm MDR or XDR-TB. Since introducing the programme, turnaround time for TB smear results has decreased from 5 days to half a day, and bacteriological coverage has increased from $\sim 35\%$ to $>90\%$. In July 2007 the 'Inpatient ARV Warrior Programme' was introduced to fast-track ARV initiation for inpatients with advanced AIDS who would not live to access drugs through the existing outpatient ARV program. To date, 137 patients have been screened; 98 patients have started ARVs (mean CD4 47), with average mortality rate of 37%.

Developing patient education materials for MDR-/XDR-TB patients in Tugela Ferry, South Africa

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Background: As part of a community-based MDR-TB treatment program in Tugela Ferry, South Africa a needs assessment determined that education materials were needed to assist with a number of patient management related issues including general MDR-TB knowledge, drug regimens, DOT, and follow-up laboratory exams. Rather than create new MDR-TB patient education materials, project officers decided to adapt existing materials that were developed in Peru for patient education purposes.

Methods: A systematic process was used to create the new materials including a needs assessment, test existing messages and images, validate changes made to the materials, and field test the final products. Changes included language, different messages depending on program conditions, image selection in some cases.

Results: A patient education flipbook was produced with limited resources that was understood and widely accepted by MDR-TB patients in South Africa by adapting existing materials. Additional materials with HIV-TB messages are also contemplated.

Conclusions: With limited resources, patient education material can be adapted to a wide variety of MDR-TB settings to better inform patients on different aspects of MDR-TB treatment and management. Using a systematic process to adapt materials is essential to ensure acceptance of such projects.

Effective distance-based learning activities to improve TB and HIV training in Namibia

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Background: One of the key challenges facing HIV and TB programs in Namibia is ensuring that in-service training reaches all health care workers, even those located in remote facilities. The vast geographical distances and limited number of HIV specialists in the country mean that standard workshop-style or on-location training is expensive and/or impractical.

Intervention: Digital Video Conferencing (DVC) and Internet Based Clinical Seminars are live, interactive training tools that bridge time and distance, and reduce costs of training. International Training and Education Center on HIV (I-TECH)-Namibia, working with the Ministry of Health and Social Services and the US Center for Disease Control and Prevention launched a DVC program in 2006. It currently links health workers in 11 sites in 9 of the 13 regions of Namibia. A 'bridge' allows simultaneous connection of up to 12 sites, enabling participants from different parts of the country to share their experiences and insights with each other. In 2007, 97 sessions were held with 4086 participants. Sessions included clinical case conferences, dissemination of National TB and HIV management guidelines, PowerPoint presentations on relevant topics, supportive supervision of clinical staff, and video viewings with discussions during the annual HIV DVC film festival. Internet Based Clinical Seminars are broadcast from I-TECH headquarters at the University of Washington in Seattle. They allow HIV and TB experts to present simultaneously to clinicians in 19 countries in Africa, the Caribbean and India twice per month. The technology allows participants in remote sites to hear live lectures and to utilise a computer keyboard to ask real-time questions and make comments. Namibian clinicians generally gather at one site in order to participate as a single group thus enhancing learning.

Conclusion: Distance learning tools can effectively support TB and HIV training for health care workers.

Speaking books reaching audiences in new ways with critical HIV and TB messages

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Aim: To reach low literacy audience with vital TB messages. A major challenge facing health programs is effective consumer education. Low levels of literacy drastically reduce the effectiveness of health educational material. Furthermore, skilled trainers are expensive and scarce in developing countries

Design/Methods: SADAG, a non-governmental organisation dedicated to increasing the awareness of mental health issues, created a new educational tool to reach illiterate vulnerable groups, in the form of a 'speaking book'. These hard backed books feature a sound track read by local celebrities, in the local language, on many relevant health topics. Each 'speaking book' consists of 16 illustrated pages supported by understandable text. Each page has a corresponding push button that triggers a sound track of the text, so the information will be seen, read and heard for better comprehension. 7000 copies* of the TB speaking Books were distributed in rural SA in 2006/7. Health Care Workers, DOTS volunteers, or Home Based Care Workers shared them with at-risk members of the community. According to research each 'speaking book' was seen and heard by an average of 27 people: family members, church groups and schools, at shopping malls, clinics, and hairdressers.

Results: Good uptake and comprehension, appreciated by funders (MoH and pharmaceutical).

Conclusion: The next TB project by a pharmaceutical company is a book for youth, designed to make them aware of TB and able to help their parents with diagnosis, access to treatment and adherence in rural South Africa.

*Two books on TB were created. A general book describing TB and its treatment and encouraging adherence to treatment, *Living Free of TB* (Ministry of Health) and a specific book about the DOTS program in South Africa, *TB Can be Cured* (pharmaceutical company).

SMOKING AND EVIDENCE FOR INCREASED RISK OF TUBERCULOSIS, INVASIVE PNEUMOCOCCAL DISEASE, BACTERIAL PNEUMONIA AND INFLUENZA

Smoking and the risk of community-acquired pneumonia in persons with HIV infection

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Community-acquired pneumonia is a common respiratory complication in persons who are HIV-infected.

While opportunistic infections, such as *Pneumocystis jirovecii* pneumonia, have decreased considerably in countries such as the United States with the use of co-trimoxazole prophylaxis and since the introduction of highly active antiretroviral therapy (HAART), community-acquired pneumonia has now become the commonest respiratory infection in HIV-infected persons in that country. In sub-Saharan Africa, community-acquired pneumonia is second only to tuberculosis as the commonest respiratory infection in HIV-infected persons. Several studies have indicated that a high prevalence of pneumonia continues despite the introduction of HAART. There is considerable emerging evidence that smoking is one of the major risk factors. Smoking more than doubles the risk of pneumonia in HIV-infected persons, and this risk is evident at all levels of the CD4 cell count. The mechanisms by which smoking increases the risk of pneumonia are almost certainly multifactorial. Smoking has a number of harmful effects on the immune system, including the impairment of alveolar macrophage phagocytic function, a major host defence against pneumonia. In HIV-infected patients cigarette smoking attenuates the immunological and virological response to HAART by up to 40%. A comprehensive smoking cessation strategy is an essential component of the overall care of HIV-infected persons.

Smoking and mortality in India

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Background: The effects of smoking on mortality from tuberculosis and from other diseases in India as a whole have not been assessed reliably.

Methods: In a nationally representative sample of 1.1 million homes, we compared prevalences of smoking among 33 000 deceased women and 41 000 deceased men (case subjects) to 35 000 living women and 43 000 living men (unmatched control subjects). The smoker versus nonsmoker mortality risk ratios were adjusted for age, education and alcohol use.

Results: About 5% of control women and 37% of control men between the ages of 30 and 69 years were smokers. In this age group, smokers had a substantially higher rate of death from any medical cause than did nonsmokers (female risk ratio, 2.0; 99% confidence interval [CI], 1.8–2.3; male risk ratio, 1.7; 99%CI 1.6–1.8). Daily smoking of even a few bidis or cigarettes was associated with increased mortality. Excess deaths among smokers were chiefly from tuberculosis (female risk ratio, 3.0; 99%CI 2.47–3; male risk ratio, 2.3; 99% CI 2.1–2.6) and from respiratory, vascular, or neoplastic disease. The leading cause of smoking death was from tuberculosis in rural areas and was

heart disease (chiefly acute heart attack) in urban areas. Smoking was associated with a reduction in median survivals after the age of 30 years of 6 years for men who smoked bidis, 8 years for women who smoked bidis and 10 years for men who smoked cigarettes. Smoking is causing about 1 in 20 of all female and 1 in 5 of all male deaths between the ages of 30 to 69 years, and smoking will cause about 920 000 deaths in India in 2010 of which about 70% (90 000 female, 580 000 male) will be between the ages of 30 to 69 years. Because of population growth, the absolute numbers of deaths at these ages are rising by about 3% per year. **Conclusion:** Smoking will cause about 1 million deaths in India in the 2010s.

Biology and mechanisms for tobacco-attributable respiratory diseases, including TB, bacterial pneumonia and other respiratory diseases

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Smoking increases the risk of bacterial pneumonia, influenza infection. Among persons with chronic obstructive pulmonary disease (COPD), smoking also increases the risk of acute respiratory infection. Cigarette smoking increases the risk of acute infection by several possible mechanisms. Smoking may impair mucociliary clearance, which is a primary defense mechanism against infection. It may also improve bacterial adherence to respiratory epithelial cells, resulting in bacterial colonization and subsequent infection. Smoking may produce decreased T-cell function, as manifested by decreased proliferation to T-cell mitogens. Polarization of T-cell function from a TH-1 to TH-2 response may also impair host defense against acute infection. Smoking may also have negative impacts on B-lymphocyte function, leading to decreased immunoglobulin production. In sum, smoking increases the risk of infection via its adverse effects on airway structure and function and the host immunological response to infection.

Responding to evidence: current global efforts to raise awareness and limit active and passive exposure to cigarette smoke

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Aim: The growing evidence linking the use of combustible tobacco products, particularly cigarettes, to active tuberculosis highlights the opportunities for professionals involved in tuberculosis prevention and control to link their efforts with colleagues involved in tobacco control to mitigate the suffering exacted by these interwoven epidemics. This presentation will review national and international tobacco control ef-

forts to familiarize the audience with the evidence-based components of these programs, and introduce a variety of public and private initiatives designed to limit the use of and exposure to tobacco products, particularly cigarettes.

Background: The current and future burden of disease and suffering that will be exacted by the growing epidemic of tobacco use across the globe, including exacerbation of the existing tuberculosis problem, is staggering. In the face of this public health threat WHO adopted the Framework Convention on Tobacco Control (FCTC), the first public health treaty, in 2003. The treaty primarily addresses the legal and policy intervention components of a comprehensive tobacco control program (e.g., taxes, advertising and public smoking bans, product content regulation). However, other components of successful public health programs for tobacco include community engagement and organization, public education and counter-marketing campaigns, cessation services, and surveillance and evaluation efforts. New initiatives such as the Bloomberg Initiative on Global Tobacco Control are designed to catalyze governmental and civil society efforts to address the full range of tobacco control efforts.

Conclusion: There are many synergistic opportunities for tuberculosis and tobacco control and prevention efforts to mitigate the scourge of these interrelated public health problems.

IMMUNE RECONSTITUTION INFLAMMATORY SYNDROME AND TUBERCULOSIS

Clinical diagnosis and management of TB-IRIS

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Tuberculosis immune reconstitution inflammatory syndrome (TB-IRIS) is emerging as a frequent early complication of antiretroviral therapy (ART), especially in countries with a high burden of TB-HIV co-infection. Two forms occur: 'unmasking' and 'paradoxical' TB-IRIS. This presentation will focus on the paradoxical form. This occurs in patients diagnosed with TB prior to ART, who are typically improving on TB treatment and then after starting ART develop new, worsening or recurrent symptoms, signs and/or radiological manifestations of TB.

Common manifestations are recurrent TB symptoms, fever, lymph node enlargement, worsening radiographic pulmonary infiltrates, granulomatous hepatitis

and tuberculous abscesses. Neurological manifestations, such as meningitis and enlarging tuberculomata, carry the highest risk for mortality and disability.

Because there is no diagnostic test that confirms the diagnosis of paradoxical TB-IRIS it remains a diagnosis of exclusion. Case definitions to assist with diagnosis and allow for comparability of research findings are necessary. Consensus definitions appropriate for use in resource limited settings that were formulated at an international meeting of researchers will be presented. Important differential diagnoses to consider include multidrug resistant TB, an additional opportunistic infection or malignancy and drug reactions.

Approaches to treatment have included: anti-inflammatory treatments and drainage procedures (such as aspiration of tuberculous abscesses). There are anecdotal reports of clinical improvement on corticosteroid therapy. No randomized controlled data regarding steroid therapy has yet been published, but a trial is currently underway in South Africa. Before treating with steroids it is important to consider their immunosuppressive side effects (such as herpes virus reactivations). Furthermore given that MDR-TB is a frequent differential diagnosis, steroids should be used with caution until this is excluded.

The immunopathogenesis of TB-IRIS

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Background: The tuberculosis immune reconstitution inflammatory syndrome (TB-IRIS) induced by combination antiretroviral therapy (cART) has been attributed to dysregulated expansion of tuberculin PPD specific interferon-gamma (IFN- γ) secreting CD4⁺ T cells. **Methods:** Longitudinal and cross-sectional studies of *M. tuberculosis*-specific IFN- γ ELISpot responses and FACS analysis of blood cells from a total of 129 adults with HIV-1-associated tuberculosis, 98 of whom were prescribed cART.

Results: In cross-sectional analysis the frequency of IFN- γ secreting T cells recognising ESAT-6, alpha-crystallins (acr) 1 and 2 and PPD of *M. tuberculosis* was higher in TB-IRIS patients than in similar patients treated for both HIV-1 and tuberculosis who did not develop IRIS (non-IRIS, $P \leq 0.03$). The biggest difference was in recognition of acr molecules: peptide mapping indicated a polyclonal response. FACS analysis indicated equal proportions of CD4 and CD8 cells positive for activation markers HLA-DR and

CD71 in both TB-IRIS and non-IRIS patients. The percentage CD4 cells positive for FoxP3 was low in both groups (TB-IRIS 5.3 ± 4.5 versus 2.46 ± 2.46 non-IRIS, $P = 0.13$). Eight weeks' longitudinal analysis of tuberculosis patients starting cART showed dynamic changes in antigen-specific IFN- γ secreting T cells in both TB-IRIS and non-IRIS groups: the only significant trend was an increased response to PPD in the TB-IRIS group ($P = 0.041$).

Conclusions: There is an association between T cell expansions and TB-IRIS, but the occurrence of similar expansions in non-IRIS brings into question whether these are causal. The defect in immune regulation responsible for TB-IRIS remains to be fully elucidated.

TB-IRIS in children

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Background: Immune reconstitution inflammatory syndrome (IRIS) is a paradoxical reaction to latent, occult, or previously treated opportunistic infections which worsen despite successful immune reconstitution after being started on highly active antiretroviral therapy (HAART) for HIV. Minimal data on IRIS exist among children.

Methods: A retrospective cohort study of 1806 Paediatric Infectious Diseases Clinic children and adolescents initiating HAART through 1 July 2006 in Kampala, Uganda. Co-infection with tuberculosis (TB) was queried along with demographics, clinical presentations, and HIV parameters extracted from chart records.

Results: Pre-HAART, the baseline rate of TB was 10 cases per 100 person-years within the registered clinic population. The median time from clinic registration to HAART initiation was 16 weeks (IQR = 8 to 32 weeks). Post-antiretroviral TB infection occurred in 6.2% (104/1669) of all children without prior TB within 6 months of initiating HAART. During the first 100 days of HAART, the risk of unmasking TB-IRIS increased 2.7 fold compared to pre-HAART (95%CI = 2.1–3.5; $P < 0.0001$) with probable immune protection thereafter (RR = 0.41; 95%CI = 0.30–0.54; $P = 0.002$) through a median HAART follow up of 63 weeks (IQR = 47 to 72). In time-to-event analysis, children with CD4 counts <200 cells/ μ L had a 41% longer time to TB unmasking ($P = 0.04$).

Conclusions: Unmasking of incident-TB during immune reconstitution with HAART is common among Ugandan children. The temporal relationship suggests a significant portion is unmasking TB-IRIS. Aggressive screening for occult TB in pediatric populations prior to starting HAART is warranted.

VERTICAL FUNDING SUPPORTING HORIZONTAL DEVELOPMENT: THE GLOBAL FUND AS A CATALYST FOR CHANGE

The role of the Global Fund in the TB and HIV response

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Background: Established in 2001, the Global Fund has quickly become a major driving force behind the global fight against HIV, TB and malaria. As of June 2008, the Global Fund has committed 10.7 billion US\$ to support more than 550 programs in 136 countries. Almost 6 billion US\$ have been disbursed, resulting in the distribution of 58 million impregnated bednets, and the access of 1.75 million people to ARVs and almost 4 million people to DOTS.

From its inception, the Global Fund has recognized the importance of supporting programs that address the three diseases in ways that strengthen public, private and community health systems. In 2007, the Global Fund Board reaffirmed the Fund's strategic approach of 'investing in activities to help health systems overcome constraints to the achievement of improved outcomes in reducing the burden of HIV/AIDS, TB and malaria' and approved a new approach to HSS that is expected to increase both the scope and ambition for Global Fund support to health system strengthening.

The support provided by the Global Fund contributes to strengthening health systems in at least three different ways: a) direct funding of health systems components; b) positive externalities of support provided to disease targeted programs for the whole health systems; and c) reducing the burden of major diseases. The latter not only decreases the workload for health workers that can therefore attend to other patients, but can also remove major obstacles to micro-economic productivity and macroeconomic growth. An estimated 35% of Global Fund resources are used in ways that directly or indirectly strengthen health systems, mostly to address the lack of skilled health workers.

Conclusions: Health system weaknesses are major barriers to achieving global targets for HIV, TB and malaria control. Global Fund resources are increasingly being used to address these system weaknesses.

Key benefits of strengthening community systems in the response to TB and HIV

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Aim: To strengthen the interaction between tuberculosis (TB) and AIDS services to provide better management of patients with dual infection.

Design: TB is an important cause of morbidity in Central Asia and the most common opportunistic infection, leading to early deaths among AIDS patients. Local health care systems have weak linkages between vertical HIV and TB service providers. The USAID-funded CAPACITY Project worked with the governmental structures and local communities to implement TB-HIV models, to test and refine approaches for management of patients with co-infections in Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan.

Methods: Following the initial assessment, CAPACITY initiated round-tables for the Ministries of Health and Justice, national and regional TB and AIDS centers, international and local NGOs to discuss the most effective mechanisms for linking TB and HIV services and to form the National Technical Working Groups (TWG). Based on the WHO-recommendations, CAPACITY helped to develop clinical guidelines and other supporting documents, including new registration forms.

Results: Countries supported proposed models. TWGs were established and have regular meetings. National teams of trainers were built, and hundreds of medical specialists, health managers, and monitoring and evaluation specialists were trained on the newly developed clinical protocols. Co-infected patients are receiving appropriate medical services. National governments are expanding pilots for nation-wide coverage.

Conclusion: Active role of the government was the key to successful implementation of TB-HIV models. Political recognition of the problem and support of better collaboration of two vertical services in the form of Ministerial Orders have made it possible for the work to be effective and sustainable. Aside from the government ownership participation of community organizations, including the association of PLHIV allowed to adapt services to the actual needs of clients.

RECENT ADVANCES IN TB DRUG DEVELOPMENT

Overview of the global TB drug pipeline

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Available anti-tuberculosis drugs are grossly inadequate in confronting the new challenges of this ancient disease. There are urgent needs for new therapies that can 1) shorten and simplify therapy, 2) address MDR- and XDR-TB, and 3) treat TB and HIV co-infections. We have seen some advancement in the field of anti-tuberculosis drug discovery and development

in recent years. Currently, there are two fluoroquinolones (moxifloxacin and gatifloxacin) in Phase III clinical development for the treatment of drug sensitive tuberculosis. There are three novel compounds (TMC-207, OPC-67683 and PA-824) in Phase II clinical trials for the treatment of both drug sensitive and resistant diseases. Additional compounds are in the early stages of clinical and preclinical development. In the discovery phase, there are many projects in compound lead optimization stage and even more projects are in compound lead identification stage. The current drug pipeline, although encouraging, is clearly insufficient to address the growing needs for the treatment of tuberculosis. Novel compound classes with mechanisms of action that are effective against both phenotypic drug persistence and genetic drug resistance are in great demand.

Update on PA-824

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PA 824 is the Global Alliance for TB Drug Development's lead nitroimidazo-oxazine. It is a novel compound that has demonstrated significant anti-*M. tuberculosis* activity both in vitro and in animal models of TB, with sterilizing activity and therefore potential for shortening TB treatment as part of a multi-drug regimen. It demonstrates approximately equal potency against multidrug-resistant and fully drug-susceptible strains of *M. tuberculosis*. PA-824 has been evaluated in a series of Phase I studies in healthy, human volunteers; the results of these studies will be summarized. More recently, we conducted a Phase IIa, proof-of-concept study to evaluate the extended early bactericidal activity (EBA), safety and pharmacokinetics of PA-824 in newly diagnosed, adult, sputum smear-positive patients with drug-susceptible TB. This partially double-blinded, randomized clinical trial was conducted in Cape Town, South Africa, between August and December 2007. Based on findings from the pre-clinical and Phase I studies, dose levels of 200, 600, 1000 and 1200 mg/day PA-824 were administered orally once daily for 14 consecutive days (15 patients per cohort). A fifth cohort (8 patients) received standard first-line TB treatment (Rifapour e275), as a control for the EBA laboratory methodology. During the study the patients were maintained in-hospital and monitored rigorously for safety. Efficacy, safety and

pharmacokinetic results from this study will be presented. Recent results from three-month toxicity studies of PA-824 in rat and monkey will also be discussed.

Update on development of fluoroquinolones for TB

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There is a pressing need to develop effective shortened regimens for pulmonary tuberculosis. The activity and pharmacology of fluoroquinolones make them attractive as potential anti-tuberculosis agents. Animal studies have provided important evidence that moxifloxacin containing regimens can be more bactericidal. These encouraging data are now being evaluated in clinical studies. There are two compounds that have gone forward into clinical trial, gatifloxacin and moxifloxacin. Early phase clinical trials performed by the Oflotub, TBTC and TBRU consortia have generated data that indicates treatment shortening may be possible. Both gatifloxacin and moxifloxacin are now in phase III clinical studies with treatment shortening arms. All of these studies have posed challenges in developing and delivering registration quality studies. None of these could go forward without the support of international donors. Encouragingly, after more than thirty years of stagnation clinical research is moving forward with the promise of improved regimens for tuberculosis treatment.

NUTRITION AND TB: FROM MOLECULAR CONSIDERATIONS TO POPULATION HEALTH INTERVENTIONS

Nutritional supplements as immune-modulators to improve TB treatment outcomes

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Innovative solutions are required to shorten treatment duration and to treat tuberculosis (TB) drug resistance. Certain micronutrients could be effective adjunctive treatments, with the advantage of being inexpensive, safe and deliverable via the oral route. This talk explores the anti-mycobacterial immunological actions of various nutrients, chiefly addressing the relevance of in vitro data (especially regarding the vitamin D—LL-37 and arginine—nitric oxide (NO) pathways) in relation to the human in vivo setting, and the immunological rationale for further clinical trials of nutritional adjunctive therapy. Vitamin D anti-

mycobacterial mechanisms include induction of macrophage cathelicidin, superoxide release and reversal of phagosome maturation arrest. L-arginine exerts antimycobacterial effects via its conversion to NO and modulation of T-cell CD3 ζ expression. While critical in macrophage anti-TB responses, both vitamin D and arginine-NO (as well as vitamin A) suppress excessive T-cell activity. This might provide lead to the amelioration of excessive cell-mediated inflammatory pathology. Hypovitaminosis D, hypoargininemia and other micronutrient deficiencies are recognised in TB, underscoring the rationale for clinical trial of these agents. In developing such trials, questions include: Should supplementation be in those with active or latent disease? Would supplementation in non-deficient populations be of benefit? What are the optimal dosing schedules? As well as answering these questions, specific hypotheses to be addressed include whether enhanced mycobacterial killing could allow shorter antimicrobial treatment durations; whether pathology could be diminished by nutritional agents which demonstrate T-cell-suppressive activity; and what is the relative importance of different immunological pathways in the human immune response to TB.

Nutritional enablers to enhance TB treatment adherence

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A number of incentives have been used by TB control programs to enhance TB treatment compliance in a variety of settings. Whole food supplementation has been proposed as one method, and has been used in humanitarian emergency situations and in patients with drug resistant TB. Whilst food is intrinsically attractive as both an adjunctive therapy (due to the nutritional benefits) and as an enabler (particularly in the presence of malnutrition), there is a lack of systematic evidence to support this method. There have been no published randomised controlled trials (RCT) testing the hypothesis that the method is effective in improving compliance or, more importantly, TB treatment outcomes. Similarly, there have been no economic studies demonstrating cost-effectiveness. Using the example of a completed RCT in Dili, Timor Leste (the Food Incentives for TB Treatment Compliance-East Timor, the FITTCET Study), the evidence for and against the effectiveness of food will be presented. The involved 270 patients diagnosed in three urban clinics and under normal programmatic conditions. The primary outcome measure was TB treatment compliance with a range of secondary outcomes including treatment success, weight gain and clinical

improvement. In this talk, the methods used in this study, a summary of the results, a discussion of the difficulties of conducting an RCT to answer this question in this setting will be outlined. Recommendations for future research needs and the potential for programmatic introduction of this intervention will also be presented.

The role of nutritional supplementation in HIV-TB co-infection

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HIV-infected TB patients experience significant wasting and malnutrition, and studies have demonstrated deficiencies of vitamin A, selenium, carotenoids and albumin, and also anaemia. Co-infected patients with malnutrition are at high risk of early mortality, this risk increasing as the body mass index decreases. In the pre-ART era, randomised trials in Thailand and Tanzania in HIV-infected patients and pregnant women showed that multivitamins and micronutrients can reduce the risk of death and progression to serious forms of AIDS. In TB patients, nutritional supplements may also result in significant weight gain, earlier smear conversion and faster X-ray resolution. A randomised trial in Malawi amongst 829 HIV-infected TB patients given daily micronutrients with vitamins, zinc and selenium showed no improvement in survival or reduction in death rates despite significantly higher serum concentrations of vitamin A, vitamin E and selenium. In the ART era, both cotrimoxazole preventive therapy (CPT) and ART reduce mortality rates in HIV-infected patients, including those with TB. However, in patients starting on ART in the developing world, there is a high early death rate, the risk of which increases with malnutrition. In HIV-infected patients with TB, ART may be started between 2–8 weeks after anti-TB treatment has been commenced and during this time sick patients may die. There are no data to determine whether nutritional supplementation (macro-nutrients or micronutrients) reduce this early mortality either before or when starting ART, and further research is needed to answer this important question.

Nutrition and TB: a research agenda. Panel discussion

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This symposium will conclude with a panel discussion led by the session chairs, with the participation of the speakers. To guide the discussion, a series of questions will be posed to the panel and audience participation will be encouraged. The outcome of this

session will be the formulation of a research agenda to explore the themes presented in this symposium and to address the gaps in knowledge which have been identified by the speakers.

CONTACT INVESTIGATION IN THE HOUSEHOLDS OF ACTIVE TUBERCULOSIS PATIENTS: IMPROVING EFFICIENCY AND YIELD BY IDENTIFYING AND ELIMINATING BARRIERS TO EFFECTIVE IMPLEMENTATION

Yield for detecting new cases of active TB in the household and barriers to implementation of a contact investigation project in Mexico

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Background: The challenge today is to take care of vulnerable populations to achieve better global control of tuberculosis. In the last two decades the strategy was oriented to detection and cure, looking for new drugs, and quick diagnostic TB tests. TB transmission occurs most easily between young children in close contact with a smear-positive TB case, where they are at particular risk of infection and disease. In Mexico the household contact in rural and urban areas is quite similar, as children usually sleep with their parents. Little children are inoculated every day, so the risk of developing disease after they are infected is much greater for those aged <5 years. After a few weeks to 3 years, children could develop meningitis or severe neurological complications of spinal tuberculosis, peritoneal or disseminated forms in HIV patients.

Method: Identifying all contacts with index case and take care of them for screening (0–14 years) infection or disease; including: epidemiological, clinical evaluation, skin test and chest radiography (8–12 weeks). Start treatment if well, for LTBI or prevention; each child should have their own card.

Barriers: Testing reagents not available and spend two visits to read the test, isoniazid could be toxic and would generate INH resistance.

Recommendation: Make a physical review and chest radiographs to rule out active disease, and then start treatment. The challenge is diffusion, advocacy and commitment.

PARTNERSHIPS IN ACTION: ENGAGING ALL PARTNERS TO CONTRIBUTE TO EFFECTIVE RESPONSES TO THE TB HIV AND MDR EPIDEMICS

Lessons learnt and recommendations for excellence in scale-up

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The Russian Federation has an incidence of new MDR-TB cases of 6.2 per 100 000 (2006 estimated: around 8000 cases of primary MDR-TB per year). Russia must enroll up to 24 000 patients in standardized MDR-TB treatment until the end of year 2009. Most detected MDR-TB patients did not receive treatment of category IV due to:

- Absence of local scientific approval of the effectiveness of this standard
- Lack of second-line anti-tuberculosis medications and drugs for treatment of side-effects
- TB control staff without adequate experience of standardized MDR-TB treatment and its consequences
- Misperception of importance of funding for the outpatient treatment phase and social support.

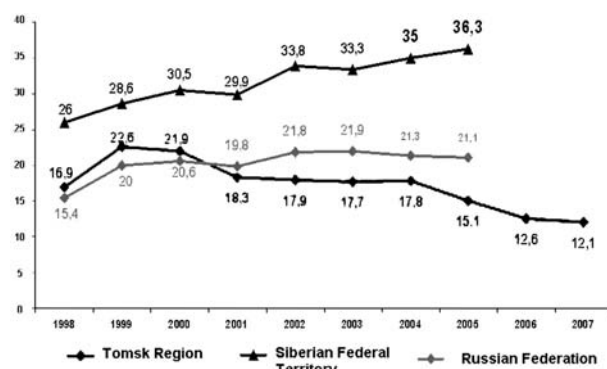


Figure TB mortality in Tomsk region, Siberian Federal Territory ("Okrug") and the Russian Federation (on 100 000).

PIH has collected positive experience on MDR-TB treatment around the world, including the MDR-TB Control project in the Tomsk region (one of 86 in the Russian Federation). More than 1300 MDR-TB patients were enrolled there. This project demonstrates balanced component development—from clinical to managerial—it is confirmed by positive dynamics in epidemiological indicators. Scale-up was through:

- Advocacy campaigns
- Published articles in scientific literature
- Conferences
- Trainings

Five federal training courses for all territories of Russia demonstrated real need of local TB specialists with MDR-TB experience, but we met some 'pilot territory' limitations. Recommendations for effective scale-up:

- Policy changes mechanisms and legislation acts are the cornerstones of the scale-up
- Existing country capacities (for example governmental funding, research institutions) must be leveraged to sustain pilot projects and scale up at country level
- NGO has to expand its activities not only 'horizontally' to another territory, but 'vertically' to local authorities and scientific institutions.

Situational analysis of contribution of FBOs and NGOs in health service delivery in primary health care: partnering process at national level

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The revival of primary healthcare promoted by WHO demands inclusion of faith-based organizations (FBOs) and NGOs to be effective in the face of widespread health challenges. A WHO review in 2007 showed that FBOs cover about 40% of healthcare and services in Africa alone. They often operate outside governmental planning exercises, they are generally unrecognized and do not receive a adequate proportion of public funds distribution. By engaging FBOs/NGOs through a sound partnering process all parties stand to gain. Civil society organizations can become significant partners in the primary healthcare approach to strengthening health systems, especially in contributing to achieve the goal of universal access. Partnerships with FBOs/NGOs increase effectiveness of governments in mobilizing all available resources and unblock these organizations from receiving government support. Added values of FBOs/NGOs in healthcare include: holistic conception of health and healthcare; depth of their roots in the communities they serve; potential for further primary healthcare outreach; the value of compassion and of the individual's dignity provides an ethical foundation to the provision of decent care; their motivation is often solidly rooted in and sustained by personal and community values that place the individual at the centre of these services. The healthcare provided by FBOs/NGOs should be seen as complementary to the healthcare provided by the public sector. A government's role is to ensure services are delivered, but this does not imply that direct provision by government is the only route through which services are provided (public function of private initiative). The involvement of FBOs, CSOs, NGOs and communities is not just a form of decentralization, but should be based on a partnership between health services and society. A typical

partnering process at country level (and WHO's possible role in it) is presented and discussed.

WHAT ANIMALS CAN TEACH HUMANS ABOUT TUBERCULOSIS

Animal reservoirs of *M. tuberculosis* and *M. bovis*

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Introduction: The family of *Mycobacterium tuberculosis*-complex organisms has an extremely large host range, but only a limited numbers of species have been found to be significant reservoirs for human tuberculosis. Traditionally, most zoonotic disease has been associated with domestic animals, but the recognition of the importance of wildlife species as sources of human disease has been increasing. Recent studies of isolates from different hosts indicates that there may be a 'spectrum of strains' that share genotypic characteristics of both *M. bovis* and *M. tuberculosis*—homology between the two species indicate that the potential exists for known reservoirs to harbor either organism.

Aim: To describe significant animal reservoirs of *M. tuberculosis* and *M. bovis* for human disease.

Methods: Literature review.

Results: Non-human primates are reservoirs of *M. tuberculosis*, with documented instances of transmission of *M. tuberculosis* from non-human primates to humans. Elephants are known to be reservoirs for *M. tuberculosis*, and have been associated with outbreaks while in captivity. While the risk of transmission to humans is considered to be very low, pet dogs and cats have been reported with cases of *M. tuberculosis* infection, and there is evidence of human *M. tuberculosis* infection during necropsy of an infected dog. The majority of human *M. bovis* infection results from consumption of foods from, and direct contact with, infected animals. The main reservoirs for human *M. bovis* are domestic and wild bovids. Other important reservoirs include cervids, brushtail possums, and European badgers. While swine were considered to be spillover hosts for *M. bovis*, mounting evidence indicates that wild boar are emerging reservoirs for infection.

Conclusions: Several animal species are recognized as reservoirs of zoonotic *M. tuberculosis* and *M. bovis*, and the importance of wildlife species as sources of zoonotic tuberculosis is of increasing concern.

The role of animal models in TB research: how responses to TB differ

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Animal models of tuberculosis give us two sets of information. First, they help us understand the nature of the host response to infection, and give us clues about the pathogenesis of the disease process. Second, they provide us with models to test drug efficacy, and provide protection data to help us guide rational vaccine design. But are we at the point of diminishing returns? The answer is no, and I will give the following three examples of important new information. 1) Mice infected with TB strains that are highly inflammatory and pathogenic generate Foxp3+ CD4 T cells that unfortunately then impede the proper expression of protective TH1 immunity; this has major implications for new vaccine efficacies. 2) Vaccination of mice with BCG induces a long-lived recirculating pool of cells with an effector memory phenotype but very few central memory T cells [only a minor CD8 subset with this phenotype]; this may directly explain why BCG loses its effect in adult humans, as well as providing a new marker for new vaccine testing and design. 3) Clinical strains of *M. tuberculosis* associated with recent outbreaks show a wide range of lung pathology; often as not this is far worse than the laboratory strains on which we base 99% of our vaccine and drug efficacy data.

TB latency in humans and animals

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The lengthy period of time needed for the chemotherapy of tuberculosis in infected individuals reflects the ability of a small percentage of bacteria to persist for long periods in infected tissues. To date the exact location of these persisting bacteria is not known but at least a proportion is thought to be in hypoxic areas of lung tissue necrosis. The difficulty in modeling human tuberculosis is that factors favoring *in vivo* persistence of *M. tuberculosis* are largely unknown. Additionally, not all animal models develop experimental lesions that resemble the naturally occurring disease in humans. Lung lesions in guinea pigs infected by a low dose aerosol with *M. tuberculosis* have striking similarities to natural infections in humans, such as necrosis, mineralization, hypoxia. Like the human, naïve guinea pigs develop primary lesions following initial exposure with *M. tuberculosis*, that differ in their morphology compared to secondary lesions originating from hematogenous dissemination. Lesion morphology in guinea pigs can vary depending on the stage of disease, route of infection or the clinical

M. tuberculosis strain used for infection. In guinea pigs, solid lesions without necrosis are much more responsive to drug therapy than are lesions with necrosis. More importantly, following drug therapy, clusters or microcolonies of bacilli have been found to persist extracellularly within non-healed, hypoxic lesions with residual lesion necrosis. This data support the hypothesis that lesion morphology significantly influences the ability of *M. tuberculosis* to tolerate drug therapy and that these drug-tolerant bacilli are associated with unique lesion morphologies. The exact make-up of this unique microenvironment is unknown but our preliminary data suggest that host cell macromolecules including cytoplasmic proteins and DNA contribute to the extra-cellular matrix that harbors drug-tolerant bacilli in an *in vivo* biofilm-like structure.

Comparison of gamma interferon in human and animal tuberculosis: animal

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Introduction: Bovine tuberculosis (bTB), a zoonotic disease with a major economic impact, continues to be a significant problem with a global perspective and increasing prevalence in various countries. Control and eradication of bTB are based on a test and slaughter strategy. The BOVIGAM® interferon gamma (IFN-γ) assay (Prionics, Switzerland) constitutes a laboratory-based test detecting the host's cell-mediated immune response (CMI). It is widely used complementary to the tuberculin skin test. The principle of this test has been adapted for TB diagnosis in humans (Quantiferon®-TB).

Setting: Environmental conditions before and during the culturing of the leucocytes influence the efficacy of *in vitro* IFN-γ production.

Aim: To analyze various parameters of the IFN-γ test in view of optimal conditions and potential simplifications in order to streamline the assay procedure.

Results: We show that the culture temperature needs to be 33°C or higher and that there is no need to use incubation in the presence of CO₂. Furthermore, various plate formats are shown to be feasible. The produced IFN-γ was stable at 4°C for 28 days as well as after repeated freeze-thaw cycles. The CMI is known to be impacted negatively by stress. We have stimulated fresh blood from animals with or without stress with mitogens resulting in significantly lower IFN-γ production in stressed animals and therefore potentially leading to false negative results. Tuberculosis-specific stimulation is currently done with tuberculin.

We have analyzed tuberculins at different concentrations from different sources and will report on the optimal standardized tuberculin activity. As an alternative, a cocktail of recombinant antigens for stimulation resulted in improved diagnostic sensitivity and specificity. **Conclusion:** Simplified culture conditions in combination with the high stability of natural IFN- γ and optimized stimulation antigens represents excellent tools for control and eradication of bTB.

SYMPOSIA: SUNDAY 19 OCTOBER 2008

CONTROVERSIAL TOPICS IN MDR-TB MANAGEMENT

Transmissibility, virulence and fitness of drug-resistant tuberculosis

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Background: In vitro models of non-pathogenic organisms have shown that drug resistance mutations are usually associated with a fitness cost. To address the question of whether specific drug-resistant *M. tuberculosis* mutations and lineages are associated with disparate levels of fitness or virulence we study the growth of drug susceptible and resistant strains in macrophages.

Methods: We have epidemiologically and genotypically characterized 10 sets of serial strains from the same patient(s) before and after the acquisition of drug resistance during the treatment of tuberculosis. We tested for drug susceptibility for the five primary drugs by standard BACTEC methods and determine the mutations responsible for isoniazid and rifampin resistance in each isolate. We compare growth kinetics between drug susceptible, resistant mutants and H37Rv in donor human macrophages.

Results: All sets of paired strains had the same fingerprints by RFLP and spoligotyping. We found 3 Beijing, 3 Harlem, 2 Latin American Mediterranean and 2 T lineages by genotyping. Unexpectedly we observed an increased growth in macrophages in 7 mutants that acquired resistance when compared to the growth of the susceptible parental strain. Moreover, in 7 of 10-paired sets of strains the resistant mutant had increased growth when compared to the susceptible virulent H37Rv laboratory control strain. *KatG* 315, *inhA* and *rpoB* mutations were associated with increased growth and no associations were apparent between lineages and differences in growth in macrophages.

Conclusion: This study does not support the principle that drug resistant mutants are associated with loss of virulence and shows that some resistant mutants are more virulent in the human macrophage model.

Reliability of drug susceptibility testing against first- and second-line anti-tuberculosis drugs

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The reliability of anti-tuberculosis drug susceptibility testing (DST) depends largely on prediction of treatment outcome of critical concentrations (CC, and resistant proportions) in use and the technical reproducibility in the laboratory. A careful calibration with representative samples of *M. tuberculosis* isolates from patients never treated with anti-tuberculosis drugs (probably susceptible, PS) and from patients failed or failing with regimens containing the corresponding drug (probably resistant, PR) in different test systems revealed that CCs of rifampicin (R) and isoniazid (H) showed better discrimination of these two groups than all other drugs studied. The drugs that can attain far higher levels in the lesions than minimal inhibitory concentrations (MIC) of wild susceptible *M. tuberculosis* isolates show much greater discrimination power between PS and PR than the other drugs of which even attainable blood levels are same or close to MIC. Hence, CCs of many second-line drugs suffer from misclassification of PR strains, urging careful use of their DST results. Technical reproducibility studies (proficiency testing) done in the WHO/IUATLD SNRL network also showed better resistance predictive values with H and R than the other drugs. Performing DST under strict internal and external quality control is essential to assure accuracy of every steps of test procedure and to convince reliability of the test results to the clients. Recent development of detection of genotypic mutations in the genes related with drug resistance is promising to overcome poor reproducibility in detecting the phenotypic resistance, though not all related genes and mutation sites were found yet and the systems to detect mutations are still not complete for all drugs. The biosafety, costs, turnaround time, and feasibility to the local technical environment should also be taken account in performing DST. The presentation will be made with available data for discussion.

Predictors of good and poor outcome in the treatment of MDR-TB: surgery and other factors

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In the last decade, multidrug-resistant tuberculosis (MDR-TB) has become an epidemiological issue of first priority at the global level. Unfortunately, regarding the treatment, controversies outweigh evidence. The difficulty is not only the absence of controlled trials validating specific recommendations, but also the extremely different and even contradictory results found in the literature. Moreover, there

are many different scenarios, from countries where second-line drugs (SLD) have practically never been used and MDR-TB patients are resistant to only 3–4 drugs, to other settings where SLDs have been used widely and patients are polyresistant. Reviewing the most important articles addressing the predictors of good and poor outcome, most of them have been published in settings where the MDR-TB situation is not favourable. The following factors have been identified, in different publications, as predictors of poor outcome: more SLDs used previously in the patient, more drugs with probed resistance 'in vitro' in the drug susceptibility test (DST), resistance to fluoroquinolones, resistance to capreomycin among injectables, fewer previously unused drugs available and the use of five or fewer drugs to treat these patients. The principal factors associated with good outcome have been the possibility of using a fluoroquinolone and surgery. Therefore, the pattern of resistance in the MDR-TB patient is pivotal in the possible outcome. Depending on these factors, the success rate can go from less than 50% to more than 80%. The worst situation is patients where resistance is tested to all first-line drugs, all the injectables and the fluoroquinolones. This, and not the currently accepted definition, should be the definition of extensively drug-resistant tuberculosis (XDR-TB). The possibility to use any first-line drugs or one injectable, what is the current XDR-TB definition, will improve the prognosis.

TB INFECTION CONTROL: COUNTRY EXPERIENCES AND HEALTH SYSTEMS RESPONSE

Implementation of TB infection control in TB-HIV care settings in Rwanda

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Background: In 2007, the treatment success rate for tuberculosis (TB) in Rwanda reached 85% and the detection rate was 46%. HIV prevalence among the adults is estimated at 3% and 37.5% of the TB cases are HIV infected. The overall prevalence of MDRTB was estimated at 4.6%. Until recently infection control (IC) was neglected. This abstract summarizes essential IC steps towards a national approach.

Method: An infection control (IC) needs assessment was carried out to selected health facilities nationwide and the National Reference Laboratory. Simultaneously national training was organized for 150 health care providers and hospitals IC plans were progressively developed. A national policy on IC is being developed and will be validated in quarter 3, 2008.

Results: Since 2005, strengthening TB-HIV collaboration is a priority and includes an IC component. Exposure of people living with HIV to TB is being reduced through the nationwide scaling up of 'one-stop TB-HIV services'. This includes HIV testing, care and treatment of HIV infected TB patients through the TB service for the duration of TB treatment. Comprehensive IC measures were set up at the MDR-TB unit where approximately 45% of the patients are HIV positive. Rehabilitation of the ward optimized the natural ventilation. Patients receive education on cough hygiene and use a mask while receiving visitors and undergoing specialized examinations. Health care workers are provided with respirators. By the second quarter of 2008, IC measures are implemented in 8 of 43 hospitals such as strengthening of education in all services, triage of TB suspects in the waiting room, separate ward for hospitalized TB suspects and isolation of infectious cases.

Conclusion: Promising initial steps for implementation of IC measures in TBHIV care settings in Rwanda have been made but challenges remain for full and adequate expansion of all the recommended interventions to TB care setting nationwide.

The national response to TB infection control in the presence of a well-established hospital-based infection control program: lessons learnt from the Philippines

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Background: Nosocomial transmission of tuberculosis is a problem in countries with high TB burden particularly. Hospitals in the Philippines have their own Infection Control Committee that provide policies and monitor compliance with the policies.

Method: Infection Control Practitioners in the Philippines participated in a CDC workshop on guidelines for administrative, engineering control and personal protection for reducing TB transmission in health facilities.

Results: Policies and standard operating procedures implemented at the MMC with a central air-conditioning is taken as a model. Isolation of sputum smear-positive TB in single occupancy isolation rooms with negative pressure controls ensuring a 12–16 ACH is enforced. In the out-patient facility, sputum smear-negative TB patients report in the early part of the day and those with smear-positive patients are seen in the later part of the day. Cough etiquette and collection of sputum specimens in open air or in appropriate collection chamber has been enforced. Personal protection for health workers requires the use of N95 respirator by the health care provider and surgical mask by the infectious patient to prevent air-born transmission both in-patient and out-patient facilities. Air handling facilities and equipment to pro-

vide a negative pressure have been installed in the TB laboratory. The efficiency of air handling is monitored and recorded regularly. Personal protection with appropriate N95 respiratory, gowns and gloves are worn by laboratory technologists when handling specimens.

Conclusion: A national implementation of these policies is recommended. Monitoring of the health care worker for TB symptoms and chest radiography can provide indicators that with these policies enforced, the nosocomial transmission of tuberculosis can be prevented.

TB infection control in European high TB priority countries

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WHO European TB high priority countries (HPCs) comprise 18 countries with a population of 387 million. In 2006, 433 261 incident TB cases and 62 197 deaths among TB patients were estimated in the WHO European region, of whom more than 84% are believed to have occurred in the European HPCs. The rate of multidrug-resistant (MDR) TB is alarmingly high, with at least 14 settings in HPCs reported more than 6% MDR-TB among new cases. In addition, concentrated HIV epidemics, particularly among injecting drug users, in some countries are further complicating TB control in the region. With the technical assistance of national and international partners, including TBCAP, particularly the Centers for Disease Control and Prevention, and additional resources from different donors, including GFATM and USAID, TB infection control is being addressed. Health care staff, programme managers, national and international consultants are being trained. Countries will be conducting facility risk assessments and TB-IC situation analysis to develop and/or update their national TB infection control plans. Outdated national infection control legislations, preference of programmes for long hospitalization for patients, poor infrastructure in the civilian and penitentiary health services and attitudes of staff in some settings are among major challenges in addressing TB infection control. Further studies need to be conducted to provide evidence of the efficacy of different TB-IC measures using proxy indicators such as the prevalence of latent TB infection among health care staff. In the meantime, common sense should prevail in applying what works best to reduce the risk of TB transmission in health care and congregate settings.

THE INTEGRATION OF FOOD AND NUTRITIONAL SUPPORT INTO THE CARE AND TREATMENT OF PLWHA

Food by prescription: a model for the integration of nutritional assessment, counselling and support within the clinical management of HIV and TB

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Background: Food by Prescription (FBP) programs provides food and nutrition support at HIV care and treatment facilities to malnourished adults living with HIV (PLHIV) and orphans and vulnerable children (OVC). FBP programs have been initiated through PEPFAR funding in Kenya and Uganda and, soon in Ethiopia and Zambia. A review of the Kenya program after two years of operation is presented. Issues examined are client graduation; loss to follow-up; uses of food; nutritional status changes; and integration of food distribution into the health care system.

Results: Key results include:

- Program clients' experienced significant improvements in nutritional status during the period of food supplementation (average 3 months).
- CD4 count was significantly correlated with nutritional status.
- Adults require an average of 4–6 months to reach the current graduation criteria.
- Considerable variation exists in implementation of FBP across facilities, which in some cases reflects healthy flexibility and adaptation and in other cases calls for greater consistency, such as alignment of food with ARV provision.
- Loss to follow-up is caused by a variety of factors, including poor access to facilities due to changes in client circumstances and inadequate resources for transport.

Conclusions:

- Further scale-up of the FBP programs through the national HIV treatment and care system is feasible and desirable. The scale-up process should address service integration issues such as staff availability and food storage capacity, review exit criteria and ration content, establish linkages to community groups for follow-up, and address food sharing.
- The program offers a model that other countries can adapt. Countries initiating FBP should consider challenges such as logistical needs, human resource capacities, and linkages to broader nutritional care for PLHIV.

The role of communities and community-based programs in providing food security and nutritional support to PLWHA and their families

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How may communities be supported to respond effectively to the interactions between HIV, TB, malnutrition and food insecurity? How to develop and sustain workable models of food and nutritional assistance at scale? And how will such models be resilient and adaptable enough to respond to the current food price crisis, and other livelihood shocks? This presentation will reflect on lessons currently being learned in eastern and southern Africa where attempts are being made to tackle these challenges. It will draw upon operational research experience being gained by the Regional Network on AIDS, Livelihoods and Food Security (RENEWAL), and on programming innovations developed by civil society and by other international and national organizations including the World Food Programme. A major finding in this work is that real attempts need to be made to break out of the prevalent vertical orientation of current programming. Individuals, households and communities naturally engage in multisectoral and multidisciplinary decisionmaking and actions—this is the norm, not the exception. A new generation of programming is needed to reflect these realities. The overriding dual objectives should be to a) maximize support to effective community-driven responses to the intertwined problems of food insecurity, malnutrition, HIV and TB, and b) provide appropriate complementary external support where local capacity is exceeded. Within this, a particular challenge will be to seek ways of strengthening links between individual/patient-oriented (usually clinic-based) nutritional assistance on the one hand, and household and community-based sustainable food security programming on the other.

TB-HIV COMMUNITY ACTIVISM: KEY COMPONENTS OF A HEALTH SYSTEMS RESPONSE

Activist roles in TB-HIV resource mobilisation

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Objectives: To share lessons learnt on how community groups and non governmental organizations can mobilize for increased resource allocation for TB-HIV activities at country, regional and International levels. While addressing the dual TB-HIV epidemic is important to achieving the Millennium Development Goals and reaching the broader human development objectives, without the necessary resources made available

to countries, the implementation of these strategies remains a dream.

Methods: International, Regional and National lobbying platforms such as the Civil G8 Forum, International Treatment Preparedness Coalition (ITPC) and the African Civil Society Coalition have provided a critical platform for CSO networks, and community groups to demand accountability for the HIV/AIDS response.

Findings: For the goals of universal access and MDGs to be met, greater accountability, transparency and civil society engagement and oversight is required. Civil Society's role will include: budget tracking/monitoring activities that assess government spending patterns on TB-HIV vis a vis the magnitude of the problem; lobbying the developed countries to fulfill 0.7% of GDP from OECD countries to be devoted to development, including health, TB-HIV and developing countries to spend at least 15% of their own GDP on health; tracking allocations and its expenditures.

Conclusions: Coalition building provides an opportunity for CSOs to leverage on their strengths and demand for increased resource allocation for TB-HIV mobilize for increased resource allocation for TB-HIV activities at country.

TB-HIV policy monitoring and advocacy from a community perspective

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Background: Tuberculosis (TB) is one of the leading causes of morbidity in Georgia. TB has reached dramatic figures during the last two decades. The situation improved slightly after the establishment of the national TB program but it still remains alarming. Especially worrying is the situation regarding drug-resistant forms of TB.

Methods: In October 2006 Welfare Foundation, an NGO based in Tbilisi, Georgia, has started working on TB-HIV Monitoring and Advocacy project, which seeks to increase civil society engagement in policy-making efforts around the adoption and implementation of WHO collaborative TB-HIV activities. During monitoring phase over 24 in-depth interviews with various stakeholders engaged in Tuberculosis and HIV/AIDS issues in Georgia was conducted.

Results: Interviews revealed that the state of collaborative TB-HIV activities in Georgia is improving slowly, but steadily, however practical collaboration is very little. Despite the increasing number of TB and HIV/AIDS patients who seek help in the private sector, they are neglected from the National TB and AIDS programs. Unreasonable use of drugs is another major problem of present days in Georgia. TB drugs are available and sold prescription-free in pharmacies. There is no law prohibiting selling TB drugs (as well

as all other antibiotics) in Georgia. Consequences of misuse of drugs lead to development of resistance to antibiotics, ineffective treatment, and adverse effects; as a result it creates an economic burden on the patient and society.

Next steps: In response to these key findings Welfare Foundation undertakes advocacy activities aimed to secure new policy guidelines against availability of prescription-free TB antibiotics in Georgia. It targets the following audience-policy makers from the Parliament's Health Committee, Ministry of Labor, Health and Social Affairs as well as TB-HIV health care providers, affected communities with both these diseases and civil society organizations.

TB-HIV policy monitoring and advocacy from an HIV institutional perspective

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Informed and empowered civil society groups have been central to advancing the global response to HIV in defining and driving the research agenda as well as accelerating the implementation of universal access to HIV prevention, treatment, care and support. This community activism and engagement is now being expanded to tackle the challenge of improving TB control for people living with HIV. This presentation will examine the role of civil society in advocating for and monitoring improvements in TB control for people living with HIV. The following topics will be discussed during the presentation:

- Historical perspective from UNAIDS and the involvement and empowerment of civil society in the HIV response and lessons for engaging civil society in TB control.
- International policy frameworks and commitments to addressing TB in people living with HIV (World Health Assembly, UNGASS, UNAIDS Programme Coordinating Board, UN High Level Meeting on HIV/AIDS and First Global Leaders Forum on TB-HIV) with examples of how of community engagement in these processes has advanced the agenda.
- How to translate these global level commitments into local action.
- How to engage civil society in national monitoring and evaluation of TB-HIV activities.

Integrating TB treatment literacy into HIV support

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Background: TALC is a Zambian NGO formed to fight for equitable and sustainable access to HIV treatment, care and support for people living with HIV

(PLHA), including TB treatment. In 2006, TALC conducted a research and monitoring project to find out the status of implementation of the WHO Interim Policy on Collaborative TB-HIV Activities and the IEC gap.

Methods: The project was carried out in three provinces—Western, Lusaka and Central—through site visits TALC interviewed a total of 53 key informants, including TB and HIV policymakers, clinical staff, NGO representatives and PLHA and/or survivors of TB.

Results: TALC found that the TB and HIV programmes were planned and implemented separately in most health centres. As a result, information about TB-HIV co-infection and/or patients' rights was not available especially among recipients of care at the community level.

Conclusion: TALC recommends greater support to HIV advocates and TB and HIV community health care providers to build their capacity to provide critical information. HIV advocates need to integrate TB into their advocacy work and be supported to carry out public awareness IEC campaigns within their communities. TB treatment literacy needs to be a part of HIV support services and programs. Training of Trainers programmes and IEC materials such as posters, brochures, TB Patients Charters and TB International Standards of Care are also needed. Lastly, the national TB and HIV programmes need to collaborate more effectively to integrate TB and HIV services.

THE COPD EPIDEMIC: HOW SHOULD THE HEALTH SERVICES RESPOND?

How can district services prepare? Training equipment and supplies

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Cigarette smoking is the major risk factor for COPD. However, focus on this single aetiology factor has led to the undermining of other risk factors like indoor pollution, malnutrition, infections and tuberculosis. The response to COPD epidemic in a district hospital will be discussed. Emphasis will be placed on the need to screen population at risk. The use of spirometry as a basic tool of diagnosis and monitoring the progress of the disease will be emphasized. Preventive measures like health education, vaccination, early detection and prompt treatment of the disease, improvement of maternal and child health and eradication of poverty should be the primary focus in resource limited countries.

LABORATORY SCALE-UP FOR ENHANCED TB DIAGNOSIS

Global scale-up of laboratory services to address the needs for migration screening for infectious diseases

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The International Organization for Migration (IOM) is the leading inter-governmental organization in the field of migration. IOM works in the four broad areas of migration management: migration and development, facilitating migration, regulating migration and forced migration. Migration health is one of the IOM activities that cuts across these areas of migration management. TB diagnosis is the main focus of IOM's health assessment programmes. To meet the pre-migration screening requirements of resettlement countries IOM has established a global network of TB culture laboratories with additional capacity to test for other infectious diseases including HIV and malaria. In 2005, IOM established its first BSL-3 laboratory in Thailand and has subsequently established similar facilities in Pakistan, Kenya, Nepal with two new laboratories in Bangkok and Mae Sot, Thailand. All facilities were designed according to WHO guidelines for BSL-3 laboratories and include two main areas one functionally clean administrative area and the other functionally dirty culture laboratory area separated by a double door airlock. Negative pressure is created in the dirty laboratories by venting Class 11 Biological Safety cabinets to the outside using a thimble connection above the BSC and ducting to the outside. Visual negative pressure monitoring devices are installed. Liquid culture and DST using the MGIT 960 instrument is implemented at all sites with standard operating procedures in place, uniform data collection and performance monitoring using quality indicators.

Sustainability of laboratory scale-up: what does it entail?

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For the second Global Plan of the Stop TB partnership, laboratory capacity will have to be greatly expanded. Microscopy services need to be increased by 50–100% over the current 80 million smears annually, at 50 million USD investment and 250 million annual recurrent cost. Cultures need to increase from 10 to 66 million, using an additional 2000 laboratories and 23 000 technicians, at 3 billion investment and 730 million recurrent costs. In low-income, drug susceptibility testing (DST) needs to be brought up to 6 million tests per year. Microscopy scaling-up holds the greatest promise. The investment needed is more

modest and with scaling-up mainly through LED fluorescence microscopy introduction, recurrent costs may actually not change much or even be less. The picture is quite different for culture and DST, particularly if commercial liquid media are used. Even if these funds can be raised initially, annual recurrent costs are staggering, and can only be covered by generous, sustained external funding. Without this, cultures will be available only to patients who can pay. Uninterrupted use of a technology that is too far advanced for the infrastructure and level of support available in low-income countries, including capacity to provide a safe environment, is not evident. But mainly human resources need to be much more developed in numbers and capacity to absorb these highly demanding methods. Worrisome are also the lack of efficient lab managers, even at national TB reference laboratories, instability of staff due to various factors, and the generalized dislike of TB work, dangerous and badly paid, unlike other laboratory tests. Monetary incentives may be unavoidable.

HEALTH SYSTEMS RESPONSE FOR HUMAN RESOURCES: ENSURING THE TB WORKFORCE IS PRESENT, COMPETENT, SUPERVISED AND SUPPORTED

Challenges to ensuring a competent workforce within a decentralised health system

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Thailand is one of the 22 high TB burden countries. TB incidence decreased by 50% from 1985 to 1991 then increased again in the 1990s due to the HIV/AIDS epidemic. The National TB Program has committed to implement the DOTS strategy and covered all public health care facilities since 2002. Along with the economic development, the government has decentralized public health system that has contributed to improve the health of the population. TB services are well integrated into the national health care system. TB is in the list of health inspector system. Key performance indicators of the MOH also includes the requirement of TB training for TB clinic staff. The recent reforms and financing mechanisms under the National Health Security Office present opportunities for enhancing TB control. The issues raised by the program monitoring reported the inadequate performance particularly in Bangkok, inadequate program management and coordination under the decentralized public health system, limited administrative authority and capacity to guide and supervise program implementation at provincial and district levels. A competent workforce is a key success factor for improving TB program performance. To ensuring a

competent workforce is not only know what need to be done but need to do it effectively also. The challenges include 1) improve staff management at all levels, 2) provide effective training activities at all levels, 3) establish the demonstration sites for specific TB control component such as TB-HIV and MDR-TB, 4) involving all stakeholders in developing a comprehensive strategic plan for TB control.

Working with partners to meet the health systems needs for TB control

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Background: The Philippines is 9th of 27 high priority countries for multidrug-resistant tuberculosis (MDR-TB). In February 1999, the Tropical Disease Foundation (TDF) established a private public mix DOTS (PPMD) Center in Makati Medical Centre in collaboration with the NTP, approved by the Green Light Committee in 2000 as the first pilot project on the programmatic management of drug-resistant TB (PMDT).

Method: The TDF provided a series of training courses for various health care workers in public DOTS units and other non-government organizations (NGOs) providing DOTS services for the decentralization of the MDR-TB patients after sputum culture conversion. A training course for treatment center staff was initiated in 2004.

Results: Up to 30 June 2008, 624 doctors and nurses and 611 community volunteer health workers had undergone didactic and practical training on various aspects of PMDT to provide direct observed treatment (DOT) for MDR-TB patients. The TDF has provided full support in the human resource development plan for PMDT into the NTP. Competency-based training modules for PMDT have been developed in the training of trainers from the NTP, the regional and local health facilities. In addition, training of clinical staff for PMDT Treatment Centres (TC) allowed expansion from three to a total of six in Metro Manila plus the first PMDT TC in Region VII in Cebu City. A nationwide scale-up to establish 42 treatment centers and 35 supporting laboratories is planned to start 2009.

Conclusion: PMDT, initiated in the private sector, is now integrated into the NTP through partnership between the TDF and the NTP. This is a major factor in the gains attained in the Philippines in keeping with the WHO strategy to meet the challenge of MDR-TB.

A PICTURE PAINTS A THOUSAND WORDS: RE-IMAGING TOBACCO

Bans on tobacco promotion: evidence and status

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Introduction: Extensive and overwhelming research has demonstrated that banning tobacco promotion and sponsorship is an effective means to reduce smoking prevalence and tobacco consumption. Political will to strengthen public health policies through passing comprehensive legislation to counter tobacco promotion, has been essential.

Status and evidence: National campaigns in developed countries have been successful to enact and enforce regulatory frameworks including promotion and sponsorship. These policies mainly prevent and reduce access to tobacco by banning display promotional items, prohibiting most types of outdoor advertising, restricting indoor promotion and placing extensive bans on sponsorship by tobacco firms. In Canada some jurisdictions (Quebec, Ontario and Alberta) have recently prohibited the visible tobacco product displays at point of sales. In many lower and middle-income countries advertising and promotion bans remain partial. Developing countries (Brazil, Mexico and Uruguay) are adopting comprehensive laws to regulate and control tobacco consumption, including tobacco promotion and sponsorship.

Challenges: However, as the regulation increases, the tobacco industry puts most of its money into the retail environment. Tobacco firms deploy other marketing tactics to continue communicating their brand imagery and attracting new consumers through point-of-sale strategies including shelf displacement and package design. Quite a few countries have passed laws to prohibit the visible display of tobacco products at point of purchase.

Conclusion: Tobacco promotion at retail is still a field that has not been sufficiently covered. Comprehensive bans legislation and effective enforcement on tobacco promotion including retail displays are needed, to limit the target audience and the content of the messages.

MONITORING AND EVALUATING THE RESPONSE TO THE HIV/AIDS EPIDEMIC AT NATIONAL AND FACILITY LEVEL IN RESOURCE-POOR COUNTRIES

Monitoring the national response to HIV testing, PMTCT and ART in Malawi using annually conducted country-wide situational analyses: 2002–2007

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Background: Malawi has a population of 12.5 million and an adult HIV prevalence of 12%. HIV services have gradually scaled up since 1999 within an extremely resource-constrained health system. Since 2002, countrywide surveys have been carried out annually to document HIV services operating in the previous calendar year.

Aims:

- To provide a national inventory of biomedical HIV service providers.
- To measure utilisation of HIV testing, PMTCT, HIV management of TB patients, ART and blood transfusion services.

Methods: Data collection covers all health sectors. The survey is conducted by a small centrally-coordinated team visiting all facilities in the 1st half of the year, interviewing health workers and reviewing primary data in registers. Qualitative data on logistics and practices and quantitative data on service utilization are collected.

Results: The surveys have documented a dramatic increase in HIV service provision over the 5 years (see Figure). In 2006, a total of 661 400 HIV tests were performed at 351 static, 290 outreach and 274 mobile locations. 141 ART clinics located in all districts in Malawi had registered a cumulative total of 85 200 ART patients. HIV status was known for 26% of all pregnant women at ANC and for 6% of all deliveries. 17 000 (66%) of the 26 700 TB cases registered in 2006 were tested for HIV; 11 700 (66%) were HIV positive; 11 500 (98%) of HIV positives started cotrimoxazole prophylaxis. Extrapolated to the national level 38% of all TB patients believed to be HIV positive started ART.

Conclusions: The annual situational analyses have provided vital strategic information to the national HIV programs. Poor accuracy limited the usefulness of passively reported data. The annual direct review

of primary data has helped to improve the design of tools and to better integrate systems. The 2007 round of the survey will be completed in July and the latest national data will be presented.

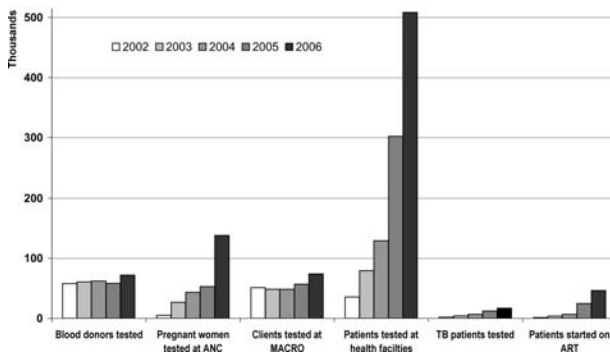


Figure Total national number of HIV tests by service type in Malawi 2002–2006.

Use of routine HIV data for planning and decision making at national level in Mozambique

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Background: Initial investments in strengthening monitoring and evaluation and other strategic information systems have increased the quantity and quality of information available on the scale-up of HIV and AIDS-related programs in many less developed countries. However, less attention has been paid to developing tools and systems to integrate data into planning and decision-making processes at multiple (facility, geographic, program) levels.

Approach: Mozambican implementing partners, in collaboration with the Government of Mozambique, have developed a portfolio of tools to facilitate enhanced evidenced based decision-making using routinely collected data. Tools have been developed focusing on key areas of service uptake, coverage, equity, and quality of services. These tools can: 1) strengthen monitoring of implementation of HIV programs at national and sub-national levels 2) provide timely feedback on 'problem areas' or other areas in need of rapid intervention, and 3) inform planning and decision-making in funding and expansion of services.

Results: Examples of tools for enhanced data use will be presented and include:

- Maps of existing services and population-based data to monitor program expansion and identify priority underserved areas for expansion of services
- Standardized analyses developed for routine use to evaluate quality of services through linkages across programs (e.g. care and treatment)

- A 'dashboard' tool to facilitate comparison of achievements by geographic area (e.g. province)

Recommendations: As the quantity and quality of HIV-related data increase, countries should place greater emphasis and resources on increasing the use of data for monitoring and decision-making at multiple levels to inform ongoing scale-up of services. Countries can adapt tools and strategies like those developed in Mozambique to begin to address their own data usage issues.

Use of real-time, touch screen electronic data systems to monitor the delivery and outcomes of antiretroviral therapy at government health facilities in Malawi

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Background: Malawi's Ministry of Health (MoH) HIV Unit is tasked with managing the country's national anti-retroviral therapy (ART) programme. Complete, accurate and timely data are critical for monitoring and evaluation (M&E). Cohort analyses are conducted every three months at each of roughly 120 sites delivering ART. Aggregation of data and compilation of reports in preparation for supervision visits is time consuming. Site supervision visits require a significant amount of manual data auditing to ensure high data quality, leaving little time to address clinical care issues. Anecdotal evidence suggests that the accuracy of reports diminishes as the number of patients on treatment at a given site grows beyond 1000. Malawi is currently piloting electronic data systems (EDS) to evaluate the impact on improving data quality and reducing the burden of M&E.

Methods: In 2005 a task force was created to investigate the feasibility of introducing computers to capture patient-level data and produce cohort reports automatically. A point-of-care approach was decided upon where doctors, clinical officers and nurses use small touchscreen computers to enter patient information at the time of the clinical visit.

Results: Point-of-care EDS systems were installed at four MoH hospitals. Data from the two sites in the Northern region are not available. The remaining two EDS sites have been live since November 2007. By the end of March 2008, the sites had 2529 and 1769 patients ever started on ART. Data from the EDS were used to generate quarterly reports. Manual reports were compared with EDS reports to identify and reconcile discrepancies. MoH supervision teams reported confidence in the reports. Current-quarter cohort reports matched. Cumulative cohort and survival analysis reports had minor errors due to unrecorded patient transfers.

Conclusion: EDS has the potential to significantly reduce the burden of M&E in this setting. Continued development will increase system usefulness.

SURVEILLANCE AND INFORMATION SYSTEMS TO MONITOR TB-HIV PROGRAMME ACTIVITIES IN RESOURCE-LIMITED SETTINGS

Evaluation of a modified TB reporting and recording system: how can the system be improved to monitor quality of TB care and HIV testing uptake in Zambia?

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Background: About 50–70% of TB patients in Zambia are HIV-infected. In response, the Ministry of Health (MOH) has scaled up HIV testing and access to care and treatment among TB patients. In 2006, the MOH revised the national TB surveillance system to include HIV data. A pilot evaluation of this revised surveillance system was conducted in two provinces. **Methods:** Two teams with representation from MOH and key partners conducted the evaluation. Each team visited a purposeful convenience sample of clinics in each province and reviewed the TB register and facility-based treatment cards of patients from July 2006–March 2007.

Results: The mean percent of registered TB patients who received HIV testing and tested HIV-positive at 26 sites was 55% (range: 6% to 86%) and 79% (range: 50% to 92%), respectively. Of the total 855 treatment cards reviewed, 637 (74%) had data recorded on HIV testing status; of these, 517 (81%) were recorded as having accepted testing. Of these, 462 (89%) had HIV test results and 365 (80%) were recorded as HIV-positive. Of the 365 patients recorded as HIV-positive, 184 (50%) had data on ART-eligibility status; of these, 165 (89%) were recorded as ART eligible and 103 (62%) were documented as being on ART.

Conclusions: Evaluation of the TB surveillance system is useful for assessing the quality and completeness of data on HIV testing and among TB patients. Additional training, tools, support, and ongoing supervision are needed to build knowledge and practice among staff to correctly record and report data.

Monitoring TB screening, diagnosis and treatment in HIV care and treatment settings: lessons learnt in Rwanda

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Background: To respond to the high burden of HIV/AIDS and tuberculosis (TB), the Rwandan Ministry of Health (MOH) adopted a national policy on TB-HIV collaboration, established a national TB-HIV working group (WG), revised program guidelines and developed the TB-HIV monitoring and evaluation (M&E) system. One of the policy areas is to screen all HIV-infected patients for active TB disease and to link all suspects to TB diagnosis and therapy.

Methods: A symptom based 5 question checklist was developed to screen all HIV-infected patients attending HIV CT services for TB. Patients who screen positive on the questionnaire are considered TB suspects and referred for further diagnostic workup and treatment. The HIV patient dossier was revised, pre-ART and ART registers that include information on TB screening, diagnosis and treatment were developed and national indicators on TB screening agreed upon which are reported by HIV CT sites to MOH every 6 months. M&E workshops for HIV CT staff were organized. Implementation started at 2 model centers, followed by national scale up. Regular supervision and mentoring were carried out to HIV CT sites nationwide. The TB-HIV WG analyses data regularly to inform the program.

Results: By the end of 2007, 95/185 (55%) HIV CT sites were using the national HIV M&E tools and were reporting TB screening data regularly to the MOH. During the second semester of 2007, 85% (10 362/12 179) of newly enrolled HIV infected patients at these sites had documented evidence of screening for active TB as part of routine care. 2.6% (268) of those who screened positive were subsequently diagnosed with TB and initiated treatment.

Conclusion: The Rwandan experience demonstrates that through national efforts an M&E system for TB screening, diagnosis and treatment can be developed and implemented at HIV CT sites nationwide. Effort remains to fully scale up this TB screening monitoring system and improve its quality.

Continuous laboratory-based surveillance for MDR-/XDR-TB and public health response in Botswana

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Background: Tuberculosis (TB) case detection through quality-assured bacteriology and recording and report-

ing (R&R) are two of the five components of the DOTS strategy. Data from the 2002 Botswana drug resistance survey (DRS) demonstrated an increasing trend in the prevalence of multidrug-resistant (MDR) TB; in 2008, three patients were diagnosed with extensively drug-resistant (XDR) TB, highlighting the need for improved surveillance of anti-tuberculosis drug resistance to facilitate rapid case detection and minimize transmission of drug-resistant TB. Prior to 2007, no computerized system for R&R of culture and DST results to the National TB Program (NTP) existed. All requests for TB culture and drug susceptibility testing at the National TB Reference Laboratory (NTRL), as well as the dispatch of results, were made via paper forms.

Methods: We piloted a laboratory information system to manage data from the 4th DRS with the goal of implementing routine anti-TB drug surveillance following the DRS. We modified the lab request form to include: patient category, HIV status, treatment regimen, date stamps, and specimen collection period and characteristics. We customized an Access database to create patient and district-level reports for these variables.

Results: Between July 2007–April 2008, NTRL managed 6640 lab requests electronically for routine and DRS purposes; NTRL is now able to review and analyze electronic data on specimen quality, turnaround times, and microscopy, culture and DST performance.

Conclusions: During a 21-month pilot, NTRL captured data on >6000 specimens which hitherto would have been reported and analyzed manually. This system increased NTRL's capacity to generate comprehensive patient- and district-level reports and statistics on lab performance. This has facilitated the program's ability to tie laboratory surveillance to routine program functions in order to meet program goals for case detection and effective treatment.

Monitoring and evaluation of TB-HIV collaborative activities in Thailand

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Background: Thailand is one of high-burden TB countries. HIV is prevalent in Thailand, with an estimated 550 000 persons living with HIV/AIDS (PLHA). TB-HIV collaborative activities have been scaled up nationwide since 2007. We analyzed routine program reports to evaluate the progress towards implementation of universal access for TB-HIV interventions.

Method: HIV status and treatment information is included in TB treatment card and TB register. The quarterly TB-HIV report is prepared by TB clinic staff, and compiled and forwarded by Provincial TB coordinators. National targets for TB-HIV implementation include HIV testing of 80% of TB patients, ART for 60%

of HIV-infected TB patients, and 90% of PLHA to have documented annual TB screening.

Results: As a baseline, in 2006, 45% (26 552/58 828) TB patients had known HIV status. After implementation in 2007, 68% (37 744/55 190) of reported TB cases had known HIV status, and of these 20% were HIV-infected. Of 7615 patients with HIV infection, 67% received CPT and 32% ART during TB treatment. Activities to decrease burden of TB in PLHA have reached very few PLHA as only 23 593 were screened for TB and 12% had TB.

Conclusions: In 2007 Thailand has made substantial progress towards universal access for TB-HIV interventions. However, performance is well below national targets for ART and for TB screening of PLHA. One key implementation barrier is that TB-HIV activities at HIV clinics are monitored only by TB program staff. Improved coordination with and involvement of HIV program and clinic staff is needed to improve implementation.

MALE CIRCUMCISION A SUCCESS STORY FOR HIV PREVENTION. NOW WHAT?

Effectiveness of male circumcision: epidemiology and clinical trials data

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Background: The efficacy of male circumcision (MC) against male HIV acquisition has been proven by three randomized clinical trials, which confirms observational and ecological study findings.

Methods: Review of the randomized clinical trials on MC for HIV-prevention conducted at 3 trial sites in sub-Saharan Africa. HIV negative men aged 18–24 years (Orange farm and Kisumu), and 15–49 years (Rakai) who accepted to receive their HIV sero-status results were randomized to receive immediate (intervention) or delayed (control) circumcision, and followed (FUP) at 6, 12 and 24 months, or more frequently at 3 months intervals post randomization. HIV infection was detected using EIA and WB for confirmation. Statistical analyses used Kaplan-Meier (KM) and Poisson regression model (per 100-person years [py]) to estimate the interval specific and 2-year cumulative risk of HIV-infection.

Results: The 2-year cumulative HIV-incidence or probability of new HIV-infection was significantly higher in the control compared to the intervention arm, with efficacies of 51% (95%CI 16–72) Rakai; 53% (95%CI 22–72) Kisumu; 60% (95%CI 32–76) Orange farm.

Protection in the intervention arm against HIV-infection was observed in all socio-demographic, behavior and symptoms of STIs. The biggest reduction between study arms was observed in 'the most at risk' groups. In Rakai, the efficacy of MC was 24% at 0–6 month, 63% at 6–12 months and 75% at 12–24 months. No significant behavioral disinhibition was observed during the study period. MC also reduced genital ulcer disease (GUD) in men (PRR = 0.53, 95% CI 0.43–0.64). **Conclusions:** Male circumcision significantly reduces HIV acquisition in men, and genital ulceration.

Activities around male circumcision in Kenya: report from the Government Task Force

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Background: Two decades of observational studies suggest that male circumcision, the oldest known surgical procedure, can partially protect men from acquiring HIV. Results from the Orange Farm Intervention Trial, South Africa; Rakai, Uganda and Kisumu, Kenya prompted the Joint United Nations Programme on HIV/AIDS (UNAIDS) to issue a position statement and develop a United Nations Work Plan on Male Circumcision (MC) and HIV. In May 2007, the Ministry of Health, Kenya appointed a Taskforce to develop a policy and oversee the implementation on an MC programme.

Approach: The taskforce consisting of three sub-committees comprises government agencies, UN agencies, and civil society organizations. MC policy was approved in November 2007 and published in January 2008. Facility assessment and acceptability studies have been carried out. The clinical manual for safe male circumcision, a communication strategy for MC as well as indicators for monitoring and evaluation have been finalized. Dialogue with non-circumcising communities is on-going. Training curricula and operational strategy are being developed. We have also carried out sensitization of health care providers and community leaders.

Lessons learned/Challenges: Translation of research findings into policy is lengthy and laborious. It is important to build capacity for countries to enhance this process. Human resource capacity may not be sufficient to meet MC demand.

STRENGTHENING HEALTH SYSTEMS FOR PNEUMONIA MANAGEMENT IN CHILDREN

Current challenges for effective case management

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Effective case management is an important strategy to reduce childhood pneumonia mortality in children. Evidence based guidelines though available are used variably. Case management strategy is shown to be effective but there are challenges which need to be addressed.

Clinical overlap: Guidelines assume that any child with fever, cough with fast breathing has pneumonia and needs antibiotics. This clinical definition can overlap with diseases not requiring antibiotic. Referral for inpatient management: Accurate recognition of the child with clinical deterioration, supported by a mechanism that allows prompt referral to a health facility is currently inadequate in resource-limited settings. Important issues about antibiotic choice and duration include:

- Assessing clinical efficacy of antibiotics on the basis of treatment failure
- Antibiotic therapy in populations with predominant viral infections
- Ability of the health workers to recognize and treat severe pneumonia in the community
- Increasing global coverage of effective vaccines against *H. influenza* type b and pneumococcus
- Difficulty in diagnosis of pulmonary TB as a cause of acute pneumonia in TB endemic areas
- Unspecified duration of antibiotic treatment for severe pneumonia in HIV infected and malnourished children.

Unsatisfactory management of hypoxaemia in resource limited settings due to ambiguity in definition and difficulties in detection of hypoxaemia, availability and proper utilization of oxygen. Undetermined value of micronutrients like zinc in severe pneumonia. Definition and management of treatment failure needs revised standardization based on evidence which distinguishes between benign treatment failures in viral infections and true treatment failures indicating deterioration.

ESTABLISHMENT OF EFFECTIVE AND RESPONSIVE TB LABORATORY DIAGNOSTIC SYSTEMS IN HIGH-BURDEN COUNTRIES

Significance of an accurate and responsive TB laboratory system for enhanced TB control

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An essential and critical component of each country's National Tuberculosis Control program is their National TB Laboratory system. Accurately performed quality assured laboratory testing plays a critical role in TB diagnosis, treatment monitoring, and surveillance of TB prevalence and drug resistance. Successful functioning of the TB laboratory system requires a well-established laboratory network, a continuous supply of diagnostic tools, adequate well-trained and appropriately managed human resources, a good laboratory information system, quality assurance program, appropriate laboratory safety practices, and partnership with other programs as well as the private sector. With a well functioning network of laboratories performing quality AFB smear microscopy, modern and rapid diagnostic tests can be incorporated into the existing laboratory network at various levels. Availability of well-trained personnel in TB diagnostics and laboratory management is critical to functioning of the laboratory system. A good laboratory information system is essential to ensure that the test results are quickly returned to the clinicians to assist them in appropriate decision making. Quality assurance programs for AFB smear microscopy, culture and newer diagnostic tests can build confidence in laboratory services and improve utilization of these essential services by the clinicians. Partnerships with other programs and private sectors also providing laboratory services can optimize use of available resources and improve the quality of laboratory systems as a component of a more comprehensive health care system.

Building and implementing TB laboratory capacity for diagnostics, vaccine trials and surveillance in Western Kenya

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The initiation of tuberculosis epidemiology studies at the KEMRI/CDC field research station in Kisumu, Kenya has created the need for onsite tuberculosis laboratory capacity. Our objective is to establish a safe and high quality mycobacterial laboratory that is able to meet current and future research and program needs. As the first step we established within an exist-

ing laboratory building a laboratory that could handle approximately 40 000 sputum samples from a TB prevalence survey for sputum concentration and fluorescence microscopy. The next step is renovation to meet biosafety level 3 requirements and perform solid and liquid mycobacterial cultures, and the last phase introduction of drug susceptibility testing. During the symposium progress, challenges and lessons learned will be discussed.

Decentralising TB culture and drug susceptibility testing customised according to local needs, and including integration with other laboratory diagnostic programmes (HIV, malaria)

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Background: Infectious diseases remain a major public health problem in Côte d'Ivoire. Tuberculosis (TB) is endemic in the context of the high prevalence of HIV infection. To effectively support TB activities, a number of achievements have, with the support of institutional partners, placed greater emphasis on the TB laboratory. The purpose of this communication is to show the Ivorian approach for decentralisation of TB culture, sensitivity tests and the integration of HIV activities in a low-income country.

Implementation Strategy: In the 1980s, culture for the diagnosis of TB began in the laboratory of Bacteriology-Virology of the Pasteur Institute of Côte d'Ivoire. In 1995 with the support of partners, CeDRes and the Pasteur Institute performed the microbiological component of a multicentre study conducted by The Union on primary resistance to first-line TB drugs. Furthermore, based on a strategy of strengthening human resource capacity through recruitment and training and rehabilitation of existing infrastructure and equipment, all in collaboration with the National TB Programme and the Ministry of Higher Education and Scientific Research, the TB laboratory network has been increasing gradually from 2004.

Results: A survey of primary TB drug resistance was conducted in 2004. The 96 functional TB laboratories in the country began screening for HIV infection in 2008. Increasing numbers of sensitivity tests using solid media were conducted in 2006 and 2007 in patients experiencing treatment failure. A procedure for transporting samples from patients to CeDRes laboratories and the Pasteur Institute was established in 2007. The TB centers of Bouake and Adjamé were rehabilitated to begin performing primary cultures.

Conclusion: Facing the expansion of the drug resistant TB and the HIV pandemic, decentralisation of culture may significantly contribute to improve TB control in developing countries.

ENGAGING COMMUNITIES AGAINST TB AND TB-HIV IN LATIN AMERICA: A PAHO INITIATIVE

Empowering AIDS activists in the fight against TB and HIV co-infection: experiences of Mexico and El Salvador

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Objective: Empowering AIDS activists in the fight against TB-HIV co-infection.

Methodology:

- 22 in-depth interviews were conducted among government officials ($n = 17$) and representatives of non-governmental organizations ($n = 5$). There are political will for implementing joint TB-HIV and MDR in Mexico. It recognizes the importance of a body coordinator of TB-HIV and MDR TB and XDR TB (77%, $n = 22$). There is recognition that isoniazid should be offered to people with HIV (80%, $n = 22$). It is recognized that HIV services can be offered in TB health facilities (72%, $n = 22$).
- It was organized a forum for dialogue between government and civil society. It discussed issues such as the role of activism in TB-HIV and MDR, the government's response and social consequence of the co-epidemic.
- 500 persons with HIV were trained as peers educators/advocates on TB-HIV and MDR and XDR. Stigma and discrimination are obstacles for TB-HIV health services (92%). Advocacy of human rights are essential to improve the quality of life of those affected (100%). Government and civil society should be engaged in integrated TB-HIV health services (85%).

Conclusions: Empowerment is an effective tool for a better involvement of affected communities in prevention and care for TB-HIV and MDR. It is important to consider that the community training represents a preventive-care within its social dimensions, and stresses the need to take into account the political perspective of the communities affected by these two co-epidemics.

Governmental support in community involvement: four success stories

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Setting: El Salvador has been classified as a country of high/intermediate TB prevalence by WHO for the last 10 years. Regarding TB-HIV the country has been classified as a country of high prevalence of HIV because since 2003 the percentage of HIV in TB cases has been consistently over 5%.

Objectives: The country has adopted the six components of the Stop TB strategy and we wanted to evaluate trends in TB cure and mortality rates for the period 1996–2006. Also the HIV component of the strategy has been addressed by among other actions, the introduction of ART therapy in the public system of care in the year 2000 and we were interested in surveying as well the national trends regarding cure and mortality rates in the national cohort of TB-HIV patients.

Method: The cure and mortality rates for TB between 1996 and 2006 as well as the TB-HIV rates for the period 2000–2006 as reported to the National TB Program were reviewed.

Results: In El Salvador TB cure rates have increased from 68% to 91% and TB mortality has been reduced from 6% to 3.7% from the year 1996 to the year 2006. Cure rates for TB-HIV patients have been consistently improving from the year 2000 (42.1%) to the year 2006 (72.1%). Mortality rates in TB-HIV co-infection have come down from 47.4% in the year 2000 to 17.6% in 2006.

Conclusion: El Salvador's National TB program has vigorously pursued the STOP TB strategy particularly DOTS enhancement and expansion with full access and community DOTS, engagement of all care providers, empowerment of people with TB and communities and meeting the HIV challenge. Cure and mortality rates in both the TB and TB-HIV population have improved largely through government support of community involvement.

SYMPOSIA: MONDAY 20 OCTOBER 2008

DELIVERING EFFECTIVE TB TREATMENT TO CHILDREN: THE CHALLENGES

Preventive therapy for children: implementation

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Young children living in close contact with a source case of smear-positive pulmonary TB are at particular risk of *M. tuberculosis* infection and disease. The risk of developing TB following infection is greatest for infants and young children under 5 years. Hence, the World Health Organization and the International Union Against Tuberculosis and Lung Disease recommend that all National TB Programs screen household contacts for symptoms of disease and offer isoniazid preventive therapy to children aged less than 5 years and all HIV-infected children who are household contacts. Nevertheless, the effective delivery of preventive therapy to children remains a challenging task. During this session, we will review the literature and guidelines regarding preventive therapy in children, provide a conceptual framework within which to address the challenges of implementing a preventive therapy program, and discuss potential solutions to overcome the hurdles of successful program implementation.

Treatment of TB in HIV-infected children

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The clinical presentation of HIV and tuberculosis in children are often similar. Co-infection is also common. Diagnosis of tuberculosis in children is difficult, leading to delayed diagnosis and treatment, and it is even more difficult in HIV infected children. Differentiating tuberculosis from other mycobacteria is often not done and can lead to inappropriate case management. Children with HIV demonstrate greater morbidity and mortality due to tuberculosis than HIV-negative children. They can also have several consecutive episodes of tuberculosis without real possibility to be sure if it is relapse or new infection. Treatment of tuberculosis in HIV-infected children, especially when they are not eligible for highly active antiretroviral treatment (HAART), is similar to that used in non-HIV infected children (2RHZE/4RH). It could be of some interest to treat them longer than uninfected children, but data are lacking. In children eligible for HAART, tuberculosis is usually treated first, at least during the 2-month intensive treatment period and

HAART is started after 2 months. When it is necessary to start HAART earlier, non nucleosides such as efavirenz are easier to use than protein inhibitors. When an HIV infected child is treated with HAART, the incidence of tuberculosis is dramatically decreased, with the exception of tuberculosis related to immune reconstitution inflammatory syndrome. Most anti-tuberculosis drugs are made for adults and are not adapted to children, which is also the case for several antiretroviral drugs. Tablets have to be divided and the pharmacokinetics of the use of these drugs in children have not been documented. In conclusion, tuberculosis in HIV-infected children has specific and difficult management aspects, even if HAART dramatically reduces the incidence of tuberculosis.

Use of second-line anti-tuberculosis drugs in children

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Second-line anti-tuberculosis drugs are mainly used for MDR-TB treatment. Other uses are alternative regimens for drug hepatotoxicity, non-tuberculous mycobacteria treatment, and use of ethionamide for treatment of TB meningitis. Problems identified with second-line drug use in children:

- 1 In countries with a high TB burden, such as many sub-Saharan countries, second-line drugs are either not available or their use is restricted
 - 2 Child-friendly drugs, both formulations and size of tablets in mg, are unavailable
 - 3 Children are rarely diagnosed with MDR-TB because cultures are seldom obtained and drug susceptibility testing is infrequent
 - 4 Second-line drugs are generally more toxic than first-line drugs and some adverse events are difficult to monitor in children
 - 5 Pharmacokinetic data, and knowledge of optimal doses for children are lacking
 - 6 Very little is known about cross reactions between second-line anti-tuberculosis drugs and antiretroviral (ARV) drugs in children co-infected with HIV.
- Possible solutions are:

- 1 National TB programs together with organizations such as WHO and the Green Light Committee should strive to make second-line drugs available to all countries with a good national TB program, especially those that have laboratory facilities to confirm MDR-TB
- 2 Development of tablets with child-friendly doses or solutions should be advocated
- 3 Although it is difficult to confirm MDR-TB in children, children with known adult MDR-TB source cases should be treated as MDR-TB until proven otherwise

- 4 Improved monitoring and reporting of adverse events, especially in long term use, should be encouraged and solutions sought to overcome these when detected
- 5 The urgent promotion of pharmacokinetic studies of all second-line anti-TB drugs in children
- 6 Careful observation and reporting of cross reactions between second-line drugs and ARV drugs.

Children, as much as adults, need second-line anti-tuberculosis drugs, as it can improve the outcome in many children with MDR-TB or other complications.

PROMISING HIV PREVENTION INTERVENTIONS AND STRATEGIES

HIV prevention in care and treatment settings: prevention interventions for HIV-infected individuals

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Background: Transmission from an HIV-infected spouse or cohabitating partner accounts for a large proportion of new infections in sub-Saharan Africa (SSA). Disclosure to partners, rates of partner testing, and condom use in stable relationships are low. Efforts to identify HIV-infected individuals, identify and counsel discordant couples, and counsel PLWHA on risk reduction are critically needed.

Intervention: With PEPFAR support, the CDC's Global AIDS Program developed a package of prevention interventions for PLWHA. Health care providers are trained to deliver prevention messages and services to PLWHA during routine clinic visits, including counseling on disclosure of HIV status, partner HIV testing, sexual risk reduction practices, adherence to ARVs and alcohol reduction. Management of STIs in PLWHA and their partners is also integrated into the routine care of PLWHA. Lay counselors, many of whom are PLWHA, are trained to counsel patients on prevention, medication adherence and positive living, and to provide HIV counseling and testing to patients' partners. Trainings and tools for health care providers and counselors have been developed to integrate prevention into routine care in HIV and other clinical settings.

Outcomes: Currently, 11 of 18 PEPFAR countries in SSA are adapting these interventions for HIV clinic settings. Implementation to date suggests that it is acceptable and feasible for health care providers to deliver prevention messages and services to PLWHA as part of routine care. Successful scale-up requires national policies and guidelines on integration of prevention into the care of HIV-infected persons in all

clinical settings. Evaluation of this package of interventions is currently underway in 18 HIV clinics in 3 countries.

Recommendations: Prevention interventions with PLWHA are a key part of a comprehensive HIV prevention strategy and should be integrated into all clinical settings providing care to PLWHA including HIV, TB and PMTCT.

Behaviour change communication: a radio serial drama for HIV prevention

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Background: Achieving health goals depends, in part, on people's adopting healthier behaviors, including adherence to treatment. Behavioral interventions may be more effective when they provide models of desired behaviors, address barriers to change, and are linked to cultural stories. The Modeling and Reinforcement to Combat HIV/AIDS (MARCH) strategy promotes behavior change through role models in serial dramas and community activities. Because MARCH is suited to addressing overlapping issues, programs in Botswana, Zambia and Guyana address HIV and other health issues such as TB.

Purpose: This presentation describes the MARCH strategy, including how HIV+ characters in the Botswana drama adhere to IPT, and draws on evaluation data to describe responses to MARCH.

Findings: Quantitative data collected in 2003 (18 months after the launch) from a nationally representative sample in Botswana suggest that the dramas are popular (46% listened weekly). Data suggest that MARCH prompts changes in factors that influence behavior, such as knowledge and attitudes. Controlling for demographics, weekly listeners were more likely to correctly reject 3 myths and identify 3 modes of prevention (aOR = 1.60, $P = 0.05$), and to correctly identify modes of mother-to-child transmission (aOR = 2.40, $P < 0.01$). They also had lower scores on a stigma scale (beta = -0.15, $P < 0.05$) and were more likely to intend to test for HIV (aOR = 1.81, $P < 0.01$). Qualitative data from listeners and survey data from pregnant and post-partum women suggest that identification with characters may be a mechanism for change. Qualitative data showed that listeners could correctly identify role models, saw similarities between themselves and role models, and aspired to be like role models.

Conclusions: Given the nature of the role models and the length of the programs, MARCH is suited to address overlapping health issues like HIV & TB. Experiences suggest that MARCH is popular and that listeners respond positively to the drama.

Addressing alcohol and its role in HIV prevention

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Alcohol use and abuse is associated with behaviors which increase the risk for sexual transmission of HIV. Alcohol consumption influences sexual risk behavior through its effects on the user's cognitive processes such as judgment and sense of responsibility. Studies in sub-Saharan Africa have shown that persons who use alcohol have higher HIV prevalence than non-drinkers. Furthermore, it has also been demonstrated that persons who drink more heavily and report being intoxicated in sexual situations also report less condom use and more concurrent sex partners compared to their counterparts. Available data from southern Africa, where HIV is most prevalent, show that up to 50% of persons living in the region report current alcohol use. While alcohol use has been acknowledged as a potential risk factor for HIV transmission, currently there is a serious lack of evidence-based intervention programs that focus on alcohol use as a significant component of HIV prevention. PEPFAR is working with its partners to develop and implement a strategic approach to alcohol and HIV prevention, which include a range of activities to effectively address alcohol abuse and HIV risk behavior at the policy, community, and individual behavior levels.

INNOVATIVE APPROACHES TO INCREASING HIV PREVENTION, CARE AND TREATMENT AMONG TB PATIENTS

Experiences and lessons learnt from providing antiretroviral therapy (ART) in TB clinical settings

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Background: In many sub-Saharan Africa countries, the majority of TB-HIV patients do not access HIV care and treatment services including anti retroviral therapy (ART) due to poor referral systems, among other reasons. To improve the access of TB-HIV patients to CTC services, we started providing ART and cotrimoxazole preventive treatment (CPT) to TB-HIV patients in an urban TB clinic in Tanzania.

Methodology: In July 2006, Temeke TB clinic started providing HIV care and treatment services together with TB drugs under one roof to TB-HIV patients. Prior to that all TB-HIV patients were referred to the CTC. We conducted an assessment of TB-HIV patients who

were referred to CTC in the country compared to those receiving care and treatment in TB clinic in Temeke.

Results: Of 61 950 new TB patients registered in Tanzania between January to December 2007, 30 809 patients (50%) accepted HIV testing and 14 386 (47%) were HIV-infected. Among TB-HIV patients, 13 771 (96%) were referred to Care and Treatment Clinic (CTC) but only 9748 (68%) were actually registered for care. A total of 10 404 TB-HIV patients (72%) received cotrimoxazole prophylaxis and 4484 (31%) were on ARV. Data analysis for the patients registered at Temeke is ongoing.

Conclusions: A significant proportion of TB-HIV patients referred to CTC are not accessing ART. Provision of CTC services in TB clinics under 'one roof' model could improve access of TB-HIV patients to life saving ARV drugs and CPT.

Evaluation of barriers to uptake of HIV testing and antiretroviral therapy (ART) among TB patients as a tool for programme scale-up and improvement

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Background: Thailand is a high HIV prevalence country and it is one of high-burden TB countries. Interventions to decrease burden of HIV in TB patients include provision of HIV testing and counseling to all TB patients and initiation of ART for TB patients with HIV infection. Although, Thailand has a national policy to support these, actual practice varies.

Method: We analyzed routine program reports to evaluate the barriers to uptake of HIV testing and ART among TB patients from a pilot project implementing in 15 hospitals geographically distribute in Thailand. These hospitals implemented Provider initiated HIV testing and counseling (PITC) in TB clinics. Post-test counseling was provided at TB clinic for non-HIV infected patients and at HIV clinic for HIV-infected patients. HIV clinic provides HIV treatment and care for all HIV positive TB patients during TB appointments. TB patients registered between April and December 2007 were included for the analysis.

Results: About 84% (1418/1914) had known HIV status and of these 19% were HIV-infected. The most common barriers for HIV testing and counseling were patients diagnosed and treated outside TB clinic, and elderly patients. Of available data among 196 HIV positive TB patients registered during July–December 2007, 43% received ART during TB treatment. The major barrier of providing ART was limited experience among doctors and nurses to manage adverse reactions to TB and HIV treatment as well as lack of the specialist services when they encounter patients with complex medical conditions.

Conclusions: The barriers to uptake of HIV testing

were minimal, but those for ART were critical. Strong support from HIV program staff is needed to mentor doctors and nurses to be competent to start ART for HIV positive TB patients during TB treatment.

TB IN MIGRANT POPULATIONS: ENSURING EQUITABLE AND EFFECTIVE ACCESS TO TB DIAGNOSIS AND CARE

Effectiveness of TB screening methods and strategies in migrants in European low-incidence settings

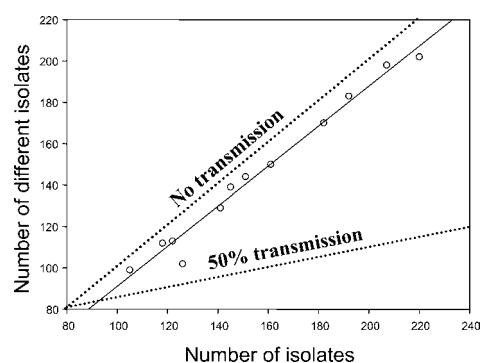
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A literature review was done with the objective to review the effectiveness of TB screening methods and strategies in migrants in European countries. Extracted data on yield were used to evaluate the effectiveness of different screening strategies. Yield was defined as the number of TB cases detected divided by the total number of persons screened. Median patient yield of chest X-ray screening reported in 38 studies in 10 EU countries included in this review was 0.35% (interquartile range 0.11–0.71%). Reported yields varied considerably between studies, countries and over time. When considering only the studies representative of national screening programs in EU countries (14 studies) a median yield of 0.18% (interquartile range 0.10–0.35%) was reported. The data did not indicate any preference for either one of the three main strategies, screening at port of entry, screening at reception or holding centre or screening in the community post arrival. The variation found between studies and over time likely reflects variation in the major risk factors and particular the composition of the migrants entering the country. In addition screening yield in the majority of studies was higher than expected based on the prevalence in the country of origin. Although no preference for either screening strategy was indicated by this review several recommendations can be made on screening programs in the EU. There is an urgent need for uniform reporting to guide evidence based decisions, better targeting of those with a higher risk of developing active disease both at entry and thereafter, inclusion of groups that are currently not properly covered, improved treatment outcome rates, special attention for migrants who travelled back to their country of origin, better education for health care providers, improved access to care for migrants, integration with other services and a good follow up system. The ideal long term TB control strategy will be global investment in TB control.

Low transmission rates from immigrants to local population: an assessment of public health risk

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Traditional contact tracing may overestimate the transmission rate of tuberculosis (TB), especially in high-risk populations. The genetic diversity of all *Mycobacterium tuberculosis* strains isolated in Norway during 1994–2005 was determined, in order to estimate the impact imported TB had on the national TB situation. Among 3131 patients diagnosed with TB, isolates from 2173 were analyzed by IS6110 restriction fragment length polymorphism. Only 33% of the strains originated from non-immigrants and 67% were isolated from immigrants. The incidence of TB showed a steady increase throughout the study period. However, the genetic diversity and proportion of clustering were stable (Figure). Among non-immigrants both the incidence and the proportion of clustered strains decreased. Only 13 outbreaks included more than five individuals and 10 of these were due to imported strains of *M. tuberculosis*. A total of 385 clustered isolates were identified within 135 clusters. Among the 250 secondary cases 75 represented non-immigrants and 175 were immigrants. Only 23 non-immigrants and 159 immigrants were infected within the country by imported *M. tuberculosis* during the 12 years. The results demonstrated that although 67% of TB cases were notified in immigrants from high-incidence countries, the transmission rate in the receiving country did not increase. In the resident population the incidence and the proportion of clustering was sinking throughout the period. The results made a strong argument that imported TB had a negligible effect on TB transmission in Norway. The established control program could prevent that import of TB from high-prevalence parts of the world led to increased transmission in the receiving country. Thus, low-incidence countries may control the transmission rate of TB, despite immigration and international travel. To avoid future increase in the transmission of this disease, the current control strategies should be maintained.



Overseas immigration visa medical exams: the physician's perspective, the Philippines

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Philippines ranks ninth among high TB burden countries globally. The continuous migration of large number of Filipinos led to an increasing TB incidence among low TB burden countries, including the United States. Stringent policies on TB screening, treatment and monitoring for immigrant visa applicants are opportunities to avert the risk of disease transmission and promote effective TB control. St. Luke's Medical Center-Extension Clinic is the sole facility in the Philippines providing medical screening for U.S. immigrant visa applicants for the last 25 years. Our mandate is to identify those with medical conditions posing risk to both public safety and public health, including tuberculosis. In 2007, the Centers for Disease Control and Prevention (CDC) through the Division of Global Migration and Quarantine, formulated new technical instructions for TB screening and treatment (2007 TBTI). This TBTI was implemented in the Philippines in October 2007 among persons applying for US immigration who are required to have medical examination. The changes in the 2007 TBTI include the performance of TST among children ages 2–14, Mycobacterial cultures among persons suspected of having TB, drug susceptibility testing (DST) on positive isolates, and contact tracing and monitoring. Treatment delivered as directly observed therapy (DOT) is also required for applicants with TB disease. This presentation will validate the efficacy of the 2007 TBTI in TB screening, treatment and surveillance among US immigrant applicants and identify issues and challenges that may assist in formulating innovative measures to enhance the current medical screening process for tuberculosis among immigrant visa applicants in the Philippines.

Overseas immigration visa medical exams: the physician's perspective, Mexico

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In 2007, the pre-immigration examination for US entry applicants was expanded to require tuberculosis cultures for adolescents and adults with abnormal chest radiographs, treatment until cure via directly observed therapy (DOT) for TB culture positive applicants, as well as testing for latent TB infection in children. These new activities posed challenges for immigration clinics in countries, like Mexico, where the in-country standards of care differed and the infrastructure for DOT was insufficient. Despite these challenges, the Mexican Panel sites, which provide US

entry examinations, have developed the elements to fulfill these new requirements. Since the beginning of the new system, in October 2007 until March 2008, the Mexican Panels have screened 51 249 of applicants, found 112 culture proven cases, and have created a DOT treatment facility where the majority of these patients are being treated. In addition, 2141 of children have been identified with TB skin tests ≥ 10 mm and they have been referred for follow-up evaluations in the US as required by the new instructions. Future steps include enhancing laboratory capacity, creating treatment facilities in other parts of the country, and implementing a quality improvement approach incorporating feedback from end-users in the US (receiving providers and health department) and the applicants. In addition, partnerships with immigration clinics worldwide will be pursued to leverage and support the strategic position of these clinics in the control of TB among migrating populations.

Experiences and lessons learnt with pre-migration screening for TB

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The International Organization for Migration (IOM) is the leading inter-governmental organization in the field of migration. Migration health is one of IOM activities which cuts across all areas of migration management. Pre-migration screening for TB has been an important focus for resettlement countries such as Australia, Canada, New Zealand and the United States (US) all of which have a long history of migration. Active case detection of TB suspects using radiological screening and sputum smear examination had formed the basis of pre-migration screening for person travelling to the US, although TB culture has been an additional requirement of other resettlement countries for many years. Outbreaks of MDR-TB among refugees from Thailand resettling to the US led to a revision of TB screening requirements (Technical Instructions) to additionally include TB culture for suspects. In 2007, these new Technical Instructions (TIs) were piloted in Thailand, and revealed limitations in local laboratory capacity which increased the processing time for migrants, affected pipeline, delayed departure and led to repeated examinations. Establishment of an IOM TB culture laboratory improved the processing speed. The new TIs have subsequently been implemented in Vietnam, Nepal, Tanzania and Kenya. This has required IOM to establish a network of quality assured TB culture facilities with appropriate bio-safety measures using trained personnel. Standard operating procedures, standardised reporting, quality assurance and performance indicator monitor of laboratory testing are essential components of the IOM laboratory services.

SOCIAL EQUITY AND ETHICAL CARE: CRITICAL DETERMINANTS OF LUNG HEALTH

Global inequities in the determinants of health and the challenges for fair health systems

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Socio-economic inequalities lead to persistent inequalities in health and disadvantage in access to health care in those with highest health needs. The example of east and southern Africa is used to highlight a range of dimensions across which inequalities exist in preventable determinants of health and access to health care, despite the adequacy of resources globally to address them. This limits achievement of health Millennium Development Goals, even under conditions of economic growth, and makes equity a critical policy objective for national and global strategies for improved health. Many actions to address such inequalities lie outside the health sector, but health sectors can play a vital role in improving health equity. There is evidence of equity gains when national health systems redistribute resources towards prevention, towards underserved areas, to community, primary and secondary levels of services and through needs-based resource allocation and equitable financing. Health systems have provided leadership for wider actions across a range of sectors to improve physical, economic and social environments for health, and provided normative frameworks and opportunities for communities to strengthen their own power and role in decisions over the resources that affect their health and to encourage action on health and effective use of services. Yet the evidence suggests that despite policy commitment to such measures, their application has been inconsistent, contested and challenged by competing paradigms, competing policy objectives and choices, resource constraints, bureaucratic cultures and political pressures. The paper explores some of the key drivers of these constraints at national and global level, particularly from an African lens, and the implications for moving policy commitments to health equity and fair health systems from paper to practice.

Justice and the distribution of research resources

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Injustice in the distribution of medical research resources is reflected by the 10/90 divide—a phenomenon whereby less than 10 per cent of medical research

resources focus on diseases responsible for 90 per cent of the global burden of disease, and vice versa. The majority of medical research is driven by commercial interests rather than the aim to address the world's most important health care needs. Research and development (R&D) on diseases that primarily affect the poor remains largely neglected. This paper illustrates misdistribution of research resources even among diseases of poverty. HIV/AIDS currently kills approximately 2.1 million people per year. TB kills almost as many: approximately 1.7 million. It has been estimated that HIV/AIDS will cause 4.5 times as many deaths as TB in 2015. In 2005, HIV/AIDS caused approximately 2.6 times as many DALYs as TB, and it is projected that HIV/AIDS will cause almost 6 times as many DALYs as TB in 2015. Though HIV/AIDS kills more people and causes more DALYs than TB, the former receives a disproportionate amount of research funding. More than 15 times as much is spent on clinical trials for AIDS drugs in the US than is spent for TB drugs worldwide. The US NIH—the largest funder of health research in general and TB research in particular—spends almost 20 times more on HIV/AIDS than TB research. Though the research spending gap between HIV/AIDS and TB likely reflects disproportionate activism surrounding these two diseases, structural reform is needed to amend the broader problem of the 10/90 divide. We thus evaluate alternative incentive schemes for incentivising R&D for neglected diseases such as TB. The establishment of a Health Impact Fund that would reward innovating companies in proportion to the disease burden reduction attributable to their new drugs and/or diagnostics, for example, might cost-effectively increase both availability of and access to urgently needed new medical technologies.

Access to high quality TB diagnosis and treatment: an ethical perspective

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The increasing prevalence of drug-resistant tuberculosis (TB) and in particular the emergence of extensively drug-resistant TB (XDR-TB) threatens global TB control, requires the reframing of ethical issues related to TB diagnosis and treatment and a re-examination of the health system responses to these issues. In high-burden countries which lack resources to deal adequately with TB control and with drug resistant TB in particular, the main ethical issue is the lack of access to high quality diagnosis and treatment. In low-burden settings, key issues include the presence of draconian public health measures such as mandatory treatment and incarceration. Underlying these themes, and related to other talks in this symposium, is the issue of the equitable distribution of health care resources. The ethical issues are most starkly demonstrated at

the border between high-burden, low-income and low-burden high-income countries and with health system approaches to TB control in marginalised population groups in both settings. In this talk, these issues will be explored with reference to a number of examples from the literature and the author's own experience in several countries. The examples will illustrate the ethical dilemmas faced by clinicians and policy makers and will make reference to the ways in which health systems need to respond to the changing circumstances posed by drug resistance and in particular by XDR-TB.

SUCCESSFUL MODELS OF COMMUNITY AND PARTNER INVOLVEMENT IN TB CONTROL

Community involvement in scaling up integrated TB and HIV services in Kenya

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Background: Kenya is a 13th among the 22 high tuberculosis (TB) burden countries, with a case notification rate of 338/100 000, TB-HIV co-infection of 48%, case detection of 70% and cure rate of 85% [DLTLD, 2007; WHO, 2008]. HIV infection has fuelled TB disease in the country and this has called for scaling up of TB and HIV integration from national to community level. Community involvement in TB activities has been a great concern in Kenya. PATH in collaboration with the DLTLD made the initiative of increasing community participation in TB-HIV activities through mass media, workplace program, magnet theatre, community leaders sensitization and school health program with support from Global Fund for AIDS, TB and Malaria [GFATM]. PATH developed TB-HIV communication and advocacy strategies for DLTLD which are being used to guide the implementation of the above activities.

Description: Mass media: The leading three provinces with high burden of TB-HIV were identified for the first phase of implementation. The most popular radio stations using local languages were selected based on the Steadman's report on the media. PATH in collaboration with DLTLD and other partners developed key messages on TB-HIV in areas of basics of TB-HIV, treatment and drug adherence, TB-HIV co-infection, diagnosis, prevention and TB-HIV in special groups which were aired weekly for twelve weeks. The speakers were drawn from national, provincial and district TB-HIV coordinators, civil societies and people living with TB and TB-HIV infection. People from different parts of the country would call through their mobile

phones and text messages asking questions on their areas of concern and they would be answered through the radio. This was an interactive radio talk show. The second phase of the radio talk targeted three other local radio stations in additional three provinces. A total of 60 radio talk shows were aired from the six radio stations.

TOBACCO IN ALL ITS FORMS: BIDI AND SHISHA SMOKING

The health effects of bidi consumption

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Bidi is a short smoking stick (~6 cm) containing a small amount of tobacco (~0.2 g) in a tree (diospyrous melanoxylon) leaf. Bidi is often portrayed as a safe alternative to cigarette based on misconception that it is natural; tobacco is unprocessed; and, there is no use of paper. Bidi however, packs a strong punch in terms of tar and nicotine delivery. The health effects of bidi smoking have not been studied as extensively as for cigarettes. Still quite a few studies have been reported and they demonstrate the same kind of health effects as for cigarette with similar or higher level of risk. In particular, bidi smoking is demonstrated to cause several types of cancers (mouth, pharynx, larynx, esophagus, lung), heart disease and lung disease in numerous studies, just like cigarette smoking. In addition, in India, the most important health consequence from bidi smoking is tuberculosis. From several case control studies, one of them representative of whole of the country and one cohort study, smoking has been estimated as responsible for 40% deaths among males who are tuberculosis patients. In a cohort study the relative risk for all cause mortality among bidi smokers was 1.64 (95%CI 1.47–1.81) compared to 1.37 (95%CI 1.23–1.53) for cigarette smokers. For smoker of 1–5 bidi per day the relative risk was 1.42 (95%CI 1.20–1.68) compared to 1.20 (95%CI 1.02–1.42) for smokers of 1–5 cigarettes per day. Thus as per available scientific data, bidi is no less harmful than cigarette and most likely, it is even more harmful. Even a small amount of bidi smoking carries substantial risk of adverse health consequences that are fatal.

Bidi taxation and regulation: time for a change?

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Objective: Should bidis (shredded tobacco rolled in a tendu leaf) be taxed more efficiently? Can the bidi

industry be regulated? This presentation discusses opportunities to align fiscal policies and industry regulation with public health objectives to reduce smoking related mortality and ensure substantial health gains in India.

Discussion: Bidis account for 77% of the smoked tobacco in India. Bidis have been proven to be at least as harmful as cigarettes and about 10 bidis are smoked for every cigarette. While the bidi industry is often regarded as being an 'unorganized sector', this is a contradiction as it has also been described as 'a highly regulated economic activity' (ILO Working Paper 2004). The manufacture and sale of bidis involves several constituencies; tendu leaf harvesting, bidi tobacco farming, manufacture of the finished product and wholesale/retail trade. Low wages, child labour, health hazards, oppressive work environments, exploitation contribute to the development of a product labelled the 'poor man's cigarette'. Bidis are virtually untaxed although the government raises significant revenue through comparatively higher cigarette taxation. Bidi taxation appears to be guided more by the consideration that poor people should be burdened lightly than by the need to impose punitive rates to discourage consumption.

Conclusion: Inefficient tax administration of bidis is perverse and insensitive, subsidises human lives for political gains and supports myths perpetuated by the tobacco industry. There is a public responsibility to regulate the bidi industry, impose rational and punitive taxes, inform and educate the public and reduce smoking related mortality in India.

Pack warnings and labels in India

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Bidi is the most common form of tobacco product in India. About 40% tobacco consumed in India is in the form of bidi compared to <20% as cigarette. Bidi is very inexpensive (about one-fifth the cost) and is termed as poor man's cigarette. Bidi smoking is concentrated among less educated and those with low socio-economic status. Epidemiologic data confirm a strong inverse trend of bidi smoking with literacy and socio-economic status. Thus most bidi smokers are unaware of health consequences and need to be provided with appropriate information. In contrast, bidi manufacturers are completely exempt from putting any warning label on bidi packets that is mandatory on cigarettes and smokeless tobacco products. Under the recent tobacco control act, pictorial warnings on all tobacco products including bidi are mandatory and such warnings were notified two years back. Bidi manufacturers, with their political clout and intense lobbying, were able to get the notified pictorial warnings diluted considerably and have been able to stall

the implementation even of diluted warnings to date. For example, the law was amended to delete skull and crossbones as a danger sign on tobacco products and pictures of dead body and oral cancer patients. Politicians supporting bidi used arguments that had no basis. For example, a minister argued that using skull and crossbones sign would hurt religious sentiments. Results from a survey especially conducted to investigate this claim demonstrated it to be a completely false proposition. Despite very clear science and obligations under Framework Convention on Tobacco Control that was signed and ratified by India long back, pictorial warning labels for tobacco products do not appear to be close to implementation.

Waterpipe smoking

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Waterpipes have been used to smoke tobacco and other substances by the indigenous peoples of Africa and Asia for at least four centuries. A widespread but unsubstantiated belief held by many waterpipe users today—that the practice is relatively safe—is as old as the waterpipe itself. Generally, waterpipes have a head, body, water bowl, and hose. There are regional and/or cultural differences in some waterpipe design features, such as head or water bowl size, number of mouthpieces, etc., but all waterpipes contain water through which smoke passes prior to reaching the smoker. The waterpipe smoker may therefore inhale as much smoke during one session as a cigarette smoker would inhale consuming 100 or more cigarettes. It is likely that the reduced concentration of nicotine in the waterpipe smoke may result in smokers inhaling higher amount of smoke and thus exposing themselves to higher levels of cancer-causing chemicals and hazardous gases such as carbon monoxide. Waterpipe smoking is often social, and two or more people may share the same waterpipe. In south-west Asia and North Africa, it is not uncommon for children to smoke with their parents. In Iran about 3% of population are waterpipe smokers, but in young adults occasional waterpipe smoking is increasing in recent years (about half in male and one third in female).

MDR- AND XDR-TB: EPIDEMIOLOGY, CASE FINDING, TREATMENT AND ASSESSING THE IMPACT OF INTERVENTIONS

MDR-TB in a setting with low level of MDR-TB and high HIV prevalence

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Setting: HIV prevalence in Rwanda is 3% among the adult population. MDR-TB prevalence is 3.9% among new smear-positive TB cases and 9.4% among Category II patients. Category IV treatment was started in Rwanda in July 2005.

Method: This article presents a retrospective study of 207 MDR-TB patients treated with Category IV regimen between July 2005 and May 2008. The standard regimen consists of 6Km+Ofx+Pto+Cs+Z/14Ofx+Pto+Cs. All MDR-TB patients undergo HIV testing at the beginning of Category IV treatment if it has not been done before. HIV-infected patients receive cotrimoxazole prophylaxis and ART if eligible, according to national guidelines.

Results: Since July 2005, 207 patients have started Category IV treatment; of these 41% are HIV-positive and women represent 68%. According to their treatment history, 21% of the HIV-positive patients were Category I failures, while this rate was 37% among HIV-negative patients. The evaluation of conversion at 6 months of treatment ($n = 105$) shows that 78% of the HIV-infected and 80% of HIV-negative patients were smear- and or culture-negative. The treatment outcomes ($n = 70$) show that the cure rate was 90% among HIV-positive patients and 85% among HIV-negative patients, with respective death rates of 10% and 15%.

Conclusion: The rigorous DOTS Plus strategy, cotrimoxazole prophylaxis and ART considerably improve the outcomes of MDR-TB treatment even in HIV-positive patients. A wider number of cases is needed to verify these results.

Recording and reporting of MDR-TB where there is a strong private sector

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Background: The Philippines is 9th of 27 priority countries for MDR-TB. The Green Light Committee-approved MDR-TB management of the Tropical Disease Foundation (TDF) started as a Private-Public Mix DOTS (PPMD) unit. Operating in the midst of a large private sector, many of its patients were never on DOTS. Since 2003, the PPMD strategy was launched to engage private doctors in proper TB management.

More than 2000 private practitioners have been trained. Concurrently, programmatic management of drug-resistant TB (PMDT) is being mainstreamed into the NTP.

Results: Data from the Electronic Medical Records of TDF May '99–May '08 showed that 64% of 2005 drug-resistant TB suspects seen in the TDF MDR facility were private and 36% were public. Private patients came from private practitioners/hospitals, PPMD units, faith-based organizations/NGOs, while public referrals came from government hospitals and health centers. From 1999–2008, there was a decrease in private referrals from 92%–66% and increase in public referrals from 8%–46%. Enrolled cases from the private dropped from 86%–50% with an increase of 14%–50% among those from the public. In terms of TB registration groups, there was a considerable decrease in non-DOTS cases with an increase in DOTS cases. As part of mainstreaming MDR-TB into the NTP, existing DOTS forms for recording and reporting were reviewed and revised to reflect MDR-TB data, e.g., results of culture and drug susceptibility testing. Consultative meetings with implementing partners and the NTP were done to come up with agreed revisions and to discuss the flow of MDR-TB reports. Adapting old forms was advantageous since these are familiar to healthworkers making training and implementation manageable. A guiding principle in finalizing forms was to simplify forms, avoid duplication and include only a minimum of variables to reflect the basic indicators of the program.

Case finding and treatment of MDR-TB treatment in a setting with high prevalence

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Introduction: Due to certain activities aimed at improving the epidemiological TB situation and implementation of the DOT strategy, TB incidence in the civil sector of the Arkhangelsk Region decreased from 48.0/100 000 in 2000 to 45.7/100 000 in 2007. Death rate decreased from 18.2/100 000 in 2005 to 12/100 000 in 2007. However among new TB cases the level of patients for whom standard treatment schemes were ineffective because of MDR has increased from 2.7% in 2000 to 16.4% in 2007. Among previously treated cases this level has gone up from 17.6% to 31.3% respectively. This demonstrates considerable reservoir of multidrug resistant tuberculosis.

Aim: To study the peculiarities of MDR-TB transmission in the civil sector of the Arkhangelsk Region based on the new monitoring system.

Design: Creation of modified registration and reporting forms for MDR-TB monitoring based on WHO

recommended forms and developing the system of information exchange between the central register and 26 district TB coordinators; analysis of quarterly and annual reports on TB and MDR-TB registration.

Results: 60 new MDR-TB cases were registered in 2000 in the civil sector, 80—in 2001, 127—in 2002, 254—in 2003, 269—in 2004, 202—in 2005, 216—in 2006, 143—in 2007. During this period more than 65% of all registered TB cases were patients with primary MDR. MDR-TB prevalence in 2000 was 12.1/100 000 ($n = 177$), in 2001—15.9 (229), in 2002—23.8 (340), in 2003—25.2 (357), in 2004—30.8 (406), in 2005—39.3 (513), 2006—43.8 (565), 2007—34.1 (436).

Conclusion:

- 1 High levels of MDR-TB threaten epidemiological TB situation. There is a need for introducing DOTS Plus program to decrease the number of patients suffering from the most dangerous form of TB.
- 2 The next stage of the MDR-TB monitoring system will be evaluation of treatment outcomes of this patient category and the impact of the DOTS Plus on the epidemiological TB situation.

MDR-TB: experience in Lesotho

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Aim: Benefits of a community-based approach to MDR-TB screening and treatment.

Background: Lesotho's population is 1.8 million, with an HIV+ rate of 24%, and TB incidence of 635/100 000. DR-TB is widespread, partly due to close proximity with South Africa. Lesotho began vigorous screening and management of MDR-TB in 2007, including the development of a community-based MDR/XDR-TB treatment program. Before this, second-line drugs were available, but limited support for patients taking the drugs. Start-up activities included creation of a national MDR-TB referral hospital for critically ill patients; creation of a central MDR-TB Pharmacy for management of medications; and refurbishment of the central TB laboratory.

Methods: As of August 2007, all patients diagnosed with MDR-TB were enrolled in the community-based program. Previously diagnosed patients taking self-administered therapy were encouraged to enroll. Care was initiated at home, supervised by a treatment supporter (TS) who visited the patient's home twice a day. TSs were trained to give injections and monitor side effects and complications, and also screened household contacts for TB and HIV. All patients and contacts received HCT, and patients were evaluated by a clinician monthly. ART was initiated early for all HIV+ patients, regardless of CD-4 count. Food packages were provided to all patients, TSs received a monthly incentive, and transport fees were reimbursed for both. Family planning services and psychosocial

counseling was also provided. Hospital-based care was available for severely ill patients.

Results: During the study period, there were no defaulters. The HIV co-infection rate was 80%. TSs were successful in promoting adherence and reporting side effects promptly. Most patients were severely malnourished, which improved with treatment and nutritional support.

Conclusion: Community-based care utilizing MDR-TB treatment supporters can be very successful in a resource limited setting with high HIV prevalence.

MDR-TB and XDR-TB: experience in a developed country

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Global trends in MDR-TB and emergence of XDR-TB have resulted in new challenges for global TB control efforts. Complexities associated with diagnosis and treatment of these patients has prompted TB control programs to enhance their TB control activities for dealing with these challenging cases. During the mid '80s, the United States experienced TB resurgence, including an increase in the number of MDR-TB cases. In response, the Federal Government developed the 'National Action Plan to Combat Multidrug-resistant TB,' and received new resources to begin the implementation of several action steps outlined in that plan, i.e., improving the identification of TB cases, upgrading state laboratories for early diagnosis and prompt recognition of drug resistance via routine and systematic drug susceptibility testing, updating treatment recommendations, broad-scale use of directly-observed therapy as a tool to improve treatment completion, and emphasized the need for ongoing program evaluation. Successful implementation of these steps resulted in controlling TB, including MDR-TB in the country. These efforts would need to be continued and enhanced to ensure prevention and control of emergence of XDR-TB.

IMPROVING ACCESS TO QUALITY TB DIAGNOSIS FOR THE POOR

Rural poverty and delayed presentation to TB services

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Background: The Malawi National TB Programme and its partners have published and presented a significant body of work around the barriers that poor urban populations face in accessing TB services. However since 80% of the population lives in rural

areas further research was undertaken to understand the delays and costs faced by rural people in accessing a TB diagnosis and to identify strategies to increase access to services.

Results: We found that patients accessing services were typically less poor than the general rural population (an average of 56% were poor compared with 69% in the study districts): poorer people are not getting access to services. Barriers are predominantly related to the distances people have to travel (a median of 11 km to reach a provider) and the cost of getting and staying there.

Conclusions: Access to services can be improved by:

- i Further reducing (to one) the number of visits required for a diagnosis through improvements to smear microscopy and through new technologies
- ii Improving the quality of current services to ensure that results are made available and reported more quickly
- iii Developing new diagnostic tests that can be delivered at community level and ensuring that health systems have the resources required to do so
- iv Scaling up public-private partnerships with formal and informal providers
- v Improvements to livelihoods.

Using existing technology and 'one-stop' approaches to improve the cost effectiveness of TB case detection for the poor in Africa

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Tuberculosis (TB) is a disease of poverty and its diagnosis relies on the examination of sputum samples using smear microscopy for the majority of patients. Samples for diagnosis are collected over two days as spot-morning-spot in most poor settings and the process is time consuming. Patients need to make repeated visits to the clinic before commencing treatment and often stop attending after the first consultation. Although it is necessary to improve the efficiency of the diagnostic approaches, there are very few new technologies that could replace smear microscopy as a diagnostic test for resource-poor settings.

The use of existing technologies could be optimised to increase the sensitivity of microscopy and shorten the time for diagnosis. These include the examination of reduced numbers of smears, the processing/digestion of sputum (e.g. bleach or NaOH), concentration techniques (e.g. sedimentation and centrifugation) and LED-fluorescent microscopes.

Schemes that collect and examine smears in an accelerated fashion, called here—frontloading smear microscopy—also have the potential to reduce the

time required for diagnosis. This paper will present preliminary data of a WHO-sponsored study that collects sputum samples in an accelerated fashion and examines the specimens using both ZN and LED-FM. The presented will argue that the use of these approaches, single or in combination, may increase the sensitivity and reduce the time necessary to complete the diagnostic process and that these approaches could result in more patient-friendly and efficient schemes for resource-poor settings of Africa.

A randomised, controlled trial of sputum processing techniques to improve quality of smear microscopy

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Setting: REACH Trust, Malawi; Bwaila Hospital, Malawi; Wellcome Clinical Research Programme, Blantyre, Malawi and Liverpool School of Tropical Medicine, UK.

Introduction: Several studies in recent years suggest that sputum concentration using bleach improves sensitivity of smear microscopy. There have, however, been no direct concurrent comparisons of the various bleach concentration methods.

Aim: The study aimed to compare centrifugation at 3000G for 15 minutes and sedimentation for 45 minutes utilising 3.5% bleach (sodium hypochlorite-NaOCl) as a disinfectant and digestant.

Design: Samples from patients whose smear status was initially designated by direct smear microscopy of unconcentrated sputum were blinded and randomly allocated to one of 3 processing arms: A—bleach concentration, B—bleach sedimentation, and C—Petroff concentration (NaOCl) and culture.

Methods: For process A an equal amount of 3.5% NaOCl was added to the sputum sample in universal container and shaken for 20 seconds, incubated at room temperature for 30 minutes and spun for 15 minutes at 3000G. For process B an equal amount of 3.5% NaOCl was added and each sample was hand shaken as in process A. For Process C an equal volume of 4% sodium hydroxide was used to rinse out the sample container before centrifugation prior to culture on Lownstein Jensen slopes. Smears were stained and read using the Ziehl Neelsen technique according to The Union.

Results: Recruitment and sample collection were completed in April 2008 and a total of 510 patients who submitted all sputum specimens according to the schedule were recruited (255 smear positive and 255 smear negative). Results will be presented during the

conference. At the time of writing final mycobacterial culture results (the gold standard for comparisons) are awaited prior to unblinding the study for analysis. In addition possible implications will be discussed for the concept of front-loading of smear microscopy in order to improve access by the poor.

TB diagnosis as a catalyst for strengthening laboratory systems

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The laboratory plays a critical role in diagnosing tuberculosis (TB) and monitoring its treatment. The success of TB control depends on a network of laboratories that provide sputum smear microscopy for case finding and monitoring of treatment. The laboratory system is an integral part of the general health care network and TB diagnosis is carried out within these laboratories. However laboratory services are often faced with poor or absent quality assessment (QA) mechanisms. Improving the quality of TB diagnosis would serve as a catalyst for improving the quality of other microscopically diagnosed diseases such as malaria.

We assessed the feasibility of linking malaria microscopy into the existing TB microscopy QA system in Kano, Nigeria. A model system was designed for selecting and blinded rechecking of TB and malaria slides from these laboratories. Supervision and evaluation was conducted at 3 monthly intervals between March 2005 and April 2006.

The integrated system improved the quality of TB and malaria microscopy results. For TB Microscopy the Specificity increased from 80% to 97.9%–100%; Concordance rate increased from 81% at baseline to 91.0% at the final assessment. False positivity decreased significantly ($\chi^2 = 59.8$, $P < 0.001$) from 19.0% at the baseline to 1.8% at the final assessment. Increase in case finding reflected by the increase in the number of smear positive cases in Kano state from 1484 in 2005 to 2306 in 2006. The QA process was expanded to 10 more microscopy centres by the beginning of 2007. For malaria microscopy there was an increase in specificity from 77.8% to 80.0%; Concordance rate increased from 69.2% at the baseline, to 83.3% at the final assessment. Decrease in false positivity rate from 30.8% at the baseline to 0% at the final assessment.

This project demonstrated that it is feasible to integrate the QA system for TB and malaria microscopy and other microscopically diagnosed diseases.

The community diagnosis programme: bringing quality assured diagnostics closer to the community

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The Community Diagnostics Programme (CDP) aimed to design and operate a functional system for providing quality-assured diagnostic services for anaemia and malaria to poor communities in five states in Nigeria. In each state a team of four laboratory supervisors/trainers designed the programme during workshops. The supervisors introduced simple diagnostic tests for malaria and anaemia into 92 primary health care (PHC) and 12 secondary health care (SHC) facilities across the five states, achieving population coverage of about 1 million.

Using a colour scale, haemoglobin was estimated with 70% accuracy by PHC staff—a great improvement on clinical diagnosis alone. Initially 40% of malaria microscopy results performed by SHC were incorrect, predominantly due to over-diagnosis. The CDP introduced rapid tests into PHC facilities which had an accuracy of 91%. In just three months, targeted re-training improved the accuracy of haemoglobin results by over 6% and malaria microscopy by 9%.

For the first time in Nigeria, the CDP established a generic system for providing quality-assured diagnostics that operated across all tiers of the state health service and reached those living in poor rural areas. The system was able to monitor the quality of test performance, identify problems and deliver cycles of targeted training to improve the quality of the tests. The CDP provided a platform on which to build other simple tests to meet the health needs of the rural poor, and has produced an evidence base to inform national scale-up. The CDP could form a model system for the implementation of point of care diagnostics for TB once they become available.

CONTROL OF TB TRANSMISSION IN HEALTH CARE FACILITIES: REDUCING THE GLOBAL THREAT TO LUNG HEALTH?

TB infection prevention and control: ten steps to get started today

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The dramatic increase in the prevalence of multi-drug resistant tuberculosis (MDR-TB) including XDR-TB, and the influx of HIV-infected persons into health services seeking HIV care and treatment in resource-constrained settings have highlighted the urgency of implementing tuberculosis infection control practices

into health care and other congregate settings where TB patients and PLWHA receive care. Current practice is based on the WHO 1999 Guidelines for the Prevention of Tuberculosis in Health Care Facilities in Resource-limited Settings and the 2006 WHO Addendum to the 1999 Guidelines, Tuberculosis Infection Control in the Era of Expanding HIV Care and Treatment. However there has been very limited implementation of these guidelines in resource-limited settings. While these guidelines are being revised, the WHO STOP TB Partnership TB Infection Control Subgroup of the Global TB-HIV Working Group in collaboration with the HIV/AIDS and Stop TB Departments at WHO have issued guidance on TB infection control practices to health care facilities termed 'Essential Actions for Effective TB Infection Control: Safety Without Stigma.' This presentation will discuss these essential actions, which include 1) include patients and community in advocacy campaigns; 2) develop an infection control plan; 3) ensure safe sputum collection; 4) promote cough etiquette and cough hygiene; 5) triage TB suspects for 'fast-track' or separation; 6) assure rapid diagnosis and initiation of treatment; 7) improve room air ventilation; 8) protect health care workers; 9) link with other infection control efforts; 10) monitor infection control practices.

Biosafety in TB laboratories: status of recommendations

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While TB laboratories have suffered years of neglect, biosafety has even more so. The World Health Assembly calls for universal access to culture and drug susceptibility testing (DST) for 2015. To fulfill the needs, at least 2000 new culture and DST laboratories have to be established and 22,000 newly recruited staff have to be trained.

Laboratory acquired TB infections are poorly documented. A study (IJTLD 2007(11): 138–142) showed that the relative risk of TB compared to the general population was found to be 1.4 in microscopists and 21.5 among technicians carrying out drug-susceptibility testing. The risk of exposure to *Mycobacterium tuberculosis* varies with the types of laboratory procedures performed in the laboratory, as generation of and exposure to infectious aerosols containing live tubercle bacilli vary on the procedure. Biosafety conditions should be optimal in laboratories to prevent occupational TB among laboratory staff.

For the protection of the laboratory staff, aerosols produced during TB laboratory activities need to be minimized and contained. Specimen processing for culture purposes has to be performed in Biological Safety Cabinets (BSCs), at least in Biosafety Level 2 (BSL2) facilities. However, culture manipulation for identification and DST must be performed in BSL3 fa-

cilities. Applying these recommendations to line probe assays for the detection of resistance, processing of smear-positive specimens for direct testing should be performed in a BSL2, whereas performing the assay on positive cultures would require a BSL3 (WHO policy statement, 2008).

For most high burden countries, there are major constraints to the successful establishment, staffing and maintenance of BSL3 laboratories. A WHO-CDC project will provide a manual which will fulfill the needs of low-income countries to design, organize and maintain safe conditions in BSLs where TB procedures (microscopy, culture, DST, molecular tests) are carried out.

What will it cost to implement TB infection control in resource-limited settings?

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TB infection control is one component of the revised Stop TB strategy and a new TB Infection Control Subgroup has been recently established. Infection control measures aim at protecting health workers from TB and reducing the risk of TB transmission among patients. Guidelines for implementation of infection control measures exist and are being widely disseminated, some countries have already developed plans to implement TB infection control measures. An essential factor of any of these plans should be the cost. Although there is no magic number to answer the question how much will it cost to implement TB infection control, there are a few possibilities to explore to cost an infection control plan. It is recommended that any method to cost these plans follow an ingredients approach, where the quantities of resources required are identified separately from the prices of these resources, then costs are calculated as the quantity used multiplied by the unit price. Therefore, an important basis for costing these plans is the current framework for infection control, which will help identify the activities and inputs needed, in addition to the country's knowledge on the quantities required of these resources. This framework is composed of three broad areas of work: a) programmatic and administration interventions, b) environmental control, and c) protection of health care workers. All the details of this framework are used in the planning and budgeting tool for TB control, developed by WHO, which by combining quantities and prices, as defined by the country, helps estimating the cost of the plan. In this way, at the end, the cost will reflect the plan for implementing TB infection control in a country.

IMPLEMENTING THE THREE I'S: SCALING UP INTENSIFIED CASE FINDING, ISONIAZID PREVENTIVE THERAPY AND INFECTION CONTROL FOR TB FOR PEOPLE LIVING WITH HIV

Why not now? Community perspective of the three I's

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Background: Much effort has gone into mustering political will for 3 I's (Isoniazid Preventive Therapy, Intensified Case Finding and Infection Control), but the critical challenge comes with plans and policies for implementation. For many years, TB programmes have failed to translate sound theories into reality, due in part to the absolute dearth of infrastructure and human resource capacity needed for the execution of otherwise good strategies. New and improved approaches are essential to secure the success of the 3 I's.

Findings and Lessons Learnt: Although community involvement has often been treated as an add-on to the core content of TB programmes and policies, some of the most significant recent successes in the fight against TB in Southern Africa have come from community-driven initiatives, underpinned by comprehensive treatment literacy programmes. The management of drug-resistant tuberculosis in Lesotho is propped up by dozens of community workers trained in the science of TB. Community treatment literacy initiatives in South Africa have boosted patient adherence; and in Botswana, a mass media infection control campaign, produced by a community group, triggered widespread public interest in infection control of TB in homes. TB is a community disease that is most successfully addressed in and by the community.

Conclusion: The success of health initiatives is greatly enhanced by synergistic partnerships with the community. In the context of under-resourced health care systems that do not have the capacity to cope with increasing patient loads, there is an increasing recognition of the value to be gained from educating communities in the science of TB, and engaging them as implementers and monitors, not merely beneficiaries. Now is the time to learn from programmes that have benefited from this value, and to integrate these lessons into the implementation of the 3 I's.

Kenya, TB control and the three I's

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Issues: Kenya has recently achieved the WHO targets of case detection rate of 70% and treatment success rate of 85%. Despite successfully initiating TB HIV collaborative activities in third quarter 2005, implementation of activities targeting the three I's now beginning to take root and lessons learnt are immediately used to improve on implementation.

Description: Kenya has successfully established a strong foundation to roll out TB HIV collaborative activities but faces challenges in three I's implementation including accelerating and establishing infection control measures that meet the current demands, effectively rolling out IPT and conducting intensive TB case finding activities. Recently the country successfully introduced Intensive TB case Finding Activities (ICF) to aggressively pursue infectious TB cases in all settings including prisons and correctional facilities and schools. In addition, more faster and sensitive equipments like LED microscopes have been distributed in high volume TB diagnostic laboratories to improve on case finding and turn around time aiming at reducing diagnostic delays. These new initiatives are bearing positive fruit with tremendous impact on overall TB control. Mechanisms to follow all smear positive TB patients and screen immediate contacts are now underway.

Lessons Learnt: Where there is focused leadership and integrated support, implementation of three I's is possible even in resource limited settings.

Next steps: Ensure that Quality Assurance issues on improved microscopy is put in place and rolling out infection prevention measures that target the community, health care workers and health care settings.

DO CLINICAL TRIALS INFLUENCE PROGRAMMATIC ISSUES IN TB CONTROL?

Investigation of the safety and efficacy of a 4-FDC for the treatment of tuberculosis (Study C): methods and preliminary results of the 12-month patient follow-up

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Background: The use of fixed-dose combined (FDC) drugs in the treatment of tuberculosis by control

programmes has been strongly recommended by the Union and WHO. Advantages of FDC drugs include preventing the emergence of drug resistance due to monotherapy, reducing the risk of incorrect dosage, simplifying procurement and prescribing practices, aiding adherence and facilitating directly observed treatment. However, large scale trials examining their use have not been carried out. To this end, the Union launched a multicentre clinical trial, Study C, to evaluate the efficacy, acceptability and toxicity of an FDC when given in the initial intensive phase of treatment of patients with newly diagnosed smear positive pulmonary tuberculosis.

Methods: Parallel group open-label randomised control trial using non-inferiority design. Smear-positive patients were randomised to receive either an FDC or separate formulations of the four drugs isoniazid, rifampicin, ethambutol and pyrazinamide in the initial eight weeks intensive phase of treatment.

Results: Between August 2004 and September 2006, a total of 1585 patients were randomised from eleven centres in Asia, Africa and Latin America. Patients found to have MDR disease or MOTT are excluded from the study analysis. An interim analysis showed no difference between the two study arms in terms of culture conversion at 2 months. These results will now be updated and presented together with the combined failure/relapse status at 18 months post randomisation. Data will also be presented according to HIV status. Lastly, data on adverse events during treatment will be presented.

Conclusion: The implications of these results for National TB control Programme policy recommendations will be discussed.

Long-term results of Study A and their impact on national TB control programmes

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Background: A WHO-recommended 8-month regimen based on ethambutol and isoniazid has been evaluated in a randomised clinical trial against a standard 6-month regimen based on rifampicin and isoniazid.

Methods: 1355 patients with newly diagnosed smear-positive pulmonary tuberculosis were randomly assigned one of three regimens in an open label non-inferiority design. The regimens were: daily ethambutol, isoniazid, rifampicin, and pyrazinamide for 2 months, followed by ethambutol and isoniazid for 6 months (2EHRZ/6HE); the same drugs but given three times weekly in the initial intensive phase (2[EHRZ]3/6HE); or the same initial intensive phase as the first regimen, followed by 4 months of daily rifampicin and isoniazid (2EHRZ/4HR). Follow-up was to 30 months after the start of chemotherapy. Throughout the study

sputum was examined by microscopy and culture. Unfavourable outcome was defined as failure during treatment or relapse afterwards.

Results: At 2 months, a significantly higher proportion of patients assigned the daily intensive phase than of those assigned the three-times-weekly regimen were culture negative (85% of 828 vs 77% of 433, $P = 0.001$). Twelve months after the end of treatment the two 8 month regimens had significantly inferior outcomes to the 6 month standard regimen; 90% of 346 2EHRZ/6HE, 86% of 351 2(EHRZ)3/6HE having a favourable response compared to 95% of 347 2EHRZ/4HR. Follow-up to 30 months will be presented and the implications of these results for national programmes discussed.

Conclusions: The results of this study have important implications for the management of new cases of smear-positive tuberculosis.

Treatment of MDR-TB: are observational studies key to solving programmatic issues?

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Treatment of drug-susceptible TB is based on decades of drug development and controlled clinical trials. In contrast, treatment of MDR-TB is based on extrapolation and experience. Skeptics have cautioned that comparative intervention studies on MDR-TB would be too difficult, lengthy, or expensive. The Preserving Effective TB Treatment Study (PETTS) is a prospective observational study designed to determine the frequency, risk factors, and consequences of acquired resistance to second-line drugs in MDR-TB patients, comparing GLC-approved and non-GLC programs. Consecutive, consenting adults with pulmonary MDR-TB are enrolled and followed monthly for 2 years. Data are abstracted from medical records, double-entered locally, transmitted to CDC, and merged into a central database. Baseline and monthly sputum isolates are shipped to CDC for DST and genotyping. With USAID funding, PETTS was launched in 2004 in 8 countries. The preparatory work took 1.5 years. Enrolment began in 2005 and ends in 2008. Follow-up ends in 2010. By May 2008, >1400 patients were enrolled and >400 patients reached a study endpoint. Also, >3000 isolates were received and >680 had both DST and genotyping results. Baseline results and preliminary outcomes will be presented. Direct costs average ~\$360,000/yr not including the annual investigators meeting at the Union World Conference. The CDC donates 2+ FTE in kind. Collaborating organizations also contribute staff time. PETTS has proven that multinational, longitudinal clinical research on MDR-TB with centralized microbiology is feasible and affordable. The PETTS network could be a backbone for further prospective studies of MDR-TB. Scientific

rigor should not be equated with value or impact. In the absence of clinical trials, observational studies have had and will continue to have an important impact on the management of MDR-TB.

What use is qualitative research to TB policy?

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While crucial for much epidemiological research, RCTs are regularly given prominence (in journals, by powerful institutions and at programmatic levels) for all research addressing tuberculosis control and policy. The current dominance of medical models, an apparent lack of understanding of the wide range of methodologies involved in qualitative research, and a failure to adequately address and discuss questions of epistemology (the conditions under which knowledge is generated) potentially undervalues different perspectives and disciplines necessary for the creation of appropriate TB policy. Yet the types and value of qualitative research knowledge is wide ranging, and generated across a range of methods from micro-level observational studies to population based surveys. Drawing on a number of research examples in tuberculosis control this presentation argues that we need to look more critically at the questions posed in research, and the design methods used. Well conducted small scale research that provides interpretive depth, is theoretically challenging and contextually rich may be just as useful for the creation of TB policy as a large scale RCT. We need to acknowledge and respect difference, and draw on relevant and diverse expertise to assess the value of such research. Finally we reflect on the structural impediments to publication of qualitative research, for example in journals like the *IJTLD*, appropriate expertise on the editorial board, and to the rules for framing and presenting research findings.

IMPLEMENTATION OF TB-HIV LABORATORY QUALITY ASSURANCE SYSTEMS

Quality assurance for clinical laboratory diagnosis

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Quality assurance (QA) of any process, including clinical laboratory, involves three major components, such as criteria (standards) of quality, quality control,

including internal quality control (QC) and external quality assessment (EQA) and quality improvement (QI). In a ideally performing QA system all three components construct permanently moving cycles: QI and EQA verify compliance of laboratory procedures to accepted standards, identify weak points and possibilities for improvement, whereas QI activities brings actual procedures to the accepted standards and induce introduction of higher level standards. Examples of good performing laboratory QA systems can be observed in many disciplines of laboratory medicine/clinical laboratories in many countries of the world. Such QA systems are basing on well developed international and national standards, regulations and traditions covering all components of a laboratory process (human resources, equipment and supplies, laboratory management, methods in use . . .). Their experiences demonstrate that QA procedures are resources consumable activities. Increase of efficiency and credibility of laboratory results justify excessive expenses for QA. However in many high burden countries with limited resources or ineffective financial policy in public health care, TB laboratory system suffers significant deficiencies, which weaken QA system and deteriorate TB laboratory tests' efficiency. In such cases coordinated external and internal inputs should be taken to support comprehensive country/region specific realistic QA programme aimed to the increase of quality criteria levels step by step instead of spontaneous inputs into separate components of a laboratory process body.

Performance indicators for AFB microscopy, culture and drug susceptibility testing

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Setting: Thailand TB Active Surveillance Network Laboratories: Bangkok, Chiang Rai, Phuket, Tak, and Ubon-ratchathani, Thailand.

Objective: Mycobacteriology laboratories in resource-limited, high tuberculosis burden settings are expanding to perform conventional solid media culture and broth-based mycobacteriology culture. Indicators that measure how well a laboratory performs sputum microscopy have been developed and broadly implemented. Routine monitoring of sputum culture performance, however, is not as common.

Design: We implemented indicators for monitoring the quality of laboratory services in five province-level mycobacteriology culture facilities in Thailand.

These indicators were derived from literature review, consultation with subject matter experts, and our program experience.

Conclusions: We believe that an international consensus document providing monitoring guidelines for mycobacteriology laboratories is urgently needed.

Quality assurance for TB-HIV laboratory systems in Europe

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With the constantly increasing prevalence of HIV infections the problem of HIV associated with TB will be more threatening in the coming years. TB diagnosis among persons living with HIV (PLHIV) is difficult due to the characteristics of the infections (bacterial and viral load), and also to both the lack of new technologies and poor utilization of existing tools. In addition, laboratory services are in general the weakest component in many countries with the TB-HIV burden, with poor coordination and management within and among TB and HIV services, poor or inexistent quality assurance (QA) system, insufficient human resources and culture facilities. Moreover, though international and national QA guidelines for TB and HIV laboratories are available they are often neglected or not systematically applied. Nonetheless, quality assured laboratory services are essential to guarantee correct and reliable diagnosis and monitoring of the therapy of TB-HIV co-infected cases, in particular for the diagnosis and treatment of the resistant forms of TB and HIV, and of the opportunistic infections (OIs). In high-HIV burden settings, molecular methods may provide effective tool for the rapid diagnosis of MDR-TB. In this regard, there is a recognized need to develop and standardise international protocols for an effective implementation of molecular biology techniques, including quality assurance systems for the identification of infectious agents and for the commercially available MDR-TB rapid tests.

Notes

ABSTRACT PRESENTATIONS SATURDAY 18 OCTOBER 2008

THEMATIC SLIDE PRESENTATIONS

PROGRESS IN THE DIAGNOSIS AND TREATMENT OF TUBERCULOSIS

TS-81219-18 Multiple mutations in *rpoB* gene *M. tuberculosis* correlate with high level of resistance to rifampicine

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The aim of this study was to investigate the significance of multiple-mutations in the *rpoB* gene, predominant nucleotide changes and its correlation with high levels of resistance to rifampicine in *Mycobacterium tuberculosis* isolates that were randomly collected from sputum samples of 44 patients with primary and secondary active pulmonary tuberculosis from different region of Belarus. Drug susceptibility testing was determined using the CDC standard conventional proportional method. DNA extraction, *rpoB* gene amplification, and DNA sequencing analysis were performed. Thirty-three (75%) isolates were found to have multiple-mutations (composed of 2–5 mutations) in the *rpoB* (β -subunit) gene. Increased number of predominant mutations and nucleotide changes were demonstrated in codons 523 (GGG→GCG), 531 (TCG→TTG), 510 (CAG→TAG, GAG, AAG) and 526 (CAC→CTC, GAC) with a higher frequency of mutations found among patients presenting with secondary tuberculosis infection with elevated levels of resistance to rifampicine (MIC $\mu\text{g/ml} \geq 100$). Furthermore it was demonstrated that the combination of mutations with their predominant nucleotide changes were also observed in codons 510, 523, 526, and 531 indicating higher frequencies of mutations among patients with secondary infection respectively. In this study, 76% ($n = 38$) of multiple-mutated isolates were found to have mutation combinations involving nucleotide changes in codons 523 (GGG→GCG), 531 (TCG→TTG), 526 (CAC→CTC, GAC), and demonstrating predominant mutations in the last nine codons of β -subunit (523–531) are associated with higher levels of resistance to rifampicine ($\geq 100 \mu\text{g/ml}$).

TS-81558-18 Extensively drug-resistant tuberculosis: a comprehensive treatment approach

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Background: Extensively drug-resistant tuberculosis (XDR-TB) has been reported in 45 countries, including resource-limited, high TB-burden settings. Ambitious global treatment targets have been established, without any published treatment strategies. We describe XDR-TB prevalence, management, and outcomes among TB patients referred for individualized, ambulatory therapy in Peru.

Methods: 810 patients were referred for free individualized therapy and necessary adjunctive services—including resective surgery, adverse event management, and nutritional and psychosocial support—between February 1999 and August 2002. 651 patients' isolates were tested for XDR-TB (resistance to at least isoniazid, rifampin, a fluoroquinolone, and a second-line injectable agent) before treatment. Regimens were constructed to include ≥ 5 drugs to which the infecting isolate was not resistant. Outcome classification conformed to international definitions.

Results: 7.4% (48) patients had XDR-TB; the remainder had multidrug-resistant (MDR) TB. XDR-TB patients had received more prior regimens (4.2, SD: 1.9 vs. 3.2, SD: 1.6, $P < 0.001$) and had isolates resistant to more drugs (8.4, SD: 1.1 vs. 5.3, SD: 1.5, $P < 0.001$). No XDR-TB patient was HIV co-infected. Twenty-nine (60.4%) completed treatment or were cured, compared to 412 (67.6%) MDR-TB patients (χ^2 , $P = 0.31$). XDR-TB patients received daily, supervised therapy with 5.3 drugs (SD: 1.2), including cycloserine, an injectable, and a fluoroquinolone.

Conclusion: In one of the largest reported cohorts of patients treated for chronic, resistant TB in a resource-limited setting, we demonstrated that XDR-TB can be cured in HIV-negative patients, through outpatient treatment. Aggressive supervised regimens for XDR-TB, as part of a comprehensive, ambulatory therapeutic approach, should supplant repeated, subcurative regimens.

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TS-81683-18 Mutations at *embB306* are sufficient for conferring resistance to ethambutol

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Background: *EmbB*, an arabinosyl transferase, is the target of the first-line antituberculosis drug ethambutol. Approximately 50–60% of ethambutol-resistant clinical isolates have missense mutations at *embB306*. Despite this association, the precise role of mutations at *embB306* in ethambutol resistance is controversial. **Objective:** To determine if *embB306* mutations are sufficient to confer ethambutol resistance.

Methods: The contribution of *embB306* mutations to ethambutol resistance was examined 1) by directly replacing the wild-type *embB306* allele with mutant alleles previously associated with resistance (*embB* M306V or M306I) in a pansusceptible *M. tuberculosis* strain and 2) by replacing mutant alleles in the chromosome of spontaneous ethambutol-resistant mutants with the wild-type allele. The marked mutations were introduced via specialized transducing phage and incorporated into the chromosome by homologous recombination. Transductants with either a wild-type or mutant *embB306* allele were analyzed for their susceptibility to ethambutol by determining the minimum inhibitory concentration (MIC) of ethambutol on Middlebrook 7H10 agar.

Results: The MIC of ethambutol was reduced four-fold for three of the four spontaneous-ethambutol resistant *embB* mutants when the mutant allele was replaced with the wild-type *embB* allele. The MIC for one of the spontaneous mutants genetically reverted to wild-type *embB* was reduced by only two-fold. When the wild-type allele was converted to the mutant allele M306V or M306I, the ethambutol MICs increased four-fold. **Conclusion:** Mutations at *embB306* can cause ethambutol resistance and are an important molecular indicator of ethambutol resistance. Identification of the mutations that confer ethambutol resistance is critical for the development of rapid molecular tests to detect resistance.

TS-81846-18 First evaluation of Xpert MTB prototype assay for rapid detection of pulmonary TB and MDR-TB in Peru and Latvia

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Background: Rapid drug susceptibility testing (DST) is essential to interrupt transmission and to halt the rapid spread of multidrug-resistant TB. Key obstacles to DST expansion have been complexity of available tools and the laboratory infrastructure required for their implementation. The characteristics of GeneXpert (Cepheid, Sunnyvale, CA) make it a unique platform for molecular detection of *Mycobacterium tuberculosis* and associated rifampicin resistance in low-technology settings. This automated, closed system uses a plastic cartridge to concentrate *M. tuberculosis* in sputum, remove inhibitors, lyse cells, and transfer the DNA into an integrated PCR tube. Target DNA is amplified in nested, real-time PCR using a six-color molecular beacon assay. Here we report on the first performance evaluation of a prototype XpertTm MTB assay in Peru and Latvia.

Methods: We evaluated the XpertTm MTB assay on two untreated sputum samples each from 393 consecutive patients with symptoms of pulmonary TB. Results were compared with smear, solid and liquid culture and drug susceptibility testing (DST) on solid medium.

Results: The sensitivity of XpertTm MTB in smear- and culture-positive sputum patients was 99.1% (113/114) and in smear-negative, culture-positive patients 87.5% (21/24). The assay specificity in culture-negative patients with limited follow-up was 97.3% (219/225). Rifampicin resistance was detected with 100% sensitivity (22/22) and 100% specificity (112/112). The hands-on-time for testing 4 samples was 15 min, significantly below that of sputum smear microscopy, and results were available in <120 min. The assay was robust, with a low rate of test failure (24 invalid among 686 assays performed). Technicians with no prior molecular experience easily performed the assay after 1 day of training.

	Xpert sensitivity in smear+, culture+	Xpert sensitivity in smear–, culture+	Xpert specificity in smear–, culture–
TB case detection			
SATLD (Latvia)	93.3% (14/15)	92.3% (12/13)	98.6% (71/72)
UPCH (Peru)	100% (99/99)	81.8% (9/11)	96.7% (148/153)
Total	99.1% (113/114)	87.5% (21/24)	97.3% (219/225)
95%CI	[95.2–99.8]	[69.0–95.7]	[94.3–98.8]
	Xpert sensitivity in RMP-resistant	Xpert specificity in RMP-sensitive	
RMP resistance detection			
SATLD (Latvia)	100% (8/8)	100% (18/18)	
UPCH (Peru)	100% (14/14)	100% (94/94)	
Total	100% (22/22)	100% (112/112)	
95%CI	[85.1–100]	[96.7–100]	

Conclusions: The Xpert MTB assay overcomes limitations of existing rapid tests for DST and has the potential to be implemented as screening tool at microscopy centers.

TS-81951-18 Preliminary results of the Genotype MTBDRplus performance on smear-positive sputum for drug resistance surveillance

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Setting: Tanzania national tuberculosis drug resistance survey (DRS).

Objective: Evaluation of the Genotype MTBDRplus test as a tool to rapidly detect MDR-TB and to scale up DRS coverage in settings where phenotypic tests are not feasible.

Methods: Aliquots of the smear positive survey sputum samples were preserved in 50% ethanol before processing for culture. Phenotypic drug susceptibility testing (DST) using proportion method on Löwenstein-Jensen was performed in Tanzania. A sample of the strains was sent to Antwerp Supra-National TB Reference Laboratory (SRL) for quality assurance (QA) DST together with the alcohol-sputum samples to be tested in parallel. MTBDRplus tests were performed following manufacturer instructions, apart from the alcohol preservation and Boom DNA extraction method. **Results:** Preliminary results show that the MTBDRplus failed to identify *Mycobacterium tuberculosis* in 28 of 193 specimens (15%), probably due to poor specimen conservation tubes. Of the 165 interpretable hybridisation profiles, there were 158 Wild Type versus 7 mutations for the *rpoB* gene, against respectively 141 versus 24 for *katG* and 164 versus 1 for *inhA*. Only 69 DST results could be compared as yet, revealing 100% agreement for rifampicin. Presence of an isoniazid resistance conferring mutation was 100% predictive of DST resistance, but also 4/60 (7%) strains without such a mutation were isoniazid resistant, yielding an overall agreement of 94.2% (65/69). Two sputum samples yielded DNA with *rpoB* but without *katG* or *inhA* mutation, for which DST is ongoing. So far 25% of DST on QA strains failed.

Conclusion: GenoType MTBDRplus from alcohol-preserved smear-positive sputum samples yielded more good results than phenotypic DST on strains sent for QA, and was 100% specific for resistance to rifampicin or isoniazid. Sensitivity also appears to be very high suggesting that MTBDRplus could be used for surveillance purposes, but more DST resistant strains should be compared to validate these findings.

TS-82037-18 Accuracy of tuberculosis diagnostic committee diagnosis in relation to the results of TB culture

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Setting: The TB Diagnostic Committee of Tropical Disease Foundation Inc., Makati Medical Center, Philippines.

Objective: To evaluate discriminatory power of the TBDC diagnosis, using radiographic comparative study of chest X-rays (CXR) among smear-negative patients. This will evaluate the accuracy of TBDC recommendation to undertake anti-TB treatment based on the gold standard which is TB culture.

Methods: Analysis of TBDC recommendations from January to December 2007 made to patients with TB culture (TBC) results available after the TBDC decisions were made. Category I treatment includes seriously ill PTB with extensive parenchymal lesions, Category III minimal parenchymal lesions. All re-treatment cases, depending on the severity degree of lesions and history, fall under Category II or Category IV treatment.

Results: Among the 284 TBDC cases with TB culture results in 2007, there were 93 cases (33%) for anti-TB treatment, 18 (19%) had positive TB culture and 75 (81%) had negative cultures. Of the 14 cases for CAT I treatment, 6 (43%) were TBC+ and 8 (57%) were TBC-. For 57 CAT II cases, 4 (7%) were TBC+; 53 (93%) TBC-. For 16 CAT III cases, 3 (19%) were TBC+ and 13 (81%) were TBC-. While for 6 CAT IV cases, 5 (83%) were TBC+ and 1 (17%) was TBC-. There were 191 (67%) with no anti-TB treatment as recommendation, of which 3 (2%) had positive TB culture and 188 (98%) had negative cultures. We have a diagnostic sensitivity of 86%, specificity of 71% and accuracy of 73%.

Treatment recommendation	TB culture		
	Positive	Negative	Total
For anti-tuberculosis treatment	18 (19%)	75 (81%)	93 (33%)
No anti-tuberculosis treatment	3 (2%)	188 (98%)	191 (67%)
Total	21 (7%)	263 (93%)	284
Anti-tuberculosis treatment			
CAT I	6 (43%)	8 (57%)	14
CAT II	4 (7%)	53 (93%)	57
CAT III	3 (19%)	13 (81%)	16
CAT IV	5 (83%)	1 (17%)	6
Total	18 (19%)	75 (81%)	93
	86%	71%	73%
	Sensitivity	Specificity	Accuracy

Conclusion: The TBDC of the MMC-TDFI has a moderately high accuracy rate in determining PTB among smear-negative patients. It has an excellent negative predictive value however, the positive predictive value is low and the TBDC will need to review criteria on recommending treatment to TB suspects. There was a high percentage of Category I and Category IV TBC+ detection which is vital since CAT I patients have extensive lung lesions and CAT IV patients are MDR-TB that needs immediate treatment.

TS-82177-18 Shortening treatment with rifapentine-based regimens: impact of intermittent dosing and use of moxifloxacin

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Background: Substitution of rifapentine (P) at 10 mg/kg for rifampin (R) in the standard daily (5/7) short-course regimen of R, isoniazid (H) and pyrazinamide (Z) reduces the relapse rate after 10 wks of treatment from 100% to 13%, while the additional substitution of moxifloxacin (M) for H reduces the relapse rate to 0%. The aim of this experiment was to evaluate in greater detail the effect of intermittent dosing and the use of M vs. H on the treatment-shortening potential of P-based regimens.

Methods: BALB/c mice were aerosol-infected with $3.66 \log_{10}$ CFU of *M. tuberculosis*. At treatment onset, 14 days later, the lung CFU count was $7.21 \log_{10}$. Positive controls received RHZ (5/7 or 3/7) while test mice received P_{7.5}HZ, P₁₀HZ or P₁₀MZ (5/7) or P₁₀HZ, P₁₅HZ, P₂₀HZ or P₁₅MZ (3/7). Lung CFU counts were assessed at 4, 8, 10 and 12 wks. Relapse was assessed by holding mice for 3 months after completion of 8, 10 or 12 wks of treatment. The PK profile of each P dose was also determined.

Results: Increasing the P dose and dosing frequency was associated with greater reductions in mean lung CFU (Table). Substitution of M for H was associated with additional CFU reductions of ~ 1 log at 4 weeks. Mice treated with PMZ and PHZ were culture-negative at 8 and 10 wks, respectively. After 8 wks of treatment, 2/15 and 8/15 mice receiving PMZ and PHZ, respectively, relapsed. Relapse rates after 10 and 12 weeks are pending.

Regimen	Week 4	Week 8	Week 10	Week 12
R ₁₀ HZ 5/7	4.58	2.51	2.11	0.45
R ₁₀ HZ 3/7	5.48	3.86	2.77	1.82
P _{7.5} HZ 5/7	3.96	0.91	0	0
P ₁₀ HZ 5/7	3.58	0.32	0	—
P ₁₀ MZ 5/7	2.36	0	—	—
P ₁₀ HZ 3/7	4.22	1.33	0	0
P ₁₅ HZ 3/7	3.97	1.20	0	—
P ₂₀ HZ 3/7	3.73	0.34	0	—
P ₁₅ MZ 3/7	2.49	0	0	—

Conclusions: Daily and thrice-weekly and daily P-containing regimens were much more active than RHZ. Activity correlated with rifamycin exposure (ie, weekly area under the free drug concentration-time curve over MIC). Substitution of M for H improved the activity further, although its overall effect on treatment shortening is not likely to be great. These results support the clinical development of daily and thrice-weekly P-based regimens, with or without M.

TS-82397-18 Lower 2-month sputum culture conversion is associated with extensive cavitation and region of enrolment

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Background: 2-month sputum culture conversion among African patients was markedly lower than among non-African patients in recent clinical trials. We evaluated variation in radiographic severity of disease as a possible explanation for this difference.

Methods: TBTC Studies 27 and 28 evaluated the substitution of moxifloxacin for ethambutol and for isoniazid, respectively, in otherwise standard 4-drug regimens including rifampin and pyrazinamide during the first two months of supervised treatment for sputum smear- and culture-positive, rifampin-susceptible pulmonary TB. African sites were in Uganda and South Africa; non-African sites were in the United States, Canada, Brazil and Spain.

Results: 604 patients were evaluable for 2-month liquid culture conversion. There were 175/277 (63%) African patients in Study 27 and 213/327 (65%) in Study 28. No significant difference in 2-month culture conversion was found in either trial between study arms. African vs. non-African baseline findings and outcomes are shown below.

	Africa (n = 395)	non-Africa (n = 226)
2-month conversion	56%	79%*
HIV co-infection	21%	6%*
Median body mass index	19.1	21.0*
Median haematocrit	35%	37%*
Cavitary disease	79%	64%*
≥4 cm total diameter of all cavities	53%	26%*
Radiographic abnormalities of ≥1/4 of thoracic area	86%	67%*

* $P < 0.001$.

In multivariate analysis, only region (Africa) and extensive cavitation (≥ 4 cm total diameter) were associated with lower 2-month sputum culture conversion. **Conclusion:** Lower sputum conversion in liquid cultures is associated with extensive cavitation and region of enrollment. This finding may have implications for trial design.

POSTER DISCUSSION SESSIONS

TB AND HIV

PC-81358-18 Scaling up HIV testing and counselling among tuberculosis patients

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Setting: Six districts in Lesotho.

Background: In 2006, of 11 523 new tuberculosis cases detected in Lesotho, only 1809 (16%) were screened for HIV. A large proportion of tuberculosis (TB) patients were not benefiting from HIV care and treatment because they did not know their status. Our objective was to increase access to and uptake of HIV testing and counseling among TB patients.

Methods: Eighteen lay counselors, trained for two weeks by Ministry of Health and Social Welfare in HIV testing and counseling (HTC), were placed in TB clinics. The lay counselors were to offer HIV testing and counseling to all TB patients and suspects. Data on TB and HIV were collected through routine quarterly reports to the National Tuberculosis Control Program. Calculations for the following indicators were done using a spreadsheet: proportion of registered tuberculosis patients tested for HIV, proportion HIV positive and the proportion of the HIV positive TB patients that was given cotrimoxazole prophylaxis.

Results: In 2007, a total of 7747 tuberculosis cases were detected in the six districts, and 4006 (52%) were tested for HIV compared to 19% (1493) in 2006. The HIV testing and counseling uptake varied by diagnostic centre, from 36% to 80%. The number of TB patients tested rose steadily during the year, from 879 in the first quarter of 2007 to 1287 in the fourth quarter. A total of 3135 (78%) tested positive for HIV and 2062 (66%) were given cotrimoxazole prophylaxis.

Conclusion: By having lay counselors, more patients were tested for HIV, and those found positive received cotrimoxazole prophylaxis, as well as being referred to the HIV clinic for care.

PC-81410-18 Health system factors affecting uptake of HIV testing among TB patients in Uganda

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Aim: HIV testing is a key entry point within health systems facilitating delivery of TB-HIV services in countries faced with the dual burden of TB and HIV like Uganda. We determined health system factors influencing uptake of HIV testing following TB diagnosis. **Methods:** Structured questionnaires were administered to patients receiving TB care and providers' in-charge of TB clinics from thirteen facilities. The outcome measure was self-reported HIV testing, validated using patient records, and HIV or TB registers. Patient and provider data were analyzed and adjusted for clustering effect.

Results: Among 13 hospitals and health centers, only three had trained ≥ 6 providers on TB-HIV. Nine facilities provided HIV testing outside the proximity of TB clinics while three were located close to TB clinic. Of 403 patients, 142 were excluded because they had tested for HIV before TB diagnosis. Among the 261 analyzed, 169 (65%) had tested for HIV. HIV testing was higher among patients receiving care from: health centers compared to hospitals (AOR = 3.85, CI = 0.96–15.38); facilities where TB and HIV clinics days overlapped ≥ 5 days/week (AOR = 14.91, CI = 3.62–61.28) compared to those with ≤ 4 days of overlap. Facilities where providers offered TB patients the option for HIV testing on ad-hoc basis had lower uptake of HIV testing (AOR = 0.24, CI = 0.06–0.89) compared to where it was routinely offered to all patients. HIV testing was less likely among patients who were not routinely given information about TB-HIV relationship (AOR = 0.61, CI = 0.11–3.24), and in facilities that experienced stock-out of rapid HIV testing kits ≥ 2 –3 times within one year (AOR = 0.08, CI = 0.02–0.42) versus those who experienced stock out once.

Conclusion: Low HIV testing in TB patients may be attributed, in part, to poor coordination between TB and HIV clinics, logistical issues, facility levels and poor provider-patient practices in TB-HIV service delivery.

PC-81855-18 Incidence and risk factors of adverse events on TB treatment at the main referral hospital in Rwanda

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Objectives: To determine the incidence and risk factors of adverse events (AE) on first line TB treatment in a cohort of HIV positive and negative patients.

Methods: Prospective data collection of all consecutive patients with active TB admitted to the Internal Medicine ward of the Kigali University Hospital between 1 May and 14 August, 2007. Follow-up consisted of 3 months.

Results: We recruited 55 patients, 51% male, median age 35 years (interquartile range [IQR] 27–42). Twenty-one patients (38%) had pulmonary TB, 23 (42%) extra-pulmonary TB. Disseminated TB was diagnosed in 31%. Forty-four (80%) were HIV positive with a median CD4 cell count of 82/mm³ (IQR 44–215). Fourteen were on antiretroviral (ARV) treatment.

We report on 22 events in 18 patients occurring at a median of 17 days (IQR 11–27) from the start of TB treatment. The main etiologies of AE were hepatotoxicity (8/22), paradoxical reactions (8/22) and concomitant infection (4/22). All required hospitalization, 1/3 died. In univariate analysis risk factors associated with AE on TB treatment were male sex (odds ratio [OR] 3.81; $P = 0.028$), disseminated TB (OR 5.36; $P = 0.006$), baseline hemoglobin <10 g/dl (OR 3.81; $P = 0.029$) and CD4 count at start of TB treatment <100 cells/mm³ (OR 14.0; $P = 0.006$). A trend was found for HIV serology (OR 6.31; $P = 0.064$). No association was found between age, weight, body mass index, white cell count, C-reactive protein or use of antiretroviral treatment.

Conclusion: Adverse events such as hepatotoxicity and paradoxical reactions are frequently complicating TB treatment. Rigorous clinical follow-up during the initial treatment phase is warranted, particularly of the immune suppressed and disseminated TB patients.

PC-81859-18 Ruling out tuberculosis to start preventive therapy in HIV co-infected patients as an opportunity to find TB

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Setting: 29 clinics for HIV care in Rio de Janeiro city (RJC)—THRio cohort.

Objectives: Tuberculosis (TB) is the most common infection in HIV patients in RJC. THRio study is an operational research designed to look for the impact of isoniazid preventive therapy (IPT) in that population, through training physicians and nurses on the topic, which is a national guideline. Because of drug resistance concerns, it's mandatory to rule out TB before starting IPT. We're assessing TB cases found during the process of ruling out TB prior to the start of IPT in eligible subjects (no prior TB treatment or IPT completed).

Methods: Through THRio database search, we looked for TB cases that were diagnosed shortly after a tuberculin skin test (TST).

Results: Since 1 Sept 2005, 5357 TSTs were applied. From those, 19.8% were ≥ 5 mm. 815 IPT were started, with a 63.2% completion so far. We found

24 TB cases after a PPD, and of those, 17 (71%) were in patients eligible to have a TST. In one case, the TST+ preceded the TB diagnosis by 1 year, enough time to rule out TB and complete IPT, if indicated then. The remaining 5 patients were symptomatic by the TST time.

Conclusion: Although only 17 of TST+ eligible patients were diagnosed with TB during the ruling out process, we stressed the importance of finding and treating the TB case any time in the course of HIV disease, due to the magnitude of the problem of co-infection. The preferred scenario would be that cases of active TB be identified at the time patients present for care, as ideally no opportunities should be missed when diagnosing TB.

PC-82102-18 Neurological TB immune reconstitution inflammatory syndrome: clinical manifestations, morbidity and mortality

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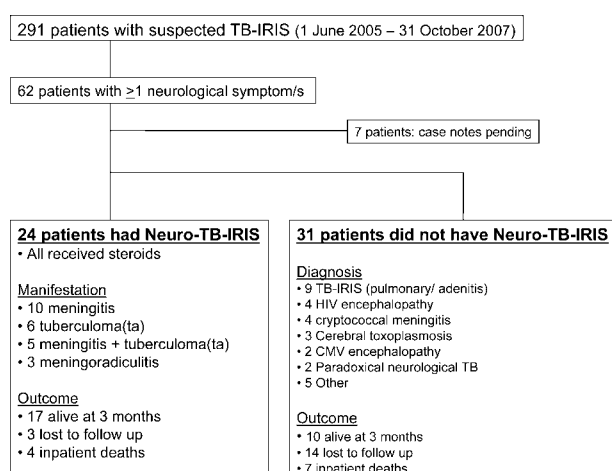
Background: Neurological TB immune reconstitution inflammatory syndrome (TB-IRIS) is considered the most severe manifestation of TB-IRIS. Only a few case reports of neurological TB-IRIS appear in the literature and benefits and risks of corticosteroids for treating the condition are not determined. We therefore undertook this study to determine the clinical manifestations, treatment used and outcomes of patients with neurological TB-IRIS at a public sector community hospital in Cape Town, South Africa.

Method: A retrospective review of 291 patients referred with suspected TB-IRIS to our facility over a 28-month period (1 June 2005–31 October 2007). We defined TB-IRIS using a clinical case definition and neurological TB-IRIS as TB-IRIS manifesting with tuberculoma(ta), meningitis and/or meningo-radculitis. We collected data on TB diagnosis, HIV parameters, antiretroviral therapy, TB-IRIS diagnosis, other opportunistic infections, corticosteroid use and outcome.

Results: 62/291 patients with suspected TB-IRIS had >1 neurological symptoms. Of these, 24 patients had neuro-TB-IRIS using our case definition: 10 meningitis, 6 tuberculoma(ta), 5 tuberculoma(ta) and meningitis, and 3 meningo-radculitis. All 24 patients received

corticosteroids. There were 4 inpatient deaths and at 3-month follow-up 17 patients were alive and 3 were lost to follow up. Among the patients with neurological symptoms who did not have TB-IRIS the most frequent diagnoses were cryptococcal meningitis, cerebral toxoplasmosis, CMV encephalopathy and HIV encephalopathy.

Discussion: This is the largest reported case series of neurological TB-IRIS. 8.2% of TB-IRIS suspects presented with new or worsening neurological features that included intracerebral tuberculomas, meningitis and meningoradiculitis. The condition is associated with considerable short term morbidity and mortality at 3-months is 17%.



PC-82135-18 Treatment access and outcomes in HIV-infected infants with tuberculosis

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Background: There are limited data on the treatment and outcome of tuberculosis (TB) in HIV-infected infants from highly endemic settings.

Aims: To describe the clinical picture, treatment access (antituberculosis and antiretroviral therapy [ART]) and outcome of TB-HIV co-infected infants.

Method: All HIV-infected infants with culture-confirmed tuberculosis were identified from a database of confirmed tuberculosis cases from January 2004–December 2006 at three referral hospitals in the Western Cape. Data were retrieved from folders at different health institutions.

Results: Fifty-one infants, 28 (54.9%) male, with median age 6 months were identified; 48 (94.1%) had pulmonary TB and 15 (29.4%) had extrapulmonary TB (12 had both). Six (11.8%) infants had miliary TB

and/or TB meningitis. Three (5.9%) infants were on ART at TB diagnosis, and 25 (49.0%) were known to have started ART after TB diagnosis. The remaining 23 (45.1%) did not access ART during TB treatment or died before ART was started. Start of TB treatment was documented in hospital folders in 42 (82.4%) infants. TB treatment was unknown or not started in 9 (17.6%). Twelve (23.5%) infants are known to have died.

Conclusions: There was a high proportion of disseminated TB. Despite access to diagnostic facilities a high proportion of infants were not started on antituberculosis treatment or ART, indicating missed opportunities in hospital services. Mortality rate was high amongst these infants. Access to TB treatment and ART may be improved by appropriate follow-up of infants screened for TB and integrating hospital-based health care with community level HIV and TB programmes.

PC-82232-18 Essential management and logistics support for rapidly expanding TB-HIV interventions to health centre level

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Objectives: Going to scale with TB-HIV interventions in the context of rapid scale up of HIV services requires a public health approach that can achieve broad coverage of essential services. Supporting the management and logistics requirements is necessary to feasibly scale up to hundreds of health centres in each country.

Methods: To support this scale-up, in 2007 the WHO/PEPFAR collaboration to standardize operational guidance for delivery of HIV services at primary health centres was formed to prepare an operations manual for delivery of HIV prevention, care and treatment at primary health centres in high-prevalence, resource-constrained settings. This manual compiles the logistical, managerial, lab and infrastructure requirements for delivery of essential HIV, TB and primary care services; complements the IMAI-IMCI or other national primary care clinical guidelines; supports current efforts to scale-up HIV prevention interventions including provider-initiated testing and counselling (PITC), prevention interventions for PLHIV, and TB infection control; and provides full support for getting more children and pregnant women on ART and improved TB-HIV co-management.

Findings: The operational requirements for scaling up TB-HIV interventions at health centre level illustrate the importance of simple, practical instructions for the infrastructure required for greatly increased testing and counselling; for supply management; to manage a health centre laboratory and quality assure tests done by lay providers; to quality assure testing

and counselling; and to estimate FTE requirements and train and support sufficient health workers and lay providers for the scale up.

Conclusion: Clinical guidelines and training are not sufficient to support scale up without serious attention to management and logistics support to the large number of health centres required to scale up HIV services, particularly given the introduction of TB-HIV and many other new interventions.

PC-82410-18 Utility of tuberculosis diagnostic guidelines applied to an HIV-infected paediatric cohort in Tanzania

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Background: The diagnosis of tuberculosis in children is notoriously difficult, and as such several countries with high disease burden have developed diagnostic scoring systems. Tuberculosis is a major cause of mortality in the HIV-infected population; however, the utility of tuberculosis diagnostic guidelines for HIV-infected children has not been established.

Objective: To assess utility of Tanzanian (TZ) and South African (SA) pediatric tuberculosis scoring systems in diagnosing tuberculosis in HIV-infected children at the DARDAR Pediatric Program (DPP) in Tanzania.

Methods: Retrospective chart review of HIV-infected DPP patients enrolled between June 2006 and November 2007 suspected to have or started on treatment for tuberculosis. Both TZ and SA pediatric scoring systems were applied.

Results: 13 HIV-infected patients (11 male, 2 female, median age 7.3 years) commenced anti-tuberculosis treatment and had follow-up; median CD4 count and percent 237 and 14% respectively at TB diagnosis. Clinical characteristics were: 10/13 radiographic findings consistent with tuberculosis, 2/12 had a positive PPD, 1/9 positive sputum culture, 10/13 history of fever, 12/14 not on ART at time of tuberculosis diagnosis; 11/14 diagnoses made within 6 months of HIV diagnosis. Per SA guidelines 9/13 (69%) patients, and per TZ 7/13 (54%), met criteria for 'high likelihood' of tuberculosis; suspect cases SA 4/8 (50%) and TZ 1/8 (12.5%) 'high likelihood'. Scoring criteria not met include documented weight loss, adenopathy, documented fever, known tuberculosis contact, and presence of specific radiographic findings. All 13 children responded to tuberculosis treatment.

Conclusion: The application of SA and TZ diagnostic guidelines may result in the under-diagnosis of tuberculosis in HIV-infected children. Many cases of tuberculosis are diagnosed near the time of HIV diagnosis demonstrating the importance of initial screening.

PC-82462-18 HIV co-infection among patients with multidrug-resistant tuberculosis in Lesotho

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Aim: The southern African countries have the highest rates of HIV infection in the world. Globally, about 70% of all of HIV/AIDS infections occur in sub-Saharan Africa. To date Lesotho is the third worst affected country in Southern Africa and the world with an estimated adult prevalence of 23% among the 15–49 age groups. TB-HIV co-infection is a serious problem, as is the transmission of multidrug-resistant (MDR) strains of TB among HIV-infected patients. The aim of this study was to determine the prevalence of HIV infection among patients treated for MDR-TB in Lesotho.

Design: In Lesotho, an MDR-TB treatment program was launched in 2007, a collaboration between the National TB Program and Partners In Health, an NGO. We retrospectively reviewed clinical records of all patients enrolled in this program.

Methods: Each patient diagnosed with MDR-TB and registered in the national treatment program was provided with HIV testing and counseling upon enrollment. HIV testing followed national guidelines, and involved two rapid HIV tests, with a third used as a tie-breaker.

Results: Among 62 patients enrolled in the Lesotho MDR-TB program between August 2007 and February 2008, 45 (72.6%) were HIV-positive while 17 were HIV-negative.

Conclusion: HIV co-infection is common among MDR-TB patients in Lesotho, likely due to rapid transmission of MDR strains among HIV-infected patients. The HIV co-infection rate may actually be slightly lower compared to drug-susceptible TB, likely due to delayed diagnosis and mortality for MDR-TB-HIV co-infected patients.

TB IN SPECIAL POPULATIONS

PC-81446-18 Prevalence of latent tuberculosis infection among undocumented migrants in Lausanne, Switzerland

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Aim: Undocumented migrants with latent tuberculosis infection (LTBI) are a potential source of tuberculosis (TB), but are difficult to screen and treat. Dedicated medical centers for undocumented immigrants facilitate the approach of this population group. In

this study, we assessed the prevalence of LTBI in a population of immigrant patients visiting two dedicated premises and their adherence to preventive or curative treatment.

Design: Prospective observational study.

Methods: All consecutive undocumented migrants newly attending two healthcare centers in western Switzerland were offered tuberculosis infection screening using an interferon- γ assay (T-Spot.TB® Oxford Immunotec). Preventive treatment was offered if indicated. Adherence to treatment was evaluated monthly. **Results:** Of 161 undocumented immigrants, 131 (81.4%) agreed to be screened and 125 had a complete examination. Twenty-four of the 125 patients (19.2%; 95%CI 12.7–27.2) had a positive interferon- γ assay, and 2/125 had active TB (1.6%; 95%CI 0.2–5.7). Full preventive treatment was followed by only 6 patients with LTBI. Four others initiated the treatment but interrupted it.

Conclusion: Screening for tuberculosis infection in this hard-to-reach population is feasible in dedicated clinics, and the prevalence of LTBI is high in this vulnerable population. However, the low adherence to treatment is an important public health concern, and new strategies are needed to address this.

PC-81482-18 Evaluation of tuberculosis risk in the staff of the National Reference Pneumological Hospital, Cuba, 2007

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Objectives: To evaluate the individual and collective tuberculosis infection risk by areas or occupational groups in the National Reference Pneumological Hospital.

Methods: The individual risk was assessed applying to the health care workers a survey that includes personal data, labor location and exposition to *Mycobacterium tuberculosis* in its different grades and forms, as well as a tuberculin test to a sample of 112 of them. This information allowed to classify them as high, intermediate, low and minimum risk. Tuberculin tests were considered positive if ≥ 10 mm. The collective risk was assessed in each area or department using individual risk, prevalence of tuberculosis infection, tuberculin conversion rate according to previous survey, and the number of TB cases hospitalized per year. They were classified as high, intermediate, low, very low and minimum risk.

Results: 106 workers out of 183 (57.9%) had been more than 5 years working in the institution; 38 had a positive previous Mantoux. Of the 64 previously negative, 34.4% became positive in this survey. The tuberculosis infection prevalence was 50.8% (93/183). Half of the departments or areas (17/34) were evalu-

ated as high risk, 23.5% (8/34) with intermediate risk, 11.8% (4/34) with low risk and 14.7% (5/34) with very low risk.

Conclusions: The National Reference Pneumological Hospital, just as we preview, is a High Risk facility for *M. tuberculosis* infection to the staff, and most of its areas constitute a risk potential for the personnel working there.

PC-81682-18 Silicosis, COPD, TB and HIV in a cohort of Basotho gold miners followed for one year after lay-off

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Background: Miners who have left employment are likely to be missed by the current system of statutory occupational lung disease surveillance and compensation by South African gold mining companies. The burden of disease is then passed to miners and their communities.

Objective: To describe the experience of TB, progression of silicosis, COPD prevalence, and incidence of HIV over a one-year period in Basotho gold miners who returned home after mine closure.

Methods: A cohort of 779 black gold miners from Lesotho was followed for one year starting 18 months after having been laid off in 1998. At baseline and follow-up, they underwent a respiratory symptom interview, physical exam, HIV test, chest x-ray, and spirometry. Active TB case finding was performed only at baseline due to budgetary constraints.

Results: 515/779 (66.1%) participants attended both rounds. Baseline HIV prevalence was 22.3% and 24.3% at follow-up. HIV incidence was 5.43/100 person yrs (95%CI 3.39–8.18). Baseline prevalence of silicosis (ILO score $\geq 1/1$) was 24.6% and at follow-up 27.2%. Progression of silicosis score occurred only among HIV negative participants. COPD prevalence (pre-bronchodilator, GOLD category II or higher) at baseline was 7.9% and at follow-up 10.0%. At baseline 39/624 (6.3%) active TB cases were found: 8 (1.3%) already on treatment, and 31 (5.0%) undiagnosed cases. At follow-up, 18/514 (3.5%) were on or completed treatment between rounds. 'Incidence' of TB treatment rose from 2770/100 000/yr at baseline to 3368/100 000/yr at follow-up.

Conclusion: The burden of TB, silicosis, COPD, and HIV is high in ex-goldminers. Health systems in both labor sending and receiving countries need to find ways to serve this population. In particular, given the high rates of HIV and undiagnosed active TB, a partnership between the South African mining industry

and governments is needed to support active surveillance and access to treatment and prevention services in labor sending communities.

PC-81804-18 Some problems of BCG vaccination of HIV-positive children

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Design: In Russian mothers, HIV infection is a contraindication for BCG vaccination of newborns and children up to 18-months of age. In the given material analysis results of safety and efficiency of BCG vaccination of 76 HIV-infected children are presented. We analysed the medical documents of 80 children born to HIV-infected mothers. The control group consisted of by 34 BCG vaccinated, almost healthy, children similar age.

Vaccination against a tuberculosis was received with 36 HIV-infected children (47.3%) without clinical signs of immunodeficiency. BCG vaccination has led to various age terms, the majority of the HIV-infected which have received BCG vaccination, were till 1 year—83.3% of children. In a maternity hospital vaccinated 12 person (16.7% from number of vaccinated), till 18 months of age—18 children and the others 6 vaccinated older than 18 months.

Introduction of BCG vaccine given up to 18 months of age did not cause any pathological reactions and complications in post vaccination period. Vaccination of a HIV-infected children did not cause also an aggravation of a HIV infection. Probably, it is because that during this period of time immunodeficiency condition is not presented.

Among the patients imparted after 1.5 years old ($n = 6$ person) at 1 child the complications of BCG vaccination disseminated BCG infection) was marked. Efficiency of vaccination estimated on presence of positive reaction on tuberculin 2TE Mantu test.

Positive Mantoux reaction a year after BCG vaccination was observed in only 36% of an HIV-infected group against 76% of children in the control group.

Despite the relative safety of BCG vaccination for HIV-infected children, it appears not so effective by way of formation of postvaccinal immunity.

Conclusion:

- 1 Early BCG vaccination of HIV-infected children is safe and not accompanied by any complications
- 2 The efficiency of vaccination is lower than among healthy children.

PC-81806-18 Effect of BCG vaccination on tuberculin skin test measurements among medical students in Brazil

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Setting: Concern with tuberculosis (TB) transmission to healthcare workers, including medical students, has increased with the HIV epidemics and MDR/XDR outbreaks. Serial tuberculin skin testing (TST) is recommended in this setting. The interpretation of TST is controversial in countries where BCG vaccination is universal. We have previously reported that a positive TST (≥ 10 mm) was not associated to previous BCG vaccination among 1032 medical students in Rio de Janeiro.

Objectives: To analyze the association of BCG vaccination with TST small reactions (< 10 mm).

Methods: Medical students from 5 universities in cities with different TB incidences (28, 63 and 114/100 000) were submitted to a TST. BCG vaccination scars were searched for.

Results: Among 961 students with a negative TST (< 10 mm), mean age was 22 years (± 2.9), 848 (88.2%) had a BCG scar and 365 (37.9%) informed date of last vaccination (Table).

	TST = 0 ($n = 758$) n (%)	TST = 1–4 mm ($n = 101$) n (%)	OR (95%CI)	TST = 5–9 mm ($n = 102$) n (%)	OR (95%CI)
BCG vaccination scar					
No	90 (89.1)	5 (5.0)	1	6 (5.9)	1
Yes	658 (77.6)	96 (11.3)	2.6 (1.0–7.5)	94 (11.1)	2.1 (0.9–5.6)
Age at last BCG vaccination					
None	90 (89.1)	5 (5.0)	1	6 (5.9)	1
Infancy	149 (83.7)	15 (8.4)	1.8 (0.6–5.9)	14 (7.9)	1.4 (0.5–4.3)
Later	129 (69.0)	26 (13.9)	3.6 (1.3–11.2)	32 (17.1)	3.7 (1.4–10.4)

Conclusion: BCG vaccination after infancy can result in TST small reactions (1–9 mm) but not in a positive test when 10 mm is the cut-off value. Conversely, early vaccination does not seem to cause a significant impact in TST results. However, the sample of students with known date of last vaccination and some induration was small, as was the number of non-vaccinated. Further studies taking into account the vaccination booklet should be carried out to confirm these findings. We conclude that for subjects submitted to BCG vaccination after infancy, the cut-off for a positive test should be 10 mm.

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PC-81857-18 Interpretation of repeat tuberculin skin testing in international adoptees: conversions or boosting

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Background: Internationally adopted children are a unique group of BCG vaccinated children with high rates of latent tuberculosis infection (LTBI) in whom serial tuberculin skin tests (TST) are recommended. No study has measured the incidence of TST conversion in these children.

Aim: To measure the incidence of *Mycobacterium tuberculosis* infection and factors associated with TST conversion in internationally adopted children who had recently immigrated to the United States.

Design: Longitudinal cohort.

Methods: Internationally adopted children completed baseline and follow-up TST to measure the incidence of *M. tuberculosis* infection and factors associated with TST conversion. Data were collected regarding age, gender, birth country, vaccination history, history of tuberculosis (TB) exposure, previous TB screening, and pre-adoptive environment. All children completed physical examinations including a standardized evaluation for TB, anthropometric assessment and documentation of BCG scar.

Results: Fourteen percent of children ($N = 390$) had evidence of LTBI at baseline. Children were more likely to have LTBI if they were older, BCG vaccinated or had been in the US longer. An additional 13% of children had TST indurations ≥ 10 mm at follow-up testing. Regardless of BCG vaccination status or nutritional status, children who were younger at baseline were more likely to have a TST induration ≥ 10 mm at follow-up.

Conclusion: International adoptees have significant risk of LTBI. Although our findings suggest that recent infection with *M. tuberculosis* led to TST conversion in some children, the increase in follow-up TST induration could also be attributed to TST boosting resulting from prior BCG vaccination. When serial TST testing is completed in young, BCG vaccinated children, interpretation of the follow-up TST should consider baseline TST results.

PC-82264-18 Determinants of tuberculosis prevention and treatment adherence among disadvantaged Thai communities

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Aim: To identify determinants of tuberculosis prevention and treatment compliance as well as propose interventions to improve TB control for economic

disadvantaged individuals who live in the lower north-east, Thailand.

Design: A combination of qualitative and quantitative designs and community-based participatory research based on a synthesized health promotion model.

Methods: The study used a cohort of TB patients and adult community residents. Provincial TB records were used to draw patient participants and then community residents. Data were collected from 400 individuals using short self-completed questionnaire and focus group interviews. Data were analyzed using descriptive and nonparametric statistics, Pearson's correlation, Structural equation modeling, and content analysis.

Results: Participants had moderate treatment compliance and low levels of TB preventive behaviors. TB contagious to other family members was concern only early after TB diagnosis. Several combinations of individual, family, and community factors were determinants for treatment compliance in different settings.

Conclusion: Community-based participatory interventions can be implemented to promote excellent treatment outcomes for close-knit communities and some sub-rural communities. Additionally, individual case management was identified as potential intervention for those who live in urban communities.

PC-82284-18 Tuberculosis and HIV infection among drug users and males having sex with males in Karachi, Pakistan

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Background: Population of Pakistan is over 164 million with a burden of tuberculosis estimated to be 1.5 million patients and 234 100 new infections in 2007. The DOTS program claims 100% coverage and case detection rate of 68 sputum smear positive cases and sputum conversion rate of 60. Due to successful implementation of DOTS in the country Pakistan has moved from 6th to 8th highest burden country in the world. Despite success in reducing the burden of tuberculosis in general population certain segments of the population remains unattended such as drug users, commercial sex workers, industrial and mine workers etc. Another emerging challenge is a recent increase in HIV infection which is becoming a concentrated epidemic among IDUs (9–31%) and MSMs (1.8–7.0%) in certain parts of Pakistan.

Methods: To find out the incidence of tuberculosis in these two groups we conducted a study based on VCT for HIV and DOTS. After informed consent VCT for HIV and sputum smear examination was done. HIV antibody was tested by EIA. Three sputum samples were collected for microscopy from those individuals who were suffering from cough of more than 2 weeks

duration. 200 IDUs, 200 DUs and 300 MSMs were included in the study.

Results: Of 200 IDU, 49 (24.5%) were HIV antibody positive and 12 (6%) were AFB smear positive. Among 200 DU 21(10.5%) were AFB positive and all were negative for HIV. Among 300 MSMs 5 (2.5%) were HIV antibody positive and 9 (4.5%) were AFB positive. HIV TB co-infection was noted in five IDU (2.5%). Of 21 smear positive DU and 9 MSM none was HIV antibody positive.

Conclusions: Collective sniffers are at increased risk of tuberculosis. IDU does not appear to increase chances of tuberculosis but HIV infection is definitely a risk factor for tuberculosis as dual infection was noted in five cases. Detection of 9 (3%) AFB positive cases out of 300 MSM is much above the community average for general population.

PC-82294-18 Tuberculosis in the elderly, United States, 1993–2006

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Background: The National Tuberculosis Surveillance System (NTSS) collects data on all newly reported US cases of tuberculosis (TB).

Methods: We performed a descriptive analysis of 56 069 elderly (age 65 years and older) TB patients in the NTSS from 1993–2006 compared with other adults (age 21–64 years).

Results: From 1993–2006, the elderly had consistently higher incidence rates of TB than other adults. In 2006 the TB rate among the elderly was 7.2/100 000 versus 5.5/100 000 among other adults. The elderly had lower percentages of clinical tests done, only 59.1% of the elderly had a TB skin test compared to 72.3% of other adults and only 71.2% had a sputum culture result reported compared to 80.9% among other adults. Among elderly TB patients, 21.4% patients died during therapy compared to 7.0% among other adults. For patients who did not die, sputum culture conversion occurred within 6 months for 93.3% of the elderly and for 92.5% of other adults. Multidrug-resistant TB decreased as age increased, at 1.0% among those age 65–74 years, and 0.3% among those age 85 years and older versus 1.8% among other adults. Completion of therapy within 1 year occurred for 79.0% of the elderly compared with 74.6% for other adults through 2004, the latest date for which complete results are available.

Conclusion: The percentage of elderly TB patients who died during therapy was three times higher than for other adults. Of patients who survived, however, the elderly did as well as other adults in terms of having timely sputum culture conversion and successful completion of therapy. Our results suggest that ef-

forts to improve the management of TB among the elderly should focus on early diagnosis.

PC-82370-18 Identifying transnational *M. tuberculosis*: the Texas-Mexico experience, 2004–2007

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Background: Tuberculosis (TB) genotyping improves our understanding of local TB transmission; however, very little is known about transmission across international borders. Residents of Mexico who are under clinical TB management in the United States (binational TB cases) are an important but often challenging population because they require increased communication, data sharing, and case management.

Objectives: Describe the molecular epidemiology and assess markers of recent/ongoing transmission associated with binational TB cases in Texas.

Methods: TB cases identified in Texas from 2004 through 2007 were included in the analysis. Descriptive statistics were used to assess differences between binational and Texas TB cases. Univariate analyses were conducted to measure potential associations between clinical/epidemiologic variables and binational status.

Results: A total of 670 binational TB cases and 1960 Texas TB cases were genotyped during the study period. Binational TB cases were 1.7 times more likely than Texas TB cases to be a member of a genotype cluster (95% confidence limits [CL] 1.4–2.1). Eleven clusters had ten or more binationals in the cluster. Among clustered cases, binational TB cases were more likely than Texan TB cases to be sputum smear positive at diagnosis (Odds ratio [OR] 3.1; 95%CL 2.3–4.2).

Conclusion: Binational TB cases were more likely to be a member of a genotype cluster and sputum smear positive indicating greater likelihood of recent/ongoing transmission. Binational TB cases may play an important role in domestic transmission in the United States. Access to universal TB genotyping improves the ability to detect potential transnational TB transmission events. Collaborative intervention strategies, including transnational contact investigation and case management, may be required to interrupt transmission on both sides of the border.

DRUG RESISTANCE IN TB: DRUG SUSCEPTIBILITY TESTING/RAPID DETECTION

PC-82123-18 Low doses of rifapentine versus high doses of rifampin in the mouse model of tuberculosis

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Aim: Increasing rifamycin exposure by replacing rifampicin (R) by rifapentine (P) increases the killing of persisters: twice-weekly P-containing regimens cure mice in ≤ 4 monthss rather than the 6 months required by daily R-containing regimen. Daily P-based regimens are even more effective. It remains to determine whether increasing the daily dose of R could give comparable activity.

Design: To address that issue we compared the bactericidal and sterilizing activities of increasing doses of P and R when combined with moxifloxacin (M) and pyrazinamide (Z).

Methods: BALB/c mice were aerosol-infected with $3.78 \log_{10}$ CFU of *Mycobacterium tuberculosis*. At treatment onset, 2 weeks later, mean lung CFU counts were 7.45. Positive controls were RHZ and RMZ at standard doses. Test regimens were RMZ and PMZ regimens with escalating doses of R (15, 20, 40 mg/kg) or P (5, 7.5, 10 mg/kg). All regimens were administered 5 days per week for 10 weeks. Lung CFU counts were assessed bi-weekly for 6 weeks. Relapse rates were assessed after 3-month follow-up.

Results: Increasing the R dose from 10 to 40 decreased CFU counts from 5.97 to 5.39 in 2 wk, 3.78 to 2.81 in 4 wk, and 2.28 to 0.78 in 6 wk, respectively. Increasing P dose from 5 to 10 decreased CFU counts from 5.69 to 5.22 in 2 wk, 2.96 to 2.44 in 4 wk, and 0.71 to 0 in 6 wk. Although relapse was low in all test groups, the sterilizing activity of P7.5 was at least as great as that of R40.

Conclusion: Low daily dose of P was as active as high daily dose of R, likely because the long half life of P provides greater rifamycin exposure. This suggests that P is more effective because the killing of persisters is not only concentration-dependent but also time-dependent.

PC-81589-18 Molecular diagnosis of multidrug-resistant tuberculosis

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Introduction: Multiple-drug resistance (MDR) was defined as *Mycobacterium tuberculosis* isolates resistant to at least isoniazid and rifampin. Global surveil-

lance of drug resistance tuberculosis (TB) revealed that there was an emerging concern of MDR-TB patients infected with *M. tuberculosis* strains. Furthermore, MDR *M. tuberculosis* causes patients with high rates of treatment failure and death, the severity of the disease poses a public health concern. In order to have better control of MDR-TB, a DOTS-plus program was implemented in May 2007 in Taiwan. All MDR-TB patients cared in the program had to be confirmed by Taiwan-CDC.

Methods: From May to December 2007, a total of 167 MDR *M. tuberculosis* strains initially identified in clinical laboratories were sent to the Reference Laboratory of Mycobacteriology at Taiwan Centers for Disease Control for confirmation. Molecular methods, multiplex PCR, commercial kits and resistant gene sequencing, were used for rapid rechecking of MDR *M. tuberculosis* isolates.

Results: Of 167 MDR clinical isolates evaluated, the accuracy for isoniazid resistant detection by multiplex PCR, GenoType®MTBDR-plus assay and resistant gene sequencing was 80.8%, 83.2% and 96.4%, respectively. Whereas, the accuracy for rifampin resistant detection by multiplex PCR, GenoType®MTBDR-plus and resistant gene sequencing was 86.2%, 95.2% and 97.0%, respectively.

Conclusion: Based on the preliminary results obtained, the algorithm of molecular diagnosis was recommended for rapid confirmation of MDR-TB. However, the conventional methods still remain as golden standards for diagnosis of MDR-TB.

PC-81427-18 Rapid detection of multidrug-resistant tuberculosis with a nitrate reductase assay using a liquid medium

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Aim: For a rapid and low-cost detection of multidrug-resistant (MDR) *Mycobacterium tuberculosis*, we applied the nitrate reductase assay (NRA) using a liquid medium directly to sputum samples.

Methods: A total of 179 sputum samples were analyzed by the NRA and results were compared to those obtained by the indirect proportion method (IPM) as standard reference.

Results: Out of 144 specimens for which comparable results were available, only one discrepant result was obtained: MDR by NRA but susceptible by the IPM. In total 56% of the results were obtained in 10 days by the NRA whereas IPM results were available after 2 months.

Conclusion: NRA performed in liquid medium is rapid and inexpensive and can be easily implemented in low-income countries.

PC-81842-18 Detection of rifampin resistance in *M. tuberculosis* by the nitrate reductase assay in sputum samples

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Setting: Resistance to rifampin (RIF) is an important predictor for the early diagnosis of MDR-TB. An alternative in vitro method which can detect drug susceptibility directly from sputum and presents quick results and low cost, will be very important and useful for tuberculosis diagnosis and control. The nitrate reductase assay is based on the ability of *M. tuberculosis* to reduce nitrate to nitrite.

Objective: To compare the nitrate reductase assay (NRA) with the proportion method (PM), considered as gold standard, to detect RIF resistance directly from sputum samples.

Methods: The study was carried out by 4 regional laboratories from the state of São Paulo, Brazil. A total of 206 sputum samples tested smear positive from patients with pulmonary tuberculosis. The sputum was decontaminated by the Petroff method and DST to RIF was carried out using the PM and the NRA. Proportion method in LJ medium was used to test susceptibility of rifampicin (40 µg/ml), and was considered the gold standard method.

Results: 6 samples resistant to RIF and 200 samples susceptible. The comparison between NRA and the traditional gold standard method showed agreement of 100%. The sensitivity and specificity of the NRA for rifampicin was 100%. Results were available in 10 days for 66 (34%) samples, 15 days for 102 (53%) samples and 20 days for 24 (13%) samples while the results of PM took 30 days to be available.

Conclusions: The NRA proved to be a promising method for the screening of suspect MDR-TB cases directly from sputum samples. The simplicity of the method, its low cost and celerity to give the results make it a good alternative method for laboratories in resource-poor settings.

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PC-81941-18 Use of rapid molecular tools to determine drug resistance amongst the clinical *M. tuberculosis* isolates from Pakistan

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Background and Aims: Given the increasing burden of drug resistant tuberculosis globally there is an urgent need to develop rapid tools for resistance detection. We compared the utility of real time PCR, line probe assay (LiPA) and sequencing for detection of

rifampicin (RIF) and isoniazid (INH) resistance mutations in clinical *M. tuberculosis* isolates.

Methods: 58 MDR and 10 susceptible *M. tuberculosis* strains were tested for *rpoB*, *katG* and *inhA* mutations using hybridization probes, Light Cycler, Roche. Mutations in *rpoB* were also detected using the INNO-LiPA assay (mutations 531; S to L, 526; H to Y and H to D, and 516; D to V) and DNA sequencing. *katG* (region covering codon 315) and *inhA* genes (promoter region) were also sequenced to detect mutations for INH resistance.

Results: Rifampicin resistance: Real time PCR and LiPA assays detected *rpoB* gene mutations in 51/58 (88%) MDR strains, with a sensitivity and specificity of 88% and 100% in each. Sequencing detected mutations in 56/58 (97%) resistant strains. Codons 531 and 526 of *rpoB* gene showed 60% and 24% mutations respectively.

Isoniazid resistance: Mutation at *katG* codon 315 was found in 34/58 (59%) strains by real time PCR assay while sequencing reaction detected 37/58 (64%) mutations. Only one mutation was detected in *inhA* by real time PCR and sequencing. One strain had both *katG* and *inhA* mutations, detected by both real time PCR and by sequencing.

Conclusion: Sequencing appears to be the most sensitive tool for detection of *rpoB* mutation amongst our isolates. While LiPA and real time PCR were comparable, LiPA was able to identify only four widely reported *rpoB* mutations. On the other hand, both real time PCR and sequencing were limited in detecting *katG* and *inhA* mutations suggesting a need for inclusion of more genetic loci for detecting isoniazid resistance within this region.

PC-81965-18 Nutrient media test for determination of *M. tuberculosis* susceptibility to pyrazinamide

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Pyrazinamide (PZA) is an important first-line anti-tuberculosis drug, but determination of PZA susceptibility of *M. tuberculosis* is difficult. PZA exhibits its activity only at pH 5.5, where the mycobacteria grow poorly. A new PZA nutrient media test to determine PZA resistance of *M. tuberculosis* has been developed. Nitrate reductase assay is used for results reading.

Research objective: Compare the results of testing *M. tuberculosis* susceptibility to PZA obtained with new PZA nutrient media test with those using the Wayne method for detecting pyrazinamidase activity as well as PCR sequencing of the *pncA* gene.

Materials: 108 *M. tuberculosis* strains isolated on LJ medium from clinical specimens of first identified and earlier treated patients with various TB forms.

Results: Concordance of results obtained by all three techniques was found in 91.7% ($n = 99$). A total of 80 isolates out of 99 were determined as PZA-resistant and 19 isolates were PZA-sensitive.

The turnaround time for new PZA media test was 8.6 days (the range being 8–14 days), and for the Wayne method was 8 days (the range being 6–9 days). **Conclusions:** The developed new PZA nutrient media test is efficient for testing *M. tuberculosis* PZA susceptibility at high level of reliability. It is a rapid and inexpensive technique.

PC-82185-18 Development and performance of a molecular diagnostic system for the rapid detection of pulmonary TB and MDR

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Current methods for diagnosing and determining antibiotic susceptibility of *M. tuberculosis* are insensitive and inefficient. PCR-based techniques are more rapid, but require substantial labor and technical competency. PCR is also hindered by inhibitors, the risk of sample cross-contamination, and limited ability to concentrate samples. We have adapted a real-time, nested PCR tuberculosis detection and rifampin-resistance assay to the GeneXpert® System as a means to overcome these difficulties. This automated system uses a low-cost plastic cartridge to concentrate bacilli present in a sputum sample, remove PCR inhibitors, lyse cells, and transfer the purified *M. tuberculosis* DNA into an integrated PCR tube. The sample treatment buffer (STB) efficiently liquefied different clinical sputum samples in under 15 min, enabling subsequent pipetting and processing into the cartridge without additional chemical treatments. Sterility studies also demonstrated a >6-log kill after STB treatment, suggesting a dramatic decrease in biohazard risk. Analytical studies using sputum spiked with *M. tuberculosis* demonstrated a sensitivity between 50 to 150 cfu/ml. Specificity remained at 100% during more than one year of testing *M. tuberculosis*-negative sputum samples. A panel of mycobacteria other than tuberculosis (MOTT) were also easily distinguished from *M. tuberculosis*, while MOTT/*M. tuberculosis* mixtures had sensitivities similar to assays with *M. tuberculosis* alone. All of the common mutations associated with rifampin resistance were tested using either resistant *M. tuberculosis* cells or DNA. All mutations present in >0.5% of reported rifampin resistant isolates were detected. Preliminary stability results demonstrate at least 6 months stability at 25°C and 35°C and 120 days stability at 45°C. The system's demonstrated superb performance, robustness and ease of use

make it suitable for many challenging real world settings where rapid *M. tuberculosis* diagnostics is vital.

PC-82244-18 Long-term trends in first- and second-line anti-tuberculosis drug susceptibility in the UK, 1993–2006

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Aim: Resistance to anti-tuberculosis drugs is increasing globally. This study examines the trends in first and second line anti-TB drug susceptibility in the UK between 1993 and 2006.

Methods: The results of drug susceptibility testing of all *Mycobacterium tuberculosis* isolates have been collated through the UK Mycobacterial Network collaboration. We undertook analysis of first and second line drug susceptibility results to examine long term trends and determine the extent of multidrug resistant (MDR) and extensively drug-resistant (XDR) TB. Proportions were calculated and where appropriate, a test for the significance of a linear trend in increase was done.

Results: 59 388 initial isolates of *M. tuberculosis* were reported, rising from 3406 in 1993 to 5524 in 2006. Levels of isoniazid resistance increased significantly ($P = 0.0001$) from 4.6% in 1993 to 7% in 2006, while rifampicin resistance and MDR tuberculosis have remained low at about 0.5 and 1% respectively ($P > 0.1$). Resistance to other first line drugs have also remained low (pyrazinamide—0.7%, ethambutol—0.5%).

Among MDR isolates, levels of resistance to amikacin, capreomycin, ciprofloxacin, cycloserine, ethionamide and PAS were 5.3%, 4.1%, 5.7%, 5.1%, 13.3% and 17.2% respectively. Seven XDR-TB cases were identified during this period with no suggestion of an increase.

Conclusion: The increasing trend in isoniazid resistance may reflect an outbreak of isoniazid resistant TB in London, highlighting the need to strengthen local control. Levels of other first and second line anti-TB drug resistance have remained low.

PC-82379-18 National surveillance of susceptibility to second-line drugs in MDR-TB strains, Peru, 2005–2006

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Aim: To determine the prevalence of drug resistance to second-line drugs in MDR-TB strains isolated in the third national surveillance study in Peru.

Design: Drug susceptibility testing for second-line drugs are not fully standardized. However, identification of

resistance to all available drugs is essential for effective treatment of MDR and XDR-TB cases.

Methods: During the third national surveillance study of resistance to first-line TB drugs, all isolates of MDR-TB were tested for resistance to second-line drugs using the Agar Proportions Method. We performed tests for ciprofloxacin, kanamycin, capromycin, ethionamide, para-aminosalicylic acid and cycloserine. The National Mycobacteria Reference Laboratory has demonstrated proficiency with this method by participating in an external quality assessment program organized by WHO Supranational Laboratory of Massachusetts State Laboratory Institute.

Results: Of the 2169 patients in the national surveillance, 1809 were new cases and 360 were previously treated. From these two groups, respectively 95 and 85 were strains of MDR-TB. We obtained valid second-line DST results in 136 strains—68 in each group. Resistance to second line drugs in new and previously treated patients with MDR-TB were 35.3% and 32.4%, respectively. Ethionamide and kanamycin resistance were most common in both groups, reflecting the greater time these drugs have been in use in Peru. The prevalence of XDR-TB in new and previously treated patients with MDR-TB was 2.9% and 5.9%, respectively. Others results are presented in the table below.

Table Prevalence of primary and acquired anti-tuberculosis second line drug resistance in MDR-TB, Peru, 2005–2006

	Primary resistance <i>n</i> = 68		Acquired resistance <i>n</i> = 68	
	<i>n</i>	%	<i>n</i>	%
Fully susceptible	44	64.7	46	67.6
Any resistance				
Cx	5	7.4	5	7.4
Kn	6	8.8	10	14.7
Cp	4	5.9	5	7.4
Et	16	23.5	16	23.5
PAS	5	7.4	4	5.9
Cs	1	1.5	0	0
Resistance to one drug				
Cx	1	1.5	0	0
Kn	1	1.5	2	2.9
Cp	0	0	0	0
Et	10	14.7	7	10.3
PAS	2	2.9	2	2.9
Cs	1	1.5	0	0
Extensively Drug Resistant TB				
Cx + Kn + Cp	1	1.5	0	0
Cx + Kn + Et	0	0	2	2.9
Cx + Cp + Et	0	0	1	1.5
Cx + Cp + Et + PAS	1	1.5	1	1.5
Non XDR polyresistance				
Cx + Et	2	2.9	1	1.5
Kn + Cp	1	1.5	2	2.9
Kn + Et	1	1.5	2	2.9
Kn + PAS	1	1.5	0	0
Et + PAS	1	1.5	1	1.5
Kn + Cp + Et	1	1.5	1	1.5
XDR in MDR TB strains	2	2.9	4	5.9
Resistance to one or more drugs	24	35.3	22	32.4

Cx = ciprofloxacin; Kn = kanamycin; Cp = capreomycin; Et = ethionamide; PAS = para-aminosalicylic acid; Cs = cycloserine.

Conclusion: We found a high prevalence of resistance to at least one second-line drug which was similar in both primary and previously treated MDR-TB cases. While the prevalence of XDR was higher in previously treated patients, the occurrence of two cases of XDR-TB in patients who had not received prior treatment for TB has serious clinical and public health implications.

PC-82404-18 Association of low-level resistance to streptomycin and high-level of resistance to capreomycin

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Introduction: DOTS-plus strategy requires greater programmatic sophistication than DOTS including, case detection, definitive diagnosis, patient management and public health measures. It has been shown that the use of DST to first and second line anti-TB drugs plays a pivotal role in increasing the effectiveness of both, individualized and standardized treatment regimens. Necessity for quality controlled DST results is associated with the fact that some second line drug resistance phenotypes can be linked with first line DR. A minimal inhibitory concentrations (MIC) study, based on the array of drug concentrations, can give important insights into DR trends which could have remained obscured in the case of regular DST.

Aim: To study an association between resistance to streptomycin (SM) and capreomycin (CAP).

Methods: MIC to second-line drugs were studied in *M. tuberculosis* isolates obtained from patients in Lima, Peru who failed Category I and II anti-tuberculosis therapy between 1999 and 2003. Two concentrations of streptomycin (2 and 10 µg/ml) were routinely tested at the MSLI laboratory.

Results: Among 79 specimens tested against 2 µg/ml of SM there were 22 sensitive and 57 resistant. 21 of the 57 were also resistant to 10 µg/ml of SM and 36 were sensitive. Of the 36 that were resistant to low SM concentration only, 31% were also found to be resistant to the highest concentration of CAP (32 µg/ml). Among isolates resistant to both low and high SM concentrations only 14% were found to be resistant to 32 µg/ml of CAP. Only 9% of the 22 isolates sensitive to SM were resistant to 32 µg/ml of CAP.

Conclusion: Low level of SM resistance in *M. tuberculosis* strains isolated from chronic TB patients can be used as a predictor of a high level of CAP resistance.

PC-82405-18 A rapid sputum PCR-SSCP test for guiding pyrazinamide use in tuberculosis therapy

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Rationale: Pyrazinamide susceptibility testing is usually too slow to guide initial therapy, so that many patients with pyrazinamide-resistant tuberculosis receive ineffective pyrazinamide therapy.

Objectives: To optimize and evaluate a rapid molecular test for tuberculosis drug susceptibility to pyrazinamide.

Methods: Tuberculosis polymerase chain reaction-single strand conformational polymorphism (PCR-SSCP) was optimized to test for mutations causing pyrazinamide resistance directly from sputum samples and *Mycobacterium tuberculosis* isolates. The reliability, sensitivity and specificity of PCR-SSCP in sputum ($n = 65$) and isolates ($n = 185$ from 147 patients), was compared with the Bactec-460 microbiological test ($n = 139$) that was considered to be the gold standard. Pyrazinamide susceptibility testing for all 185 isolates was also compared with the Wayne biochemical test, with DNA sequencing for *pncA* mutations that cause pyrazinamide resistance and with traditional microbiological susceptibility testing in duplicate broth cultures containing pyrazinamide.

Results: PCR-SSCP provided interpretable results for 96% (46/48) of smear positive, 76% (13/17) of smear negative sputum samples and 100% of *M. tuberculosis* isolates. PCR-SSCP had pyrazinamide susceptibility testing sensitivity and specificity of 88% and 93% for sputum and 89% and 95% for isolates. For isolates that yielded concordant results in conventional broth culture, sensitivity and specificity were 95% and 92%, compared with 88% and 100% for Wayne biochemistry. All 34 negative-controls were PCR-SSCP negative. Material costs were \$1.36 per test and PCR-SSCP took one day, compared with 3–7 weeks for the other techniques.

Conclusions: PCR-SSCP is a rapid test that indicates which patients should receive pyrazinamide from the start of therapy, potentially preventing months of inappropriate treatment.

LUNG HEALTH AND TOBACCO

PC-81385-18 Asthma and symptoms of wheeze, hay fever and bronchitis among Irish school children exposed to smoking in cars

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Aim: This study determined the prevalence of 'ever' asthma, and symptoms of wheeze (past 12 months), hay fever and bronchitis (cough with phlegm) among the Irish school children exposed to second-hand-smoke (SHS) in cars, using the 2007 Irish International Study of Asthma and Allergies in Childhood (ISAAC) protocol.

Methods: 2979 children aged 13–15 yrs completed the ISAAC self-administered questionnaire. 30 representative and randomly selected schools throughout Ireland took part. Self-reported SHS exposure prevalence in cars was calculated, as well as the prevalence of asthma, and symptoms of wheeze, hay fever and bronchitis. No objective validation of SHS exposure was done in this study. We also performed a logistic regression analysis adjusting for gender, smoking status and SHS at home to examine the association between SHS exposure in cars and the four outcomes studied.

Results: Overall 14.9% (13.9% in boys, 15.6% in girls) of Irish children aged 13–15 years were exposed to smoking in cars, while 45.9% had SHS exposure at homes in 2007. Prevalence (%) for asthma, wheeze, hay fever and bronchitis symptoms (non-asthmatics only) among children exposed to SHS in cars and not exposed to SHS in cars are shown in table. Wheeze and hay fever symptoms are significantly higher among exposed children (adjusted odds ratios [OR] with 95%CI 1.40 [1.12–1.74] and 1.34 [1.05–1.71]), respectively, while bronchitis symptoms and asthma are not significant (1.26 [0.87–1.81] and 1.11[0.85–1.46]), respectively.

	Asthma		Wheeze symptoms		Hay fever symptoms		Bronchitis symptoms	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Prevalence Exposure								
Overall	20.3	18.5	48.5	36.6**	30.0	24.3*	14.7	7.6**
Boys	21.9	19.4	43.8	34.4*	29.6	22.9	12.0	6.8*
Girls	19.3	17.9	51.4	38.2**	30.3	25.3	16.2	8.2**

* $P < 0.05$.

** $P < 0.001$.

Conclusions: Approximately one in seven Irish school children are exposed to smoking in cars. Those exposed (girls in particular) in cars have significantly

higher prevalence of wheeze and bronchitis symptoms. Unfortunately, smoking in cars is a public health challenge even in a country with comprehensive clean indoor air policies. We strongly recommend that smoking in cars containing children should be banned.

PC-81401-18 Smoking as a risk factor for asthma in children

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Objective: To detect if intrauterine and current exposure to cigarette smoking act as a risk factor for asthma.

Materials and Methods: Case-control study was conducted in Baghdad (Capital of Iraq) among primary school children aged 6–12 years. Cases were 644 children with asthma, and control group was 1618 children without asthma. A well constructed standardized modified questionnaires of ISAAC were completed by the parents of the chosen children.

Results: Our study found that the prevalence of asthma was significantly higher among children with history of intrauterine exposure to cigarette smoking by their mothers (60.2%) ($\chi^2 = 45.34$, $P = 0.000$) or their father (39.1%) ($\chi^2 = 36.42$, $P = 0.000$) compared to their counter group. Also a significantly higher rate of asthma was detected among children who were currently exposed to cigarette smoking by their mother (45.2%) ($\chi^2 = 5.91$, $P = 0.015$) or father (40.3%) ($\chi^2 = 43.31$, $P = 0.000$). Moreover, this study gave an evidence that exposure to cigarette smoking from both parents whether intrauterine or currently was acting as a risk factor for asthma occurrence.

Conclusion: Smoking acts as a significant risk factor for asthma occurrence.

PC-81405-18 Type of infant feeding as risk factor for asthma

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Background: Asthma is one of the commonest chronic diseases among children.

Aims: To fill the gap in data concerning this disease in Iraq, we investigated the sociodemographic and other risk factors related to asthma occurrence among primary school children.

Materials and Methods: A case-control study was conducted in Baghdad, the capital of Iraq, among primary school children aged 6–12 years. Cases were 644 children with asthma, and control group was 1618 children without asthma. A well constructed standardized modified questionnaires of ISAAC were completed by the parents of the children selected. In addition to the sociodemographic characteristics such as

sex, residency and crowding rate of the index child, our questionnaire concentrated on the possible risk factors for development of asthma, feeding patterns and duration of breast feeding.

Results: Interestingly, our results found that the majority (1645) of the study group had history of exclusive breast feeding (BF), moreover (1377) of children had their BF period extended beyond 6 months. Our results showed that participant with such a history demonstrated slightly higher prevalence of asthma 481 (29.2%) when compared to those with no such history 163 (26.4%), however this difference statistically was insignificant. Also this study detected that duration of BF (<6 m, or ≥ 6 m) has no significant relation with development of asthma ($\chi^2 = 0.55$, $P = 0.468$), in spite that children with history of BF >6 m were showing lower prevalence rate of asthma (398/1377) (28.9%) compared to those with duration of BF <6 m (83/268) (31%).

Conclusion: No significant association between breast feeding and asthma was observed.

PC-81413-18 Prevalence of asthma and allergy symptoms in adults in Sudan

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Objectives: Estimation of asthma and allergy symptoms prevalence in adults in Sudan and validation of the adapted ISAAC questionnaire.

Methods: Cross-sectional study in eight universities, chosen randomly, in Khartoum (central Sudan), Kassala (east Sudan) and Shendi states (north Sudan), during the period 2006/2007. A modified ISAAC questionnaire for adults was distributed to students, academic staff, employee and workers. Any subject with asthma symptoms was interviewed by another questionnaire and had lung function and skin prick tests.

Results: 3780 subjects aged 18–76 years were included. Average prevalence of wheeze was 11.3%: Khartoum 10%, Kassala 15.2% and Shendi 12%. Most of the patients have intermittent and mild symptoms. Reversibility test was positive in 35% of patients with wheeze. Skin test showed sensitivity to house dust, cat and cockroaches. Asthma symptoms were correlated with allergic rhinitis symptoms. Prevalence of wheeze and shortness of breath was 7%.

Conclusions:

- 1 Asthma prevalence in adults varies among regions.
- 2 The average prevalence depending on wheeze is 11.3% and 7% when combined with shortness of breath.
- 3 This combination of symptoms 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 in chest.

- 4 House dust is the most important trigger factor and asthma symptoms are correlated with allergic rhinitis symptoms.
- 5 Reversibility test is not well correlated with the symptoms and as most of the subjects have intermittent symptoms, provocation tests might be more appropriate to validate the questionnaire.

PC-81690-18 Prevalence of COPD in relation to smoking habit among urban population of North-West India

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Introduction: Very few epidemiological studies for prevalence and smoking as causative factor for COPD based on spirometry have been reported from India.

Aims and objectives: To study the prevalence of COPD (GOLD criteria) among residents of Bikaner and its relationship with smoking habit.

Methods: Randomly selected 4021 individuals (1% of the covered population aged 30 yrs. or above) during social events were approached. Data from 1763 subjects who cooperated for General Health and IPAG (modified for age and biomass fuel) Questionnaire, Spirometric evaluation and fulfilling our predefined exclusion criteria were subjected to statistical evaluation.

Results: Prevalence of COPD as per GOLD Guidelines—5.2% with significant male dominance, directly related to age, smoking habit, quantity in pack year ($P < 0.001$) and type (Bidi-tobacco Melanoxydon leaf) of smoking more so amongst ex-smokers ($P < 0.001$), industrial workers, professional drivers and in females using biomass cooking fuels.

Conclusions: Prevalence of COPD and effect of smoking on it is more or less same as reported in other studies from India. Probably smoke from burning of Melanoxydon leaf adds to injurious effect of tobacco on lung. Need further confirmation. Study also reveals that severity of illness forces smokers to stop smoking.

PC-81746-18 Decreased respiratory capacity in ragpicker children in Mumbai slums: need for health action

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Introduction: According to UNICEF and the International Labour Organization, ragpicking is one of the worst forms of child labour. The burden of respiratory morbidity in ragpickers is high due to exposure to high level of environmental pollution.

Aim: This study attempted to explore the compromise in respiratory function measured in terms of peak expiratory flow rate (PEFR) in children residing in vicinity of Deonar dumping ground, Govandi, Mumbai. We also compared the PEFR of children involved in ragpicking with those not involved in ragpicking within the study subjects.

Design: This is a cross-sectional study.

Methods: We administered an interview schedule and measured height, weight and PEFR of the children using Wright's peakflow meter. Data was analyzed using SPSS.

Results: The mean PEFR of study subjects was significantly lower than mean standard PEFR for Indian children with similar height. The mean PEFR of ragpickers was found to be lower than that of non-ragpickers. A general linear model was constructed to compare the mean PEFR in ragpickers and nonragpickers using univariate ANOVA. The mean adjusted PEFR for ragpickers—237.587 L/min whereas the mean adjusted PEFR for non-ragpickers—246.634 L/min.

Conclusion: This study underlines the severe respiratory hazards of ragpicking in children. Measures should be taken by the public health system to channelise manpower and funds to educate vulnerable occupational groups and provide protective gear.

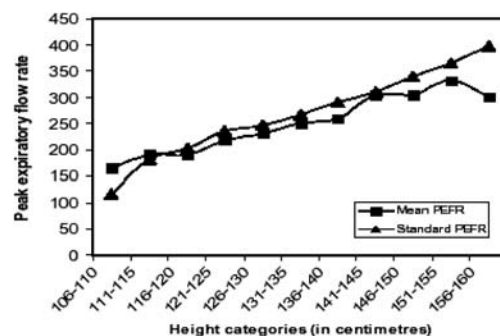


Figure Mean peak expiratory flow rate in male children compared to standards.

PC-81748-18 Study of prevalence and relationship of COPD and smoking habit among workers in wool industry of Bikaner

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Introduction: Sheep wool related industrial environment (the largest in Asia) has not being convincingly documented as an etiological factor for COPD, but reports suggest higher respiratory symptoms amongst wool workers.

Objective: To find prevalence of COPD and its relationship with smoking habit amongst the workers.

Methods: Of 2340 randomly selected wool workers screened for study, 964 aged 30 years and above co-operated in completing modified IAPG questionnaire. Out of these 708 subjects scoring 17 and more, 660 cooperated for performing spirometry and reversibility test.

Results: Cough, expectoration, wheezing, allergic manifestations and breathlessness were present in 39.94%, 27.80%, 15.77%, 6.22% and 5.71%, respectively, of subjects, having direct relationship with age and duration of exposure more so amongst workers from the sorting and spinning sections.

—Prevalence of respiratory symptoms ($P < 0.001$) and COPD ($P < 0.001$ HS) were more among smokers than non smokers

—Sorting and carding are associated with highest prevalence, followed by opening and spinning as compared to workers from other vocations

—Prevalence of COPD amongst workers above age of 30 yrs (964), by Gold Criteria—6.22%; M:F—2.75:1; Smoker:non Smoker—3:1

—Prevalence of COPD was significantly higher among the female workers, mostly engaged in sorting vocation which has maximum exposure to wool dust.

Conclusion and suggestion: The wool industry should be considered as occupational hazard for respiratory ailments e.g., COPD, ILD, asthma.

—Preventive measures such as mask with specific air filters should be advocated to workers engaged in sorting vocation.

PC-81786-18 Study of the determinants of adolescent smoking habits, with a special focus on teacher smoking

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Introduction: Approval of smoking by friends and teachers is likely to increase the probability of smoking by the students.

Objectives: To determine whether adolescent smoking is associated with teachers or other students smoking.

Methods: In a cross-sectional study a representative sample of 4599 students in 3rd grade aged 17 to 19 years was selected from high schools in Tehran. A 21-item questionnaire was administered consisting of demographic and tobacco smoking habit questions. Association between smoking behavior and perceived exposure to teachers smoking were assessed using bivariate and multivariate analyses, adjusting for parental, best friends, and sibling smoking and sex. A multivariate logistic regression model was constructed and adjusted ORs were estimated.

Results: Of the students studied, 250 (12.1%) of boys and 131 (5.3%) of girls reported being current smokers ($P < 0.001$). The proportion of smoker and non-smoker students being exposed to teachers smoking inside the school building were 209 (55.7%) and 1191 (29.3%) respectively ($P < 0.001$). Of those being exposed to teachers smoking outdoors on school premises, 220 (58.7%) were smoker and 1205 (29.2%) were non-smoker ($P < 0.001$). Furthermore, 809 (70.0%) of smokers and 1504 (45.0%) of non-smoker students reported that they had seen other students smoking outdoors on school premises ($P < 0.001$). After adjusting for sex, smoking habit of father, mother, brothers, sisters and best friends adolescent perceived exposure to teachers smoking on school premises, but not inside school, was significantly associated with current smoking (OR = 2.1; 95%CI 1.7–2.7). Adolescent exposure to best friend smoking was strongly associated with current smoking after adjusting for above variables (OR = 6.7; 95%CI 5–9).

Conclusion: Teachers smoking during school hours and best friend smoking are the two important determinants to be considered in any project aiming to set schools free of tobacco.

PC-81887-18 Tobacco use among secondary school students in Nigeria

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Setting: Secondary schools nationwide.

Objectives: Tobacco use prevalence and associated factors among secondary students in Nigeria.

Methods: Cross sectional questionnaire study using multistage sampling method.

Results: Current use of cigarettes, other tobacco or any tobacco products was 5.2%, 10.0%, 12.5% for all, 7.5%, 11.3%, 14.5% for males and 2.3%, 8.4%, 9.9% for females. Daily cigarette smoking and the mean number of sticks consumed was $0.8\%/2.8 \pm 2.8$ for females and $2.5\%/3.9 \pm 5.7$ for males. There were significant zonal differences in prevalence and type of tobacco product used with user rates highest for cigarette in the North-east 12.7%, snuff in North-central 7.4%, chewing tobacco in South-south 5.0% and wrapped tobacco in North-west 4.1%. Overall tobacco use increased with students' age and decreased with social class but was lowest for females, urban dwellers, and students cared for by both parents. Students' overall perception of cigarette harm, addiction and environmental tobacco smoke was 70.5%, 55.6% and 60.5%. Knowledge of specific tobacco-associated diseases ranged from 7.8% for stomach ulcers to 37.2% for lung cancer while 24.4% only knows it is harmful. Sources of information on tobacco harm came mostly from radio 46.0%, television 41.9%, school 36.8% and least from tobacco product packages 2.0%.

Conclusion: Among these students, the tobacco burden is greatest among males, rural dwellers, and the poor. Overall students' knowledge of the specific diseases caused by tobacco is inadequate and there is an emerging epidemic of cigarette smoking in the North-east zone. Contributory factors to this looming epidemic should be comprehensively and urgently addressed.

PC-82314-18 Smoking cessation in Morocco: data from the MARTA survey

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The effects of smoking on health can be prevented through smoking cessation. Cessation of smoking is a complex, dynamic process, formulated as including the stages of precontemplation, contemplation, preparation, action, and maintenance. A characterisation of the distribution of the population across these stages is essential for planning tobacco cessation programmes. The aim of this study is to describe the characteristics

of Moroccan ever smokers, addressing cessation and intent to quit in the 2006 national prevalence survey. A cross-sectional survey was carried out in 2005–2006 on a representative sample for the entire country. A standardised questionnaire was interviewer administered. The sample included 2695 ever smokers of whom 1044 had quit. About 26.0% of current smokers reported not intending to give up their smoking behavior, and 14.2% of current smokers said they intended to do so, but have not taken any action. Of all ever smokers, the percentage of former smokers was 38.7%, and 40.2% of current smokers had quit at least once, but relapsed by the time of the survey. The most common reason for quitting was to be healthy. There was no association between educational level and attempt to quit. Men were more likely to have made an attempt to quit ($P < 10^{-5}$) and participants aged more than 40 years have attempted more frequently to quit ($P = 0.017$). The percentage of smokers contemplating quitting was high in Morocco in 2006, but the proportion of successfully quitting was low. The study shows that smokers need to be supported in their quit attempt.

POSTER DISPLAY SESSIONS**CLINICAL TRIALS AND TUBERCULOSIS BASIC SCIENCE: BACTERIOLOGY-I****PS-81258-18 Capacity building of TB microscopists at district level through quality AFB microscopy training**

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Aim: TB is one of major public health problems and AFB microscopy is the basic laboratory tool for case-detection in Pakistan. However, the quality of AFB microscopy is not reached to international level in most of diagnostic centers. The study aims to standardize and strengthen AFB microscopy training method in resource limited country.

Methods: AFB microscopy training was given to 12 participants from peripheral diagnostic centers, Faisalabad one of JICA owned districts of Punjab, Pakistan. Urdu version of AFB microscopy training manual published by The Union, RIT and USAID was followed by trainers. The training done was basically participatory including individual assessment and feedback. The results were assessed in terms of quality of smear preparation and number and type of errors occurred. **Results:** In smear preparation, proportion of good quality improved from 43% to 93% in specimen

quality, 56% to 94% in staining, in cleanliness 3% to 88%, thickness improved from 25% to 97%, in size from 79% to 98% and in evenness from 9% to 80%. Assessment of microscopy performance was based on occurrence of errors. Error rate decreased.

Conclusion: Remarkable improvement was observed during participatory training based on the translated AFB microscopy training manual and it was very effective for quality AFB trainings. Follow up of skill can be made through EQA activities for AFB microscopy therefore, this method should be expanded to all EQA implemented areas.

PS-81347-18 FSEQA: seven years of EQA of TB laboratory testing

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Federal System for External Quality Assessment of Clinical Laboratory Tests (FSEQA) is an organization empowered to perform EQA in all Russian medical labs since 1995. Participation of labs in FSEQA had been obligatory to all medical labs in RF according to regulations of the previous MoH and is highly recommended by today's licensing authorities. Total number of laboratories participated in FSEQA since 1995 is over 12 000, number of laboratories that had participated in 2007 is 7049, number of EQA modules—appr. 100. National Centre for External Quality Assessment in Laboratory Medicine (NCEQA) is accomplishing everyday FSEQA activities. Panel testing (PT) is a prevailing EQA method in FSEQA. Since 2000 PTs for Ziehl-Neelsen microscopy, culture, 1st line DST, PCR—since 2001 (PT DST in cooperation with WHO-SRL—since 2005), fluorescence microscopy—since 2006, Ziehl-Neelsen microscopy rechecking—since 2007. In 2007 with financial support of the Russian Health Care Foundation and International NGOs NCEQA performed PT of 1000 laboratories—for Ziehl-Neelsen microscopy (2 rounds), 100 laboratories—for fluorescent microscopy (2 rounds), 120 laboratories for culture and 120 laboratories for DST. Both civilian and penitentiary health care system laboratories were included in EQA.

PS-81356-18 Evaluation of the biocidal effect of bleach on *M. tuberculosis* in smear microscopy: a safety measure approach

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Background: Recent findings indicate that sodium hypochlorite (bleach) could be used as a safety measure in smear microscopy for diagnosis of tuberculosis. However, these findings have not yet been evaluated.

Aim: To evaluate the biocidal effect of bleach on *Mycobacterium tuberculosis* in direct sputum smear microscopy for diagnosis of tuberculosis (TB) as a safety measure.

Method: A total of 185 pooled smear positive sputum specimens were assessed for the viability of *M. tuberculosis* after treatment with 5% bleach. Each specimen was homogenized using sterile beads and then divided into seven equal portions. One portion was directly cultured. Each of the six portions was treated with 5% bleach and then cultured at 15 minutes, 1, 3, 4, 6 and 15 hours intervals.

Findings: Of the 185 smear positive specimens, 174 (94%) were both smear and culture positive. Of these, 13 (7.5%) showed growth after treatment with 5% bleach between 0 and 3 hours but no growth after 4, 6, and 15 hours respectively.

Conclusion: Use of 5% bleach with at least 4 hours of exposure should be recommended for use as a safety measure in smear microscopy for diagnosis of TB. This could serve as an alternative to currently used phenolic agents as recently recommended by the Health Protection Agent.

PS-81366-18 NRA: an alternative method for rapid first and second line DST

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Setting: Specialized Treatment Institution (STI), Ministry of Justice, Baku, Azerbaijan.

Objective: To illustrate the potential of the NRA performing DST.

Method: During 2007, DST was performed at the STI lab on over 100 *M. tuberculosis* strains, using the LJ proportional method and the NRA method. In the latter, potassium nitrate is included in the media, inoculated then from pure cultures. By adding 'Griess' reagent after 7, 10 and 14 days, nitrate reductase activity is detected as a purple colour. Results were compared with those obtained by the SRL of Borstel (Germany).

Results: For results please refer to the Figure. 45% of the results were obtained within 7–9 days (Mean time: 9 days). Comparison of NRA results from the STI lab with SRL results showed high agreement for R (99%), H (98%), CM (98%) and AMI (99%). Lower agreement was achieved for S (91%) and E (81%). For some drugs (OFLO, CS) the results are difficult to evaluate, because only few resistant strains were available.

	S	H	R	E	PZA*	PTH	OFLO	CS	PAS	CM	AMI
Concentration	4.0	0.2	40	2.0	1	20	2	20	0.5	20	20
	µg/ml	µg/ml	µg/ml	µg/ml	mg/ml	µg/ml	µg/ml	µg/ml	µg/ml	µg/ml	µg/ml
Agreement	91 %	98 %	99 %	81 %	98 %	99 %	99 %	99 %	87 %	98 %	99 %
Sensitivity	88 %	98 %	98 %	53 %	98 %	78 %	67 %	-	100 %	100 %	100 %
Specificity	100 %	100 %	100 %	93 %	94 %	100 %	91 %	99 %	87 %	97 %	99 %

*Instead of PZA nicotinic acid amide was used.

Conclusions: The NRA is a rapid DST method, with results in good agreement with those obtained by the SRL. As reliability in DST depends on the kind of drug employed, we could show in good agreement with other studies that H and R resistance can be reliably measured; resistance to PZA, S and E is more difficult. Overall, the NRA has proven to be a reliable method for drugs defining MDR-TB, and for the important second line drugs (AMI, CM, OFLO).

Advantages: Based on known methodology, with (safer) solid media, no investment in expensive new equipment or advanced training required.

Disadvantage: With nitrate reductase being a common substance, contamination will lead to false interpretation, hence the importance of working on pure cultures.

PS-81382-18 Simultaneous identification of *M. tuberculosis* complex and non-tuberculous mycobacteria from BACTEC culture by Rapid *rpoB* Duplex nested PCR-ICT assay

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Aim: To develop a novel nested PCR-ICT assay to direct and simultaneously detect *Mycobacterium tuberculosis* complex and NTM.

Design: The lateral flow strip were manufactured by AsaiGen Co., Taiwan.

Methods: Clinical specimens were processed by an NALC procedure and then inoculated into BACTEC 960 MGIT 12B tubes at 35°C in the MGIT instrument. The chromosomal DNA preparation and Duplex nested PCR: 1st run primer: BF3, BR2; TB Primer 1, TB primer 2 and NTM 1 and NTM 2. Finally 100 µl reaction mixture were added to lateral flow strip (AsaiGen Co.). The results were displayed after 15 min.

Results: Total 228 clinical isolates with positive signal in MGIT tubes were tested with the nested PCR-ICT assay. There were 100 isolates with positive signal in the line for *M. tuberculosis*, and 124 isolates with positive signal in the line for NTM. There two samples with both lines for *M. tuberculosis* complex and NTM positive. There were total 104 *M. tuberculosis* complex and 126 NTM including 60 *M. kansasii*, 40 MAC and 26 *M. abscessus*. The mixed infection rate with *M. tuberculosis* and NTM was only 1%. The sensitivity of the nested PCR-ICT for *M. tuberculosis* complex was 98%, specificity was 100%. The sensitivity and specificity for the NTM were both 100%.

Target DNA:		
<i>rpoB</i>		
Primer name	Sequence 5'–3'	Amplified DNA
1st: BF3	ACC GAC GAC ATC GAC CAC TT	397
BR2	AGC CGA TCA GAC CGA TGT T	
TB Primer 1	Biotin-CGT ACG GTC GGC GAG CTG ATC CAA	235
TB Primer 2	Fluorescein-GAC CTC CAG CCC GGC ACG CTC ACG T	
NTM Primer 1	Biotin-GGA GCG GAT GAC CAC CCA GGA CGT C	136
NTM Primer 2	Dig-CAG CGG GTT GTT CTG GTC CAT GAA C	

Conclusion: The nested PCR-ICT assay was very convenient to direct and simultaneous detecting the *M. tuberculosis* complex and NTM in BACTEC liquid culture. The mixed infections with *M. tuberculosis* complex and NTM were very rare in Taiwan.

PS-81407-18 Excellent in vitro activities of clofazimine against isolates of rapidly growing mycobacteria in Taiwan

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Aim: To evaluate the in vitro activities of clofazimine against RGM in Taiwan.

Design: In vitro inhibitory testing.

Methods: Broth microdilution MIC testing of these agents was performed according the tentative CLSI guideline. Serial double dilutions of the tested antimicrobial working solutions were prepared in the wells ranges from 16 µg/ml to 0.0313 µg/ml for clofazimine; 128 µg/ml to 0.2 µg/ml for dapsone and D-cycloserine. The inoculated trays were incubated at 30°C in ambient air and interpreted after 3–5 days.

Results: The in vitro activities of clofazimine, dapsone and D-cycloserine were evaluated against 185 clinical isolates of RGMs including 117 isolates of *M. abscessus*, 48 isolates of *M. fortuitum*, and 20 isolates of *M. chelonae*. Clofazimine had excellent activity against RGMs. Most (99.1%, 91.7% and 100%) of the *M. abscessus*, *M. fortuitum* and *M. chelonae* isolates had clofazimine MICs of ≤1 µg/mL. The MIC50s of clofazimine against the three RGM species were 0.25 to 0.5 µg/mL and MIC90s were 0.5 to 1.0 µg/mL. Dapsone and D-cycloserine had only little or no activity against the three pathogenic RGMs. Clofazimine in combination with amikacin showed very good enhance activity in *M. abscessus* and *M. helonae* but only moderate synergistic effect in *M. fortuitum*.

Conclusion: Clofazimine could be the drug of choice to treatment RGMs and with good synergistic effect when combination with amikacin.

PS-81439-18 CORD formation: a good tool for presumptive identification of *M. tuberculosis* complex

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Setting: For TB patients co-infected with HIV, the rapid differentiation between tuberculosis and non-tuberculous mycobacteria is fundamental. This often represents a substantive challenge for the diagnostic laboratory. The identification of *M. tuberculosis* complex (MTC), using non-molecular methods, is timing consuming. Some studies have evaluated the utility of cord formation in liquid or solid medium for the presumptive identification of MTC. The distinctive colony morphology of mycobacteria also helps to characterize the species. Our laboratory has a long experience using a screening test which consists of visual analysis of colony morphology and the presence of cording on microscopy for presumptive identification of MTC.

Objective: To evaluate the cord formation test in order to introduce it as a screening method, taking also into account the cost and the time it takes to get the result.

Method: A total of 152 strains were tested by the screening test. A molecular method, PCR restriction enzyme analysis (PRA), was used as gold standart to ascertain the confirmed identification result. A comparison was made concerning the costs and time of both methods.

Results: There was disagreement between the two methods in only one strain (0.6%). In the 6 cases where there was a preliminary disagreement between the cord formation test and the PRA, the evaluation of the macroscopic aspect resulted in agreement with the gold standard. The co-positivity of the screening test was 100% and the co-negativity was 98%. The cord formation costs US\$ 0.25 and time was 2 days to perform.

Conclusion: The presumptive identification of MTC using macroscopy analysis of colony morphology associated with the presence of cording on microscopy is a simple, rapid and low-cost test. The results showed that this method can be introduced in the laboratory network as presumptive method in the tuberculosis diagnosis, before sending the culture to a reference center for confirmatory tests.

PS-81485-18 Utility of non-pulmonary clinical samples for the diagnosis of pulmonary tuberculosis

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The diagnosis of pulmonary tuberculosis is conventionally established by Ziehl-Neelsen stained smears. However, negative smear results have low negative predictive value. The detection rate is further compromised in HIV infected patients. Therefore, it becomes desirable to utilize other clinical samples for improving the mycobacterial detection rate. In a prospective study 52 HIV positive and 27 HIV negative patients with suspected PTB utility of blood culture was evaluated using MB/BacT automated culture system. Mycobacteria could be isolated from blood of 9 (45%) of 20 HIV positive bacteriologically confirmed patients and 7 (21.87%) of 32 bacteriologically negative. The study revealed that low CD4+ counts and poor reactivity to PPD were the two best clinical predictors for the occurrence of mycobacteremia in HIV positive patients. In another set of 81 suspected patients of pulmonary tuberculosis and 121 healthy controls morning urine specimens were collected and processed for culture and genus and species specific PCR based diagnosis of tuberculosis. Of the 81 patients suspected to have PTB, twelve (26.08%) were also positive by culturing their urine specimens. Furthermore, out of 35 sputum culture negative cases, three (8.57%) were urine culture positive. PCR has rather much better sensitivity, detecting 52.2% of the bacteriologically confirmed PTB cases and 28.6% bacteriologically negative PTB cases. None of the control subjects was detected positive for *Mycobacterium tuberculosis* by culture or PCR. These studies indicated that blood and urine samples can be used as supplemental specimens to improve the diagnosis of tuberculosis.

PS-81787-18 Mobiles de renforcement de coordinations provinciales en laboratoires de cultures: cas de la R.D. Congo

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Cadre : La R.D. Congo qui a une superficie de 2 345 000 km², a un seul laboratoire de référence de Mycobactéries et le seul qui isole les mycobactéries et fait les tests de sensibilité pour tout le pays. Ce laboratoire national de référence est installé à Kinshasa, au sein de Programme de la tuberculose et dont les capacités sont suffisantes pour la prise en charge de cas de MDR et des recherches opérationnelles.

Objectif : Evaluer des résultats des échantillons d'expectorations venus uniquement de l'intérieur du pays

pour cultures et tests de sensibilité afin de dépister les cas de MDR, étant donné que la distance moyenne entre les différentes coordinations et le laboratoire national est d'environ 1000 Km.

Méthodes : Traitement de 112 échantillons d'expectoration de 56 patients. Prendre en compte la durée d'expédition du lieu de prélèvement jusqu'au laboratoire d'analyse. La perte de viabilité des expectorations avant le début d'analyse. Les résultats de culture et de tests de sensibilité.

Résultats : La durée moyenne entre l'émission des expectorations et le début d'analyse est de 15 jours. 62 échantillons d'expectoration, soit (55%) avec cultures stériles à cause de dessèchement des échantillons et 46 cultures et tests de sensibilité, soit (41%). 4 cultures contaminées, soit 8,6%.

Conclusion : La durée a été relativement longue par rapport aux techniques utilisées sur les milieux solides de Löwestein-Jensen. Les méthodes de conservation sont rendues inefficace par le temps et il est impérieux de raccourcir le temps de conservation et la durée d'expédition par le renforcement de laboratoires provinciaux de référence en laboratoires de cultures et tests de sensibilité.

PS-81802-18 Routine diagnosis of tuberculous meningitis with MODS assay

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Background: Tuberculous meningitis (TBM) is a devastating condition. Early diagnosis is crucial for a successful outcome. We report here on the routine use of the microscopic observation drug susceptibility assay (MODS) format for diagnosis of TBM in our hospital.

Methods: 410 consecutive cerebrospinal fluid samples collected from 277 patients clinically suspected of TBM presenting at the Hospital for Tropical Diseases, HCMC, between December 2006 and October 2007 were tested by Ziehl-Neelsen (ZN) smear, MODS, Mycobacterium growth indicator tube (MGIT) and Löwenstein-Jensen (LJ) culture. One hundred and sixty-eight samples were from patients already on TB therapy for >1 day and 32 samples were excluded due to untraceable patient records. Two hundred and forty-two samples from 226 newly presenting patients were included in the final analysis. 49.6% ($n = 112/226$) of patients were deemed to have TBM by clinical diagnostic and microbiological criteria (excluding MODS).

Results: Sensitivity by patient against clinical gold standard for ZN smear, MODS, MGIT and LJ were

26.3%, 55.9%, 66.9% and 58.5%, respectively. Specificity of all microbiological techniques was 100%. Positive and negative predictive values for MODS were 100% and 71.3%, respectively for HIV infected patients and 100% and 69.8% for HIV negative patients. The median time to positive was 7 days, significantly faster than MGIT at 16 days and LJ at 31 days. **Conclusions:** We have shown MODS to be a sensitive, rapid technique for the diagnosis of TBM in routine use.

PS-81860-18 Use of LED add-on fluorescence microscope conversion device for diagnosis of AFB

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The latest development in fluorescence microscopy, LED (Lumin, LW Scientific) fluorescence microscopy (LED-FM) was used in diagnosis of AFB in comparison with: standard fluorescence microscopy (FM) (NICON E400); Ziehl-Neelsen microscopy (ZN) (OPTON) and culture in routine laboratory settings. Culture on Löwenstein-Jensen (LJ) medium was used as a gold standard. 205 sputum samples from 205 patients have been examined by FM, LED-FM, ZN and culture. Sputum samples, delivered to the laboratory during two month period were examined without special selection. FM and LED-FM have shown the same sensitivity 87.8% and specificity 100%, ZN has shown sensitivity 80.5% and specificity 100%. Moreover, out of 5 cases which have been missed by FM and LED-FM and confirmed by culture, only one appeared to be sputum and the other four were saliva. FM/LED-FM microscopy took 2.5 times less time for smear examination in comparison with ZN. LED-FM has shown to have the same sensitivity and specificity as routine FM and both of them had sensitivity 7.2% higher than ZN. FM/LED-FM microscopy requires much less time for smear exam. LED add-on fluorescence microscope conversion device has the same advantages as FM but could be easily attached to the most of the models of light microscopes and convert them to fluorescent. Additional advantage of LED is much lower price and the lifetime of 50 000 hours.

PS-81875-18 LED add-on fluorescence microscope conversion device in AFB detection

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The objective of the study was to compare standard methods of TB laboratory diagnosis of AFB, such as Ziehl-Neelsen microscopy (ZN), fluorescent microscopy (FM), and culture on Löwenstein-Jensen (LJ) with fluorescence microscopy by add-on fluorescence

conversion device (LED-FM) (Lumin, LW Scientific). LED add-on fluorescence microscope device was used as an attachment to binocular light microscope Olympus SX 31, and it made possible to use conventional light microscope for fluorescence microscopy. Mik-med 2 LOMO fluorescent microscope was used for fluorescence microscopy. All diagnostic methods were used on all sputum samples, which had been delivered to the laboratory for diagnosis or treatment control purpose. Overall 290 sputum samples have been evaluated. There were 30 (10.3%) positive ZN smear examinations, 43 (14.8%) positive FM examinations, and 71 (24.5%) positive LED-FM examinations. Lumin could be easily attached to the most of the models of conventional light microscopes, and could be used even under field conditions. There was no need for additional personnel training. Lumin could essentially reduce personnel load and increase the number of smear examinations, because it requires twice less time for smear examination in comparison with ZN. LED-FM has shown 14.2% more positive results, than ZN, and 9.7% more positive results, than FM. Lifetime warranty for Lumin makes it affordable in settings with limited human resources and funds.

PS-81898-18 Screening of immigrants and refugees for pulmonary tuberculosis in Ciudad Juárez, Mexico

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Introduction: Every year many people, attempt to enter the United States as refugees or through application for an immigrant visa, but in the last years, a high percentage of tuberculosis (TB) cases in persons born outside of the US were detected, and as a result currently all applicants must undergo a medical examination that includes screening for active TB. In Ciudad Juárez México there are two clinics that are responsible for these medical examinations. They created a laboratory to perform TB diagnosis, starting on 1 October 2007.

Method: These diagnostics includes acid-fast bacilli (AFB) testing by fluorescence microscopy on concentrated smears and cultures using solid (LJ) and liquid (MGIT) media, as well as strain identification (ACCUPROBE® Mycobacterial/Fungal Identification) and drug susceptibility testing (Agar proportion test on 7H11 media).

Results: Since the opening of the laboratories, 613 TB suspects were evaluated and 154 of them are still in process. Of the 459 persons screened only 8 (1.74%) had positive culture of 21 (4.57%) AFB positive and from 438 (95.42%) AFB negatives we got 71 (15.46%)

positive culture; from the total of positive cultures 22 (4.79%) belong to *Mycobacterium tuberculosis* complex and 57 (12.41%) were mycobacteria other than tuberculosis (MOTT), and so far only one case of resistance, to isoniazid (INH), has been found.

Conclusion: With the creation of this laboratory more cases of TB are being detected, reducing the importation of active TB cases to the US, as more AFB-negative, culture-positive *M. tuberculosis* cases are being detected.

PS-81901-18 Rapid culture identification with the use of Capilia in the diagnosis of MDR-TB

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Background: The usual turnaround time from specimen collection to species identification is 12–15 weeks and 16–20 weeks total for DST results. Rapid methods for culture and species identification are essential for early diagnosis and prompt therapy of MDR-TB patients.

Objective: To determine the turnaround time in the diagnosis of MDR-TB with liquid culture on MGIT and species identification using rapid Capilia method. **Method:** Sputum specimens were collected from 800 MDR-TB suspects between July 2007 to January 2008. MGIT positive samples were screened microscopically for AFB. If AFB+, a 100 µl from the liquid is dropped into the kit and positive result is indicated within 5–30 minutes. Confirmatory procedure is done using niacin, nitrate reduction and 68°C catalase reaction from a subculture in Löwenstein-Jensen medium. Using the MGIT culture system and the Capilia kit, the average turnaround time for culture and species identification is 1–4 weeks.

Results: All specimens were MGIT positive, 726 were Capilia positive and 718 (99%) of 726 Capilia positives were confirmed *Mycobacterium tuberculosis* using the conventional method of identification. From the 74 with Capilia negative results, 72 (97%) were identified as MOTT and 2 (3%) as *M. tuberculosis*.

Capilia	Biochem M.Tb	Biochem MOTT	Total	Predictive value
Positive	718	8	726	99%
Negative	2	72	74	97%
Total	720	80	800	
	Sensitivity 99%	Specificity 90%		

Conclusions: MGIT culture combined with Capilia TB for species identification reduced turnaround time from 12–16 to 1–4 weeks. When DST was done on

MGIT, total diagnostic turn around time was reduced from 16–20 to 3–6 weeks diminishing diagnostic delays in the management of MDR-TB patients, allowing prompt treatment and enabling the MDR-TB program to treat more patients.

This study was made possible through the demonstration project of the Foundation for Innovative New Diagnostics (FIND).

PS-81902-18 Cost effective TB cultures using in-house Löwenstein-Jensen media slants

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Objective: To compare the cost-effectiveness of In-house (IH) Löwenstein-Jensen (LJ) medium slants against commercially prepared (CP).

Design: Fifty-eight batches of LJ medium prepared in-house were compared with commercially prepared as a procedure for quality control. Two tubes from each batch were inoculated with *M. tuberculosis* H37Rv at 10^{-2} and 10^{-4} dilutions and distilled water as negative control and observed for 8 weeks. Quantification of growth with 10^{-2} dilutions were based on area in the slant with macroscopic colonies: 0 = no growth, 1+ = 25% with growth, 2+ = 50%, 3+ = 75%, 4+ = 100%. Exact colony count was done on 10^{-4} dilution inoculums.

Results: Both media supported growth of *M. tuberculosis* H37RV. After 8 weeks, IH LJ with 10^{-2} dilution inoculums supported a more confluent growth reaching 3.41+ compared with 3.15+ on CP. However, CP LJ with 10^{-4} dilution overtaken IH with average 2–5 colonies on 3rd to 6th week. On the 7th and 8th week, the number of colonies between the two had a small difference of <1 colony on average. Time from inoculation to visible growth was observed during the 2nd week on all LJ slants with 10^{-2} dilution. For the tubes with 10^{-4} dilutions, 59.48% and 50% were able grow the organism on the 2nd week for IH and CP respectively. While 100% of CP was able to grow the organism macroscopically on the 3rd week, IH went through until the 4th week to achieve this.

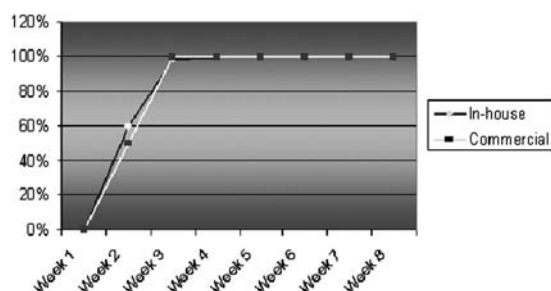


Figure Comparison between in-house and commercial LJ ($n = 116$ tubes) according to time from culture inoculation to detection of macroscopic growth.

Conclusion: The in-house LJ produced comparable results in supporting the growth of *M. tuberculosis*

H37RV. For high volume laboratory, preparing in-house LJ can be a cost effective measure. Each LJ tube produced including man hour of labor, costs only PhP 6–8 as compared with PhP 100 for a commercially prepared.

TB DIAGNOSTICS: MICROSCOPY/CULTURE AND RAPID DETECTION METHODS

PS-81241-18 Effectiveness of microbiological diagnosis of TB in different Russian regions

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Aim: To evaluate effectiveness of microbiology diagnosis of TB in different Russian regions.

Methods: To evaluate effectiveness of performance of general health clinical diagnostic laboratories we calculated the proportion of sputum smear positive TB cases out of all examined patients. To evaluate effectiveness of performance of TB bacteriology laboratories we calculated the proportion of pulmonary TB cases with positive smears and cultures out of all newly diagnosed pulmonary TB patients. The data provided by the regions coordinated by the Central TB Research Institute (CTRI) was compared with average Russian rates.

Results: In 2005–2006 the proportion of sputum smear positive TB cases detected by general health clinical diagnostic laboratories from the total number of examined patients in the pilot Russian regions, which implemented the WHO recommendations, was as follows: in Orel region—1.1% and 1.4% respectively; in Mary El republic—1.3% and 1.2%; in Ivanovo region—1.5% and 2.7%; in Vladimir region—1.2% and 1.1%. For comparison, in other regions the similar rates in 2005 were: in Penza region—0.1%, in Nizhny Novgorod region—0.1%, in Tatarstan republic—0.3%. In 2006 the average proportions of pulmonary TB cases detected using microscopy and culture in Russia were 33.7% and 44.4% respectively. In 2005–2006 the TB detection rates by culture essentially exceeded the Russian average only in two out of 15 regions coordinated by CTRI: in Orel region—77.4% in 2005 and 83.4% in 2006 and in Mary El republic—78.4% and 78.3% respectively.

Conclusion: In regions with most components ensuring qualitative studies, effectiveness of microbiology diagnosis of TB significantly exceeds the similar rates of other regions. Presently positive experience of the pilot regions is implemented in all the regions of Russia.

PS-81269-18 Diagnosis of childhood tuberculosis in Nigeria: a 5-year review

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Aim: To determine the yield of *Mycobacterium tuberculosis* from specimens collected from children with suspected tuberculosis (TB) in Ibadan, Nigeria.

Design and Methods: The records of the TB laboratory of the University College Hospital, Ibadan were reviewed for results of specimens submitted for all children aged 10 years and below with clinical diagnosis of TB between June 2003 and May 2007.

Results: Six hundred and thirty specimens were processed, majority of which were sputum and gastric washings accounting for 72.0%. Of the total specimens processed, 56 (8.9%) were positive for acid fast-bacilli while 26 (4.1%) were positive for culture on Löwenstein-Jensen medium. Overall detection of *M. tuberculosis* was in 70 (11.1%) as 14 (2.2%) were positive for both microscopy and culture. The sensitivity with smear microscopy was 53.9% while specificity was 97.9%. Thirty-two (5.1%) of the cultured specimens were contaminated. Specimens from the 5–10 year age group accounted for majority of positive cases, 69.6% for microscopy and 73.1% for culture. Further analysis showed that there were no statistical significant differences between the yield in different age groups ($P = 0.45$; $P = 0.54$) and also in the yield from different specimens ($P = 0.28$; $P = 0.75$).

Conclusion: The low yield of *M. tuberculosis* calls for an urgent need to fast-track development of more sensitive tools for TB diagnosis in children.

PS-81370-18 Implementation of new methods for quality control of AFB smears in Cuba

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Introduction: The quality control of AFB smears, it is a system designed for continuous improvement of the reliability, efficiency and use of the microscopy, like option of diagnosis and monitoring.

Method: 2064 slides were evaluated, 1518 by blinded rechecking method and 540 using the panel testing, between January 2004 and December 2006. Were participated the selected laboratories from Havana City and Las Tunas provinces. The rechecking was applied quarterly and being carried out two controls, the first in the Hygiene and Epidemiology Provincial

Center of the each county and the second in the National Laboratory of Reference, IPK; the panel was applied semestraly.

Results: The agreement observed with the rechecking during the first and the second control was 99.7% and 98% respectively, identifying 4 reading errors in the first controller, all minor and 33 in the second, 2 major and 31 minor. The general rate of errors, the rates of false positive and false negative, didn't overcome the 5% in the two carried out controls. The quality indicator showed superior values to the 99%. With the panel was identified 63 errors, 6 major and 57 minor.

Conclusions: With the rechecking method, both controllers' laboratories presented a high agreement and showed good quality indicators of AFB smears. With the panel were finding out more errors and identify the laboratories that needed additional training in the bacilloscopy diagnosis.

PS-81717-18 External quality assurance for ensuring quality diagnostic services by BRAC

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Introduction: BRAC jointly with NTP has been implementing TB Control programme in two thirds of the country covering 86 million populations. AFB microscopy is an effective method for diagnosis of infectious TB cases and monitoring treatment progress.

Aim: To ensure accessibility of quality AFB microscopy up to grass level.

Methods: A total of 591 laboratories, including 325 additional peripheral laboratories were established in BRAC supported areas. Each laboratory covers 0.25 million population. Outreach sputum collection centers organized at union level. About 350 lab technicians were trained till 2006. Refreshers training on smearing quality were conducted regularly. In BRAC supported areas, 21 EQA laboratories have been established at Government Chest Disease Clinics to check the quality of laboratories. For blinded rechecking at EQA laboratories, slides were collected in every month and discordant slides were crosschecked by the second controller at central laboratory. Feedback and corrective measures were provided subsequently that helped to develop technical competency of laboratory staff.

Result: Between January and September 2007, 2.6 million slides were examined for diagnosis and follow up. 32 275 slides were checked for EQA. Among them 1% discordant slides were found by first controller which was 1% and 2% respectively in 2006 and 2005.

Conclusion: EQA system helps to monitor the quality of laboratory activities. Corrective measures taken followed by the feed back is helpful for programme performance.

PS-81910-18 Analysis of the implementation of the external quality assessment of smear microscopy in Kazakhstan

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Aim: To evaluate the impact of implementation of external quality assurance of smear microscopy based on LQAS.

Design: In Kazakhstan external quality assurance of smear microscopy is implemented by means of rechecking 10% of negative and 100% of positive smear sputum results. In 2006–2007 a pilot project on blinded rechecking of slides based on lot quality assessment sampling (LQAS) has been implemented in 3 laboratories of Almaty oblast—2 laboratories of the Primary Health Care (PHC) and the Almaty Oblast TB Dispensary laboratory. The project was supported by Project HOPE with USAID funding.

Methods: Analysis of the data received during monthly visits to the laboratories of Almaty Oblast.

Results: The number of slides to be rechecked in the Almaty Oblast TB Dispensary laboratory decreased from 469 to 51 a year; in the PHC Laboratory #1 the number of slides to be rechecked decreased from 264 to 197 a year. In PHC Laboratory #2 the number needed to be rechecked increased from 188 to 318. No significant errors were detected in any of the three laboratories. Proportions of suspects with a positive smear increased from 18% to 23.1%; from 3.7% to 7.4%; and from 2.9% to 4.4% respectively in these 3 laboratories.

Conclusion: Blinded rechecking using LQAS decreases the overall number of slides to be rechecked and provides reliable information on the quality of sputum smear microscopy.

PS-82001-18 Evaluation of quality improvement for sputum smear microscopy by panel testing in Afghanistan

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Introduction: Panel testing has been done in 2007 to evaluate progress of quality improvement for sputum smear microscopy.

Method:

- 1 More than 2+ sputum were collected for the preparation of positive slides.
- 2 Panel set consisted of 2 unstained slides (negative: 1 slide and 2+: 1 slide), and 4 negative, 1+: 2 slides, 2+: 1 slide and 3+: 1 slide (total 10 slides).
- 3 Panel set were handed over laboratory technician during Quarterly Laboratory staff Meeting (QLM).

4 Panel set and results were collected by NGOs, regional laboratory supervisors and provincial laboratory supervisors.

5 Cross-checking was done by cross-checkers belong to National Tuberculosis Institute (NTI) in Kabul to evaluate quality of staining and screening results.

6 Score was calculated according to IUATLD guideline.

Results:

- 1 Recovery rate of Panel sets and results was 79% (397/502).
- 2 About staining of AFB, 270 labs out of 397 (68%) were good, 262 labs (66%) were background also good.
- 3 119 labs out 397 labs (30%) had false positive and 87 labs (22%) had false negative.
- 4 341/397 labs (87%) got score more than 80.

Conclusion:

- 1 By comparing Panel testing in 2005, the quality of microscopy has not been improved.
- 2 Panel testing together with EQA expansion cannot identify the improvement of quality for sputum smear microscopy.
- 3 EQA is needed to be strengthened and then the progress of quality improvement is evaluated by panel testing.

PS-82012-18 Use of fluorescein-diacetate vital staining to define failures of tuberculosis treatment

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Background: Smear microscopy cannot distinguish live from dead bacilli and *Mycobacterium tuberculosis* culture is a lengthy process and is rarely available in resource limited settings, which impacts on the monitoring of anti-tuberculosis treatment response. Therefore, patients are likely to be mis-classified as slow-responders or failures and receive unnecessary treatment prolongation or new regimens.

Objective: To evaluate the performance and feasibility of the fluorescein diacetate (FDA) live staining smear microscopy method using the LED-fluorescence microscope to identify slow responders and failures compared to *M. tuberculosis* culture in routine laboratory conditions.

Method: FDA vital staining and *M. tuberculosis* culture (MGIT and Löwenstein-Jensen method) are performed in all fresh sputum specimens of smear positive follow-up tuberculosis (TB) patients (new and re-treatment) during treatment at the MSF TB clinic of Mae Sot (Thailand). The FDA method was evaluated with and without use of 37°C incubator. Sensitivity,

specificity, reproducibility of the reading and operational aspects of the method were assessed.

Results: Since December 2007, 51 smear positive follow-up cases were included and 20 had culture results available. Out of 8 positive culture results 6 were FDA positive and 10/12 were both culture and FDA negative. By September 2008, we will be able to report performance and reproducibility of the test in a sample of 150 patients.

PS-82058-18 AFB smear positivity rates and quantitation during post-election violence in Western Kenya

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Background: The December 2007 Kenyan elections resulted in over 1500 deaths and 600 000 displaced people. Tribal clashes produced mass migrations by foot, severe cases of anxiety, inadequate nutrition, poor medication adherence, and refuge at IDP (internally displaced people) camps. The Mycobacteria Reference Laboratory (MRL) in Eldoret, Kenya provided diagnostic services throughout the turbulent month of January 2008.

Methods: A retrospective descriptive study was performed by utilizing the MRL TB Laboratory Register. Sputum smear results of 1561 new TB suspects and 318 follow-up cases were evaluated for positivity rate and quantitation during the last 6 months of 2007 to compare with results during January 2008.

Results: During the last half of 2007, 29.0% ($n = 127$) of all smear-positive samples produced a smear quantitation result of '+ + +'. The '+ + +' rate during post-election violence was 60.0% ($n = 27$) ($P < 0.0001$). The monthly positivity rate for AFB smears of new suspects in the second half of 2007 was 13.5% ($n = 200$). The positivity rate of new suspects during post-election violence rose to 22.9% ($n = 19$) ($P = 0.0051$). Follow-up patients during the last half of 2007 had a monthly positivity rate of 7.8% ($n = 23$), while the January 2008 rate rose to 13.6% ($n = 3$) ($P = 0.0695$).

Conclusion: During the month of post election violence in Kenya, rates of smear positivity increased in both new patient evaluations and in follow-up patients at the MRL in Eldoret, a central location of violent upheaval. Smear quantification demonstrated high rates as well. These changes occurred too quickly (within days to weeks) to postulate lack of access to services or medication interruptions as primary causative factors. Increased positivity rates may reflect that only overtly ill patients were willing to travel to

the hospital in a time of crisis. Continuation of health services throughout crisis situations remains essential to supply care for the critically ill.

PS-82178-18 Novel light-microscope attachment (Lumin) for diagnosing TB by fluorescence microscopy

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Aim: To evaluate the diagnostic efficiency of Lumin microscopy, compared to conventional fluorescent microscopy (FM) and Ziehl-Neelsen (ZN) microscopy, in a controlled laboratory experiment and in a routine diagnostic laboratory setting.

Background: In recent years FM has gained in popularity for diagnosis of TB because of higher sensitivity and faster slide screening than ZN. However, FM instrumentation is expensive. The Lumin kit, on the other hand, is much cheaper and comprises of a novel attachment to a special objective fitted to a normal light microscope that allows fluorescent microscopy to be performed.

Methods: Separate sets of slides were prepared from known dilutions of *Mycobacterium tuberculosis* H37Rv and (a) ZN stained for light microscopy or (b) auramine O stained for FM. The latter slides were read according to conventional methods under FM and Lumin. The influence of post-auramine ZN staining of slides on the results was also studied. The Lumin objective was further evaluated in terms of sensitivity and specificity relative to FM and ZN, using 1000 consecutive clinical specimens from TB suspects submitted to a routine diagnostic laboratory.

Results: Preliminary results indicate that Lumin performs as well as conventional fluorescent microscopy, with both Lumin and FM superior to ZN in detecting bacilli. It is easy to install and to operate. Because of the 40× Lumin objective magnification setting (as opposed to 60× for FM and 100× for ZN), screening of slides is quick. However, it makes the exclusion of artifacts and the accurate counts of aggregates more challenging.

Conclusion: The Lumin objective was found to be as accurate as FM in evaluating clinical TB specimens, and much more accurate than ZN light microscopy. There would be a clear benefit in its use as a replacement for fluorescence microscopy in resource-limited settings.

PS-82346-18 Tuberculosis laboratories in 57 cities of the Global Fund Project-Brazil 2007

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Introduction: The National Tuberculosis Control Program has in the National System of Health Care Laboratories (SISLAB) the basis of its laboratorial activities. The SISLAB is a set of national laboratories net, organized in sub-net. The sub-net with specific Tuberculosis activities is composed by organized laboratorial units with defined competence, related to the National Epidemiological Surveillance.

Objective: To evaluate laboratorial infrastructure, biosafety, diagnostic methods used, human resources, population coverage.

Methods: A 25 question questionnaire was applied in the tuberculosis laboratories.

Results: A number of 317 units answered the inquiry. 75% are under public administration. 100% perform direct sputum smear microscopy and 27% perform culture. Despite the population coverage, the average was of 1 laboratory per city, varying between 1 and 42. Only 16% achieve the goal to have one laboratorial unit per 100 000 population; 74.3% register the exam results of direct sputum smear microscopy and culture; 47% possess a standardized examination request; 78% of the laboratories emit the bacilloscopy results until 48h and 6% have more than 4 days delay; 60% informed participating in bacilloscopy quality control assurance; the positivity among the respiratory symptomatic patients was 8.4%; 52% do not possess biosafety cabin; 37% do not possess autoclave; 16% do not possess Bunsen burners; 20% do not possess N95 masks; 2.5% do not possess gloves.

Conclusion: The majority of the laboratories involved in TB diagnostic activities are under public administration. There is an equipment improvement necessity, as well as reinforcement in the use of a registration file. It is suggested to stimulate the accomplishment of the bacilloscopy quality control and the laboratorial technical visits. The positivity results indicates that the monitoring services in health surveillance must extend the searching actions of respiratory symptomatic cases.

PS-82419-18 Treatment outcome of FDC chemotherapy in active pulmonary tuberculosis in Kandy, Sri Lanka

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Objective: To evaluate the effects of Fixed-Dose Combination (FDC) chemotherapy on sputum conversion time and treatment outcome in active pulmonary tuberculosis.

Method: This was a prospective study of 58 smear positive pulmonary tuberculosis patients who started on FDC chemotherapy between 1st of October and 31st of December 2006 in the District Chest Clinic Kandy, Sri Lanka. The progress of the treatment was monitored by regular observation of sputum smear microscopy, ESR, chest x-ray, and weight gain of each patient. Data were analyzed using Minitab statistical software.

Results: The mean sputum conversion time was 3.8 weeks (SD = 2.5 weeks). The sputum conversion rate at the end of 8 weeks was 96.36%. Initial bacillary load, indicated by sputum smear grading was moderately correlated with sputum conversion time ($r = 0.53$). Women had significantly shorter sputum conversion time than that of men ($P = 0.03$). Smoking was associated with delayed sputum conversion among male patients ($P = 0.01$). Follow-up ESR at the end of the intensive phase of treatment was significantly lower than pre-treatment ESR ($P = 0.00$). The cure rate was 83% and the mean weight gain was 5.79 kg at the end of treatment. Follow-up chest x-ray revealed that 18% of patients had complete radiological clearance.

Conclusion: This study reveals that patients with active pulmonary tuberculosis on correct treatment become non-infectious in 4 weeks on average. Faster sputum conversion in women may be attributed to their healthy lifestyles such as non-smoking. Follow-up ESR and weight monitoring can be effectively used as evidence of treatment success.

PS-82432-18 Comparing agreement between microscopy and culture in diagnosis of tuberculosis

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Introduction: Early laboratory diagnosis of tuberculosis still relies on microscopic examination of stained smears. Sensitivity of direct microscopy has been shown to be 25–65%. This means there is a possibility of under diagnosis in under resourced countries which cannot afford to send up culture laboratories. There is a high possibility that the sensitivity of microscopy might drop even further in HIV positive patients who are co-infected with TB.

Aim: The aim of this study is to compare the microscopy results to the culture results from the same sputum samples.

Method: Samples were decontaminated using the 2% NaOH-NALC. 0.5 ml of the sediment from the sample was inoculated into the MGIT tube and the remaining

sediment was used to prepare the smear. The MGIT tubes were incubated in the MGIT instruments, and the smears were stained using Auramine O fluorescent stain.

Results: The following results were observed: out of 383 specimens, 255 were microscopy negative and culture negative; 72 were microscopy negative and culture positive; 52 were microscopy positive and culture positive and 4 were microscopy positive culture negative.

Conclusion: The results above suggest that almost 20% of patients with tuberculosis are missed by using direct microscopy as the only diagnostic tool. Matee et al. has also shown that only 55% of culture positive HIV patient could be detected by direct microscopy after 3 specimens from each patient. Culture laboratory will help to increase case detection.

PS-81300-18 Reducing the string test intra-gastric downtime for detection of *M. tuberculosis*

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Objectives: To optimize the string test for the diagnosis of tuberculosis using MODS culture.

Methods: Twelve patients already diagnosed with pulmonary tuberculosis (TB), four each with sputum smear AFB grade 1+, 2+, and 3+, underwent four consecutive string tests of varying intra-gastric downtime (IGDT) of 30 minutes, 1 hour, 2 hours, and 4 hours. Each retrieved string was cut into three sections—one esophageal and two gastric sections. Eluates from one of the gastric sections and the esophageal section were cultured in MODS after a decontamination procedure and eluate from the other gastric section was cultured in MODS with no decontamination.

Results: No statistically significant difference was observed in retrieval efficacy of *M. tuberculosis* ($P = 0.54$) or median time to positive MODS culture ($P = 0.92$) among string tests of varying IGDTs. A significantly higher proportion of samples became contaminated when cultured without decontamination compared to those cultured after the decontamination.

Conclusion: A shorter IGDT of one hour will make the string test more convenient for diagnosis of tuberculosis, without losing its retrieval efficacy.

PS-81376-18 Is it appropriate to use the nucleic acid amplification test routinely for diagnosis of pulmonary tuberculosis?

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Setting: Laboratory of Mycobacteriology in Eastern Taiwan.

Objectives: To compare utility of a nucleic acid amplification (NAA) test with conventional tests for the early diagnosis of pulmonary tuberculosis under normal laboratory operating conditions in a geographic region with intermediate prevalence of pulmonary tuberculosis.

Design: Three sputum specimens were obtained from each patient. NAA test (COBAS AMPLICOR PCR) was performed on the first specimen only from each patient. Liquid media culture (BACTEC MGIT 960), solid media culture (LJ slant and 7H11 agar plate), and Ziehl-Neelsen stain for AFB smear were performed on all three specimens from each patient. Results were calculated using culture results and clinical diagnosis as the gold standard.

Results: Of the 593 patients tested, 151 (25.5%) were diagnosed with pulmonary tuberculosis. The sensitivity of the first specimen only was 64% for NAA, 54% for AFB smear, 77% for BACTEC MGIT 960, 40% for LJ and 25% for 7H11. The sensitivity of all three specimens increased to 63% for AFB smear, 87% for BACTEC MGIT 960, 51% for LJ and 40% for 7H11. The specificity was 100% for all culture tests and 99% for AFB smear and 99.5% for NAA. The mean turnaround time (TAT) was 1.34 days for NAA, 0.59 days for AFB smear, 11 days for BACTEC MGIT 960, 23 days for LJ and 20 days for 7H11. NAA was able to identify 87% (83/95) of TB patients with at least 1 or more smear-positive specimens and 25% (14/56) of the TB patients with 3 smear-negative specimens. A false positive NAA result was found in only two patients in this study. The false positive rate was very low (1.3%, 2/151).

Performance characteristics of NAA (first specimen), AFB smear (3 specimens), and culture (3 specimens)

		Pulmonary TB status		Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Mean TAT (days)
		Positive(151)	Negative(442)					
AFB Smear	Positive	95	3	63	99	97	89	0.59
	Negative	56	439					
NAAT	Positive	97	2	64	99.5	98	89	1.34
	Negative	54	440					
BACTEC MGIT 960	Positive	131	0	87	100	100	96	11
	Negative	20	442					
LJ	Positive	77	0	51	100	100	86	23
	Negative	74	442					
7H11	Positive	61	0	40	100	100	83	20
	Negative	90	442					
Total culture	Positive	134	0	89	100	100	96	11
	Negative	17	442					

*Two of them had MOTT.

Conclusion: We conclude that although NAA proved to be rapid and specific, the sensitivity of NAA is still far from ideal and is not cost effective. The COBAS AMPLICOR PCR is not suitable for routine use in clinical microbiology laboratories in this setting.

PS-81460-18 MODS for tuberculosis screening prior to isoniazid preventive therapy in HIV-infected persons

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Introduction: Active tuberculosis (TB) must be excluded before initiating isoniazid preventive therapy in HIV-infected persons, but current screening strategies have poor sensitivity and specificity and high patient attrition rates. The low-technology microscopic-observation drug-susceptibility (MODS) assay has demonstrated in other populations high sensitivity, specificity and speed in the detection of *M. tuberculosis*. A comparison of the diagnostic accuracy of MODS with that of current strategies for TB screening prior to isoniazid preventive therapy was undertaken.

Methods: 471 HIV-infected candidates for isoniazid preventive therapy identified at 3 hospitals in Lima, Peru, were enrolled into a prospective comparison of TB rule-out strategies. Exclusion criteria included age under 15 years and any isoniazid preventive therapy in the previous 12 months. Outcome measures included sensitivity, specificity and number of cases correctly classified as having active TB or not.

Results: Of 435 patients who provided 2 sputum samples, *M. tuberculosis* was detected in 27 (6.2%) by MODS, 22 (5.1%) by Löwenstein-Jensen culture and 7 (1.6%) by sputum smear. Of patients with any positive culture, MODS was positive in 96% by 14 days and 100% by 21 days. MODS simultaneously detected multidrug-resistant TB in 2 patients. Screening strategies involving combinations of clinical assessment, chest radiograph and sputum smear were less effective than 2 MODS cultures in accurately diagnosing and excluding TB ($P < .01$). Screening strategies that included non-culture tests classified fewer patients correctly than no testing at all.

Conclusion: An exclusively MODS-based screening strategy was the most accurate in identifying cases of active TB and confidently excluding TB, while yielding results in significantly less time than Löwenstein-

Jensen culture. This would enable HIV-infected patients to quickly initiate appropriate multidrug chemotherapy or isoniazid preventive therapy.

PS-81628-18 Improved mycobacterial yield and reduced time-to-detection in paediatric samples using a growth supplement

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Background and objectives: The role of culture to diagnose mycobacterial disease in children has become increasingly important in the human-immunodeficiency virus (HIV) era. This study compared mycobacterial yield and time-to-detection (TTD) in primary paediatric specimens using a nutrient broth growth supplement to optimise culture confirmation techniques.

Methods: Routine paediatric specimens submitted for culture to the mycobacterial laboratory at Tygerberg Hospital, South Africa, over a seven month period (2007), were processed and split into two aliquots:

- 1 Control aliquot: Mycobacterial Growth Indicator Tubes (MGIT) and Löwenstein-Jensen (LJ) slants;
- 2 Intervention aliquot: MGIT and LJ slants, enriched with growth supplement. MGIT tubes were incubated in the BACTEC MGIT 960 system. Mycobacterial isolates were speciated through standard PCR methods.

Results: A total of 803 samples were processed: 665 (82.8%) gastric aspirates; 126 (15.7%) sputum samples, and 12 (1.5%) fine needle aspirates. The mycobacterial yield obtained with MGIT was 92/803 (11.5%) and with LJ: 15/803 (1.9%). Of the 92 MGIT positive cultures, 64/92 (69.6%) were detected in unsupplemented and 80/92 (87%) in supplemented growth media ($P = 0.04$); of the 15 LJ cultures 5/15 (33.3%) were detected in unsupplemented and 10/15 (66.7%) in supplemented media. In MGIT the yield was 64/803 (8.0%) in unsupplemented and 80/803 (10.0%) in supplemented media. The mean TTD in unsupplemented and supplemented MGIT broth cultures was 18 and 12 days ($P \leq 0.01$) and for LJ slants 26.6 and 26.8 days ($P = 0.99$), respectively. 85/92 (92.4%) were *Mycobacterium tuberculosis*, 3/92 (3.3%) *M. bovis* BCG, and 4/92 (4.3%) non-tuberculous mycobacteria.

Conclusion: Nutrient broth supplementation of 7H9 liquid media enhances both the mycobacterial yield and TTD of paediatric specimens, offering more rapid diagnosis in children.

PS-81634-18 Evaluation of the Capilia TB assay for culture confirmation of *Mycobacterium tuberculosis* in Zambia

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Background: Globally, Zambia has the sixth-highest annual TB incidence rate per capita (680/100 000) and has experienced a 10-fold increase in notified TB cases since 1980. The city of Lusaka has approximately 16 000 new TB patients per year, of which 70% are co-infected with HIV. Rapid and cost-effective identification of *Mycobacterium tuberculosis* infection is vital in resource-limited settings with high prevalences of HIV-1 infection.

Methods: In this study, we compared the performance of the Capilia TB immunochromatographic assay with the BD ProbeTec ET assay for culture confirmation of *M. tuberculosis*. We used 182 liquid media MGIT cultures from 111 TB suspects at two TB diagnostic centers in Lusaka. We calculated sensitivity, specificity, and positive and negative predictive values with 95% confidence intervals using the exact method for binomial proportions.

Results: The sensitivity and specificity of the Capilia TB assay, when compared to the BD ProbeTec ET assay, were 93.4% (95%CI 87.9–97.0%) and 97.8% (95%CI 88.2–99.9%), respectively. The positive and negative predictive values for the Capilia TB assay, when compared to the BD ProbeTec ET assay, were 99.2% (95%CI 95.8–99.9%) and 83.0% (95%CI 70.2–91.9%), respectively.

Conclusion: In our study population, the Capilia TB assay demonstrated a high sensitivity and specificity for culture confirmation of *M. tuberculosis*. The Capilia TB assay is more rapid than the BD ProbeTec ET assay (15 minutes versus 4 hours), simpler to perform, and does not require expensive laboratory equipment. This assay should be useful in resource-limited settings where more sophisticated molecular diagnostic techniques are unsustainable.

PS-81657-18 Rapid MDR-TB detection by GT-MTBDRplus molecular assay directly in clinical samples collected in Burkina Faso

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Aim: Evaluating the usefulness of molecular assay to rapidly diagnose MDR-TB in a setting where culture facilities are not available.

Methods: 92 respiratory samples were collected from TB chronic patients in Burkina Faso, and analyzed in Italy for DST. Decontaminated specimens were also processed for DNA extraction and used to perform the GT-MTBDRplus (Hain, Lifescience) reverse hybridization-based assay to identify mutations affecting *rpoB* for rifampin (RIF-R), and *katG* and *inhA* for isoniazid (INH-R).

Results: Among 92 specimens, 37 were smear-positive and 55 smear-negative. The GT-MTBDRplus allowed the evaluation of drug resistances (DRs) to RIF and/or INH in 36/37 smear-positive and 19/55 smear-negative.

Smear-pos: 24/37 had a *M. tuberculosis*-positive culture. 4 cases harboured non-tuberculous mycobacteria (NTM), correctly revealed by MTBDRplus. The assay identified 17 MDR cases; 9 were confirmed by DST and 7 are under evaluation. 1 of 17 was reported as RIF-S by traditional DST; sequencing confirmed mutations in the hotspot region of *rpoB*. 2 samples identified as RIF-INH-S by the assay, harboured a MDR and a INH-R strain, respectively. 1 case harbouring MDR strain was identified as RIF-R by the MTBDRplus. 1 sample harbouring a RIF-INH-S strain, didn't allow to perform molecular analysis. The 9 samples that did not allow a *M. tuberculosis*-positive culture resulted 1 INH-R, 6 RIF-INH-S and 2 NTM.

Smear-neg: 2 allowed to culture *M. tuberculosis*. MTBDRplus identified as MDR the 2 samples, confirmed by DST. 15 culture-negative samples were identified as 9 RIF-INH-S, 2 MDR, 2 RIF-R, and 2 INH-R by the assay. 35 culture-negative samples resulted negative for *M. tuberculosis* also for the MTBDRplus.

Conclusion: The overall sensitivity of the MTBDRplus among clinical specimens could allow to obtain more rapidly i) DRs data and ii) suspicion for the presence of NTM. The main limitation of the test was a slightly decreasing yield of sensitivity on INH-R cases.

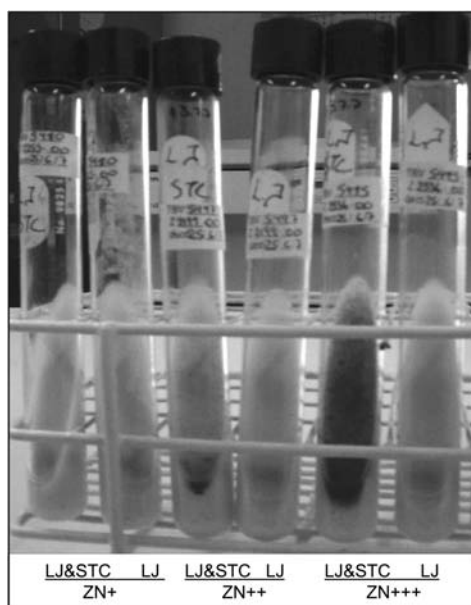
PS-81879-18 Tuberculosis diagnosis is accelerated by incorporating the colorimetric indicator STC in culture media

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Background: Worldwide, TB diagnostic culture is most often done on solid media on which TB growth takes several weeks to become visible, delaying patient diagnosis. STC (2,3-diphenyl-5-thienyl-(2)-tetrazolium chloride) is a reduction-oxidation indicator that is stable in incubators and changes colour when micro-organisms grow.

Objective: To evaluate the utility of STC for TB culture diagnosis.

Methods: Löwenstein-Jensen (LJ), Ogawa and Middlebrook 7H10 culture media were prepared with and without 50 µg/ml STC. Sputum samples with Ziehl Neelsen (ZN) smear microscopy grades +, ++ and +++ were decontaminated using the n-acetyl cysteine sodium hydroxide method. Sputum samples and also laboratory isolates of TB strains were inoculated onto the media in parallel in a blinded manner. Cultures ($n = 114$) were examined by naked eye three times per week and speciation was determined by colony morphology. Days to culture positivity and colony count means (standard error, SE) were compared with the Wilcoxon signed-rank test.



Results: The bright red coloration of the STC-containing media surrounding colonies facilitated identification of positive cultures (photograph). STC accelerated the visualization of TB growth on LJ medium by 7.2 (SE 1.3, $P = 0.007$) days, on Ogawa medium by 6.4 (SE 1.0, $P = 0.005$) days and on 7H10 medium by 2.4 (SE 0.78, $P = 0.001$) days. Average times to TB detection without STC were 20, 25 and 17 days for LJ, Ogawa and 7H10, respectively. Bacterial or fungal contamination also caused colour change, but colony morphology distinguished this from TB growth. Cultures were interpreted without being opened, enhancing bio-safety. There was no augmentation or inhibition of TB colony counts or positivity by STC.

Conclusions: The colorimetric indicator STC increased the speed and ease of the most widely used tuberculosis culture techniques. We are testing STC for concurrent colourimetric multidrug-resistant TB testing and in MODS broth culture.

PS-81939-18 Assessment of MTBDRplus assay for direct detection of *M. tuberculosis* complex and resistance to RMP and INH

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Background: The Genotype® MTBDRplus assay (Hain Lifescience) is targeting *rpoB*, *katG* and *inhA* mutation genes and has been recently evaluated for identification of rifampin (RMP) and isoniazid (INH) resistance in culture isolate and in smear positive sputum specimen after decontamination. However, it has not yet been examined, if the assay can be used also as a nucleic acid amplification method for direct detection of *Mycobacterium tuberculosis* complex (MTC) in decontaminated sputum samples of patients suspected having pulmonary TB.

Methods: In part I of the evaluation, the MTBDRplus assay, based on multiplex PCR in combination with reverse hybridization, was applied to analyse until now 55 smear- and/or culture-positive respiratory specimens after NALC-NaOH decontamination. The results were compared with conventional tests for drug susceptibility (DST) using BACTEC MGIT 960 SIRE Kit. In the second, ongoing part, the assay is performed in decontaminated sputum samples of 215 patients with symptoms of pulmonary TB. 3–4 sputum samples per patient are investigated and MTC detection results are analysed in correlation to the final outcome classification of each patient.

Results: In part I, 47 of the 55 (85%) MTBDRplus results were interpretable. The interpretable results correlated in 100% for RMP and in 94% for INH with those of the DST, whereas in two cases an *inhA* mutation-specific bands, *inhA* MUT1 and *inhA* MUT2 respectively, indicated a low-level isoniazid resistance not shown by DST. Initial results of part II suggest

that MTBDRplus can detect MTC with a high sensitivity in decontaminated routine sputum samples. Investigations on specificity of the assay are still ongoing and will be presented.

Conclusions: These preliminary results show that MTBDRplus applied directly in decontaminated sputum samples is a very promising tool for early RMP and INH resistance testing. Further results are awaited to evaluate its role in early MTC detection.

PS-82002-18 The laboratory diagnosis of paediatric tuberculosis in a high-incidence setting: a 5-year analysis

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Aim: We describe the types and positivity rates of paediatric specimens submitted for the culture of tuberculosis in the setting of a large teaching hospital in the Western Cape, South Africa.

Design: A retrospective data analysis.

Methods: All paediatric specimens submitted for the culture of tuberculosis over a five year period (2003–2007) were included in our study. We analysed the specimens according to seven major categories: invasive pulmonary specimens, non-invasive pulmonary specimens, blood cultures, cerebro-spinal fluid, bone marrow aspirates, tissue and 'other'. Trends in the frequency of the various specimen types were analysed, as well as their positivity rates.

Results: More than 15 000 specimens were included in our analysis. Non-invasive pulmonary specimens remains the most frequently submitted specimen in our setting, but there is an increasing trend to submit sputum samples in older children rather than gastric aspirates. There was an increase in the number of invasive specimens submitted, both from pulmonary and extra-pulmonary sites. The total positivity rate on all specimens was 9.7%, but higher positivity rates were encountered in more invasive specimens, such as bone marrow aspirates (16%), fine needle aspirates of lymph nodes (34.2%) and plural fluid (20.7%). Although it constitutes only 1.8% of the total isolates, BCG disease appears to be increasing.

Conclusion: The HIV epidemic in our society is influencing the clinical presentation of tuberculosis in our paediatric population, and this is reflected in the type of specimens submitted to our laboratory. There appears to be an increase in disseminated disease as well as BCG infection. However, trends in the submission of the various types of specimens are not very clear, and this may be a reflection of a lack of diagnostic algorithms for the laboratory diagnosis of disseminated tuberculosis in children. Specific studies to address this are under way.

PS-82139-18 Early detection of pulmonary tuberculosis in sputum using trained African giant rats (*Cricetomys gambianus*)

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Objective: The successful fight against TB depends on availability of a faster, earlier and more accurate case finding method. SUA-APOPO reports on a novel technology utilizing the African giant rats (*Cricetomys gambianus*) as bio-detector of *Mycobacterium tuberculosis* in the sputum of infected person.

Methods: Three sputum samples per patient are inactivated at 90°C for 30 min and analyzed within one session by three rats (twice). Rats indicate positive samples by fixing their nose in a sniffer hole for 5 seconds.

Results: Results show that rats differentiate TB-infected sputum from uninfected (sensitivity = 86.5%; specificity = 89.1%); plain medium vs. medium inoculated with *Mycobacteria* (true positives = 91.60%; false positives = 0.40%). A double blinded test involving 67 positive and 752 negative samples yielded a sensitivity = 86.5% and specificity = 89.1%. Results of 1670 samples analyzed by rats differed from that of DOTS centres in 1.6% of the 1435 smear negative samples and 9.3% of 235 smear positive samples. A rat analyzes 40 samples in 7 min, while a skilled technician needs about 8 working hours to analyse the 40 samples microscopically.

Conclusion: Rat screening is a potentially faster, cheaper and more reliable diagnostic tool for handling big volumes of samples. Sniffer-rats require low levels of conditioning skills to train. Moreover, rats could be suitable for use in an active case finding situation, hence complementary to existing public health services and the performance of DOTS in Tanzania. Of most relevance is that some TB cases that were previously ruled out as negative by smear microscopy in the DOTS centres but indicated as positive by trained are now treated following the tracing of respective individuals and further examination in the DOTS centres.

PS-82340-18 Improved performance of a new *M. tuberculosis* specific diagnostic assay based on IP-10 in HIV-positive TB patients

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Objective: To evaluate the sensitivity for active TB of diagnostic assay detecting IP-10 after stimulation with RD-1 antigens and to compare sensitivity with QuantiFERON-IT® (QFT-IT) among HIV+ve and HIV-ve tuberculosis (TB) patients.

Methods: We have recently demonstrated that an assay based on IP-10 response to stimulation with RD1 antigens had similar sensitivity and specificity as the QFT-IT test(1). A cut off point of 455 pg/ml was determined before analysing the result of the present study (Ruhwald et al. submitted). Blood was incubated in QFT-IT whole blood tubes and samples from 181 patients from Mwanza, Tanzania, diagnosed with pulmonary TB, were included the analysis, 106 were HIV-ve and 72 were HIV+ve.

Preliminary Results: The sensitivity of IP10 was 77% (139/181) and for QFT-IT 71% (127/181) ($P = ns$). Sensitivity among HIV+ve was significantly lower for both IP-10, (65%) and QFT-IT (61%) than for HIV-ve with 84% IP10 positive and 78% QFT-IT positive. The proportion of indeterminate responders were higher for QFT-IT (14%) compared with IP10 (8%) ($P < 0.05$) and higher among HIV-positive (IP10: 11%, QFT-IT: 21%) compared with HIV-ve, (IP10: 6%, QFT-IT: 9%). Combining the two tests, sensitivity increased to 84% among all patients, to 71% among HIV+ve and to 92% among HIV-ve. Adjusting for low mitogen responses ([antigen-response/mitogen-response] $\times 100$) resulted in an increase in IP10 sensitivity in the whole group to 88%, the HIV-ve to 95%, and HIV+ve to 79%.

Conclusions: We have evaluated the potential of IP10 as an alternative or a supplementary marker for TB and shown that IP10 alone or in combination may increase sensitivity for the diagnosis of TB. Till now IFN- γ has been the only marker for the immunodiagnosis of TB, and we have now convincingly shown that other biomarkers such as IP10 may play an important role in the diagnosis of TB infection.

1 Ruhwald M, et al. *Microbes Infect* 2007; 9(7): 806–812.

PS-82396-18 Sensitive and rapid tuberculosis culture diagnosis with disposable filters replacing the laboratory centrifuge

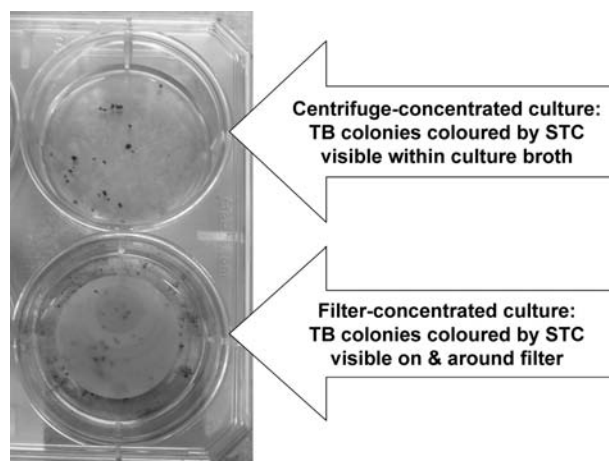
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Background: Tuberculosis (TB) sensitive culture diagnosis usually requires centrifugation to concentrate mycobacteria and remove them from the inhibitory chemicals used for decontamination. However, centrifuges are an expensive barrier to the provision of sensitive diagnosis in field settings.

Objective: To evaluate filters for replacing centrifugation in TB culture diagnosis.

Method: Sputum samples ($n = 111$, 56% smear positive) were decontaminated with *N*-acetyl cysteine and NaOH for 20 min followed by addition of excess buffer to 14 ml volume. Half of the sample was then processed conventionally by centrifugation for 15 min at 17°C and inoculation into culture broth. The other half of the sample was aspirated with a 5 ml syringe through a disposable 0.4 μ m polycarbonate filter that was then placed directly into culture broth. 7H9 broth was used with the indicator STC. Cultures were examined 3 \times weekly. Colony counts and days to positivity were determined with an inverted light microscope and days to colourimetric positivity by naked eye.

Results: Centrifugation and filtration had similar sensitivity (58% of samples were culture positive, 56% by decontamination and 53% by filtration; sensitivity 97% vs. 92%, respectively, $P = 0.2$). Centrifugation and filtration also had similar TB colony counts ($P = 0.3$), contamination rates (1.8% vs. 0%) and time to positivity (median 11 vs. 12 days by microscopy, $P = 0.4$; 13 vs. 14 days by naked eye, $P = 0.2$). Naked eye colorimetric TB detection was less labour intensive than repeated microscopic examination of cultures, but colour change indicated positivity an average of 2 days later than microscopy ($P = 0.003$).



Conclusions: Disposable filters may have the potential to replace centrifugation, providing rapid and sensitive TB culture without the expense of centrifuge purchase and maintenance. Ongoing research is evaluating filtration for enhancing the sensitivity of microscopy and for TB culture with concurrent drug-susceptibility testing.

ASTHMA/PRACTICAL APPROACH TO LUNG HEALTH (PAL)/OTHER

PS-81208-18 Risk factors for asthma severity among emergency room attendees, Palestine

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Setting: Emergency Room of Alia Governmental hospital in Hebron district, south of West Bank, Palestine. **Objective:** To determine the factors associated with chronic asthma severity among asthma patients attending the emergency rooms in Palestine.

Design: A cross sectional study using previously validated questionnaires.

Results: Among the 121 patients, 45.5% had moderate/severe asthma. Most days' regular intake of oral theophylline, and using 35 courses/year of oral steroids were more likely to be associated with moderate/severe asthmatics ($P < 0.05$). Moderate/severe asthmatics compared with mild asthmatics were more likely to use inhaled short B2-agonists more frequently (most days, 50% vs. 17%; $P < 0.05$) and in higher concentrations (31 canister/month, 78% vs. 29%; $P < 0.05$). They were also more likely to get regular treatment ($P < 0.05$) and to report their inability to afford/obtain asthma medicines ($P > 0.05$).

Conclusions: Access to health services doesn't necessarily ensure a good quality of care for asthmatics. The effectiveness of oral theophylline in controlling the more severe asthma symptoms should be reconsidered. We recommend a training program for health professionals and an educational one on self-management for the asthma patients.

PS-81530-18 Ethnic variation in lung function, asthma and skin allergy in Sudan

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Aim: To study ethnic variation in lung function (FVC, FEV₁ and PEFR), asthma and skin allergy between northern Sudan (Arabs) and southern Sudan (Africans).

Design: This was a cross-sectional study.

Methods: The study was performed in 2005–2007 in 1879 adult Sudanese. 1002 adult males (490 from south and 512 from north) of similar anthropometric measurements (age, height and weight) and socio-economic conditions were subjected to spirometric examination to see the variation in lung function (FVC, FEV₁ and PEFR) while 877 adult subjects (64% males and 36% females) from north (500) and south (377) were used to study the ethnic variations in asthma symptoms and skin allergy using ISAAC questionnaire. Pulmonary function testing and skin prick tests were performed to those claimed to have asthma symptoms.

Results: FVC and PEFR were significantly higher in northern Sudan People than southern Sudan people ($P = 0.027$ and 0.009 respectively) while FEV₁ was insignificantly higher in northern Sudan people (Table). In the asthma and allergy group, both northerners and southerners were living in Khartoum for at least one year. 22.4% of the subjects from the north had asthma symptoms compared to 8.8% of the southerners. In the southerners the Denka tribe showed the highest prevalence. Skin prick test was positive for at least one allergen in 50% of both groups.

Variables	Northerners values + SD	Southerners values + SD
Age (years)	29.42 + 6.45	28.51 + SD
Height (cm)	170.31 + 4.87	172.87 + 5.59
Weight (kg)	62.89 + 8.39	64.01 + 8.24
Lean mass (kg)	53.72 + 7.5	59.73 + 6.86
FVC (liters)	3.92 + 0.67	3.67 + 0.53
FEV ₁ (liters)	3.48 + 0.63	3.31 + 0.47
PEFR (L/min)	517.23 + 107.95	486.26 + 91.82

Conclusion: Lung function values had been found to be higher in northerners compared to southerners of the same anthropometric and socio-economic situations indicating the ethnic variation in Sudanese. Ethnic variations in asthma symptoms occur in adult Sudanese with no differences in skin allergy.

PS-82145-18 Study of prevalence of asthma and clinical course among pregnant women attending a tertiary care centre

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Introduction: Not many reports of prevalence, clinical course and its effect on pregnancy outcome came from under developed and developing countries.

Objective: To study prevalence of asthma among pregnant women attending a tertiary care centre and clinical course of Asthma during pregnancy.

Methods: 2000 women attending antenatal clinic were screened and asked to fill out the asthma questionnaire developed for International Union Against Tuberculosis and Lung Disease. 66 pregnant women were declared positive by questionnaire and 42 were clinically diagnosed as cases of asthma. These 42 subjects further evaluated for spirometry, clinical course and exacerbation events.

Results: The prevalence (Gina Guidelines) of asthma during pregnancy is 2.1%, 42.8% of these were undiagnosed previously.

- Among these 20 (47.6%) were having intermittent, 5 (11.9%) with mild persistent, 8 (19.1%) with moderate persistent and 9 (21.4%) had severe persistent asthma.
- As per GINA, 50% of the women had controlled, 7.1% had partially controlled, 42.9% had uncontrolled asthma.
- Symptoms were wheeze (85.71%), nocturnal symptoms (80.9%), cough (71.4%), dyspnea at rest (64.3%) and dyspnea on exertion (11.9%).
- Major allergens—house dust (80.9%), sand (52.3%) and cold weather (50%).
- 95% women had atopic symptoms, allergic rhinitis (71%), urticaria (16%).
- 40% of the women from severe and 20% from intermittent group had a severe exacerbation; 38% had an episode of mild exacerbation.
- 52.5% of the asthmatic women were untreated before and only 32.5% took treatment.
- During pregnancy 69% were not treated for their symptoms, 55.6% with severe asthma were not taking treatment. Only 14.3% were on combination therapy, and only 22.2% women with severe persistent asthma received inhaled combination therapy.
- In pregnancy, 35% patients had no change, while 32.5% had improvement and 32.5% had worsening of the symptoms.

Conclusion: Asthma is underdiagnosed and under-treated and its course is variable during pregnancy.

PS-82375-18 A simple test to evaluate asthma control act (ACT, Nathan 2004)

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Asthma Control Test (ACT, Nathan 2004) is a simple test used to evaluate the control of asthma. We compared the score assessed with ACT with classic parameters to evaluate the asthma control: symptom score (by diary daily card for two weeks), functional findings (FEV₁, PD20 FEV₁ methacholine, PEF variability) and markers of airway inflammation (exhaled NO, sputum inflammatory cells).

We studied 40 subjects randomly attending to our asthma clinic, (twenty-four females and 16 males, mean age 41.7 ± 14.7 years). FEV₁ before and after bronchodilator was done in all subjects; 38 performed methacholine also challenge test, 29 were able to collect sputum samples, 26 executed the measure of eNO. The mean ACT score was 20.2 ± 4.0 , mean FEV₁% pred. was 97.7 ± 11.0 , each subject, except two (out of the pollen season) were hyperreactive to methacholine.

We found a significant relationship between ACT score and changes in FEV₁ after salbutamol ($r = -0.37$, $P = 0.03$), between ACT score and PEF variability or symptom score measured by a diary daily card for at least 14 days. Correlations were found also between ACT score and sputum eosinophil percentages ($r = -0.38$, $P = 0.05$), and eNO ($r = -0.50$, $P = 0.03$).

In conclusion ACT is a good instrument to evaluate the asthma control. Because of its simplicity it can reasonably substitute other more complex evaluation of asthma control.

PS-81572-18 L'apport de l'APSR dans l'identification des problèmes prioritaires de santé respiratoire

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L'approche pratique de la santé respiratoire (APSR), stratégie d'intégration des soins de premier recours recommandée par l'OMS, a pour but principal d'identifier les problèmes de santé respiratoire prioritaires dans les services de santé de base.

Cette approche doit permettre de répondre à la demande soins des malades qui consultent pour des symptômes respiratoires. Elle repose sur une approche syndromique permettant la prise en charge standardisée des maladies respiratoires les plus fréquentes et de la tuberculose pleinement intégrée à l'activité quotidienne en pratique de routine.

Dans ce cadre, une étude d'intervention de formation concernant 88 médecins répartis dans 77 sites du nord au sud du pays a été réalisée en Algérie en 2004.

Cette étude avait pour objectif d'évaluer comparativement avant et après formation :

- la proportion des malades qui consultent pour des symptômes respiratoires
- la distribution et la répartition des maladies respiratoires selon les groupes d'âge
- la place de la tuberculose dans l'activité des services de santé de proximité
- la qualité des procédures de diagnostic appliquées et de la prescription médicamenteuse, selon les directives techniques ou recommandations
- le coût des prescriptions médicamenteuses

Les résultats de cette étude ont permis :

- de situer la charge réelle de morbidité des principales maladies respiratoires prévalentes : infections respiratoires aiguës, maladies respiratoires chroniques (asthme et broncho-pneumopathies chroniques obstructives surtout), et de la tuberculose dans les services de santé de base
- d'apprécier l'impact de la formation sur la qualité du diagnostic et de la prise en charge des cas admis à l'étude
- d'améliorer les procédures de sélection des cas nécessitant le recours à une consultation spécialisée.

PS-81578-18 Formation médicale continue et approche pratique santé respiratoire

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L'approche pratique santé respiratoire (APSR ou PAL strategy), stratégie actuellement recommandée par l'OMS sur la base d'enquête 'avant-après' a démontré l'impact d'une activité de formation médicale continue sur la pratique quotidienne des médecins généralistes en comparant leurs pratiques dans la prise en charge des malades qui consultent pour symptômes respiratoires avant et après une session de formation.

Une étude d'intervention a été réalisée en Algérie dans 10 provinces en 2004.

Les objectifs de la formation ont été les suivants :

- évaluer la qualité du diagnostic des maladies respiratoires
- évaluer l'impact de la formation sur les modalités de prescription médicale
- améliorer la sélection des malades nécessitant un avis spécialisé.

La formation a concerné 88 médecins motivés exerçant dans des structures de santé de premier recours, la formation s'est déroulée en 4 phases

Première phase : session d'information des médecins participants sur l'APSR et sur le but de cette étude.

Deuxième phase : recueil des données sur les maladies respiratoires par les médecins avant la formation.

Troisième phase : session de formation de médecins participants à l'étude.

Quatrième phase : collecte de données après formation sur la prise en charge des maladies respiratoires et de la tuberculose

Résultats de l'impact de l'intervention sur la pratique des médecins ont montré :

- une amélioration de la qualité du diagnostic des maladies respiratoires
- une amélioration dans la prise en charge des malades tuberculeux
- un changement des attitudes de prescription
- une amélioration dans la sélection des malades nécessitant une référence spécialisée.

PS-82171-18 The effect of Ramadan fasting on spirometry in healthy Sudanese subjects

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Introduction: Ramadan is the holiest month in the Islamic calendar and Muslims fast during this month. We designed this study to evaluate the effect of Ramadan fasting on lung function tests.

Setting: Faculty of Medicine, Gezira University, Medani, Sudan.

Subjects and Methods: The study was performed on 50 healthy adult volunteers (28 males and 22 female), aged between 17 and 43 years, and was carried out during Ramadan in October 2006. Each volunteer had observed fasting for an average 14 hours a day. Spirometry was performed according to the recommendations of the American Thoracic Society, and was done on 3 occasions: 1st and 4th week of Ramadan and 4 weeks after the end of Ramadan. We evaluated forced vital capacity (FVC), forced expiratory volume in the first second (FEV₁) and peak expiratory flow rate (PEFR), beside the anthropometric measurements. The results were analyzed by repeated measures analysis of variance.

Results: No significant change was seen in spirometric values at the 4th week of Ramadan fasting as compared to the 1st week of Ramadan, and the results were similar in both genders. However all spirometric parameters increased insignificantly 4 weeks after Ramadan, and this period was associated with an insignificant increase in body weight and body mass index in both sexes.

Conclusion: Ramadan fasting had no adverse effects on spirometry of normal healthy subjects.

PS-82330-18 Chest physiotherapy as an alternative method for the diagnosis of pulmonary TB at a reference hospital

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Setting: A public referral hospital in Sao Paulo, Brazil.

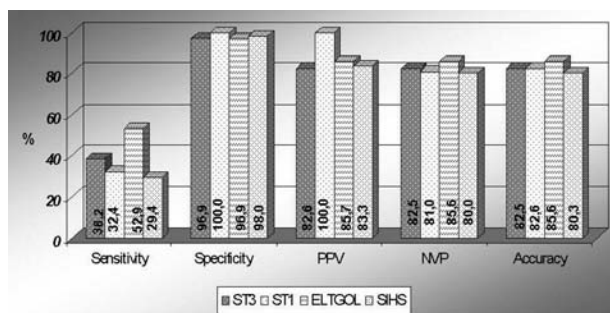
Objective: To evaluate chest physiotherapy as a means of obtaining sputum samples from human immunodeficiency virus (HIV) positive in-patients suspected of having pulmonary tuberculosis (TB).

Material and Methods: Five consecutive samples were collected from 132 patients using the 'spontaneous' technique (ST) on day 1, slow expiration with the glottis open in a lateral posture ('expiration lente totale glotte ouverte en infralatérale', ELTGOL) on day 2, ST on day 3, sputum induction with hypertonic

saline (SIHS) on day 4 and ST on day 5. Samples were processed for acid-fast bacilli (AFB) smear and seeded onto Löwenstein-Jensen medium.

Results: Mycobacteria were recovered from 34 patients (25.8%). Nine (26.5%) of the strains were identified as mycobacteria other than *Mycobacterium tuberculosis*. AFB smear sensitivity was higher in ELTGOL samples than in ST or SIHS samples (52.9% vs. 32.4% and 29.4%), although the difference among the three was not significant ($P = 0.098$). In culture, the three ST samples proved significantly more sensitive ($P = 0.05$). On Figure 1, AFB-smear yield rates for the various sputum sampling techniques used in HIV-positive patients vs. final diagnosis of TB ($n = 132$).

Conclusions: Physiotherapy shows promise as a technique for obtaining sputum from HIV-positive patients, and AFB testing of a single sample presents high sensitivity. However, this does not preclude the routine collection of three samples, as TB cannot be ruled out before the culture results are known.



AFB = acid-fast bacilli; ZN = Ziehl-Neelsen staining; ST = 'spontaneous' technique; ST3 = any one of three samples; ST1 = only the first sample; ELTGOL = *expiration lente totale glotte ouverte en infrahéral* (expiration with the glottis open in the lateral posture) manoeuvre; SIHS = sputum induction with hypertonic saline; PPV = positive predictive value; NPV = negative predictive value.

PS-81215-18 Choice of normal spirometric reference values for compensation assessment

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Background: The Pneumoconiosis Medical Board performs compensation assessment for pneumoconiotic patients in Hong Kong.

Method: To select between a recently published set and an older set of reference values published in 1982, they were compared with the observed spirometric results of normal male construction and quarry workers aged 20–74, without significant chest symptoms or known/suspected lung diseases. Similar comparison was made among male silicotic patients. The effects of background and clinical characteristics were also assessed.

Results: Among 93 normal subjects, the mean FVC was significantly higher than either set of reference values. Using the old, instead of new, reference values,

the percentage FEV₁ and FVC were 5.2% higher (both $P < 0.001$), and both differences were significantly higher among aged subjects. These percentage values showed residual age dependency when the old reference values were used. Despite derivation largely from never-smokers, the new reference values better predicted the actual FEV₁ and FVC among both smokers and never-smokers. Smoking decreased force expiratory ratio, but did not affect FEV₁ and FVC significantly in normal subjects. Despite the presence of lung disease, the mean FVC of 357 silicotic patients was 3.4% higher than the old reference values ($P < 0.001$). When the old reference values were used instead of the new ones, the percentage FEV₁ and FVC of these patients were 8.8% and 7.4% higher respectively (both $P < 0.001$), and both differences were over 10% among aged patients.

Conclusion: The findings were in favor of the new reference values, apart from a possible need for occupational adjustment.

PS-81311-18 Spatial patterns of tuberculosis associated with the adapted living condition index in Ribeirao Preto, Brazil

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Setting: Considered as a social problem, tuberculosis is a disease that goes beyond biological barriers. Therefore, it is fundamental to understand its occurrence in the context of the population's living conditions and the space involved.

Objectives: To study the relation between the Adapted Living Condition Index and the spatial distribution of tuberculosis in the year 2000 and to obtain the spatial correlation in case occurrence according to the notification address, in Ribeirao Preto (2000 and 2006).

Methods: Tuberculosis data were collected from the Epi-Tb database, while information for the Adapted Living Condition Index was obtained from the 2000 Demographic Census. The analysis unit was the census sector. The thematic maps were elaborated with the help of MapInfo 7.5 software and spatial statistical analysis using Spring 4.3. For further calculations (Factor Analysis, χ^2 test, Chance Ratio), SPSS 10.0 was used.

Results: The geocoding percentage exceeded 86% showing a concentration of cases in 3 regions in the city. The indices with the highest factor load were family heads gaining 2 minimum wages or less and with less than 3 years of education. The comparison of the living condition and tuberculosis maps evidenced a relation between tuberculosis and poorer areas in the city, as the incidence rate in the cluster with the low

living condition was 49.9/100 000 population. The gross Chance Ratio, proved the association between tuberculosis and living condition and equaled 3.30 for the low living condition cluster (CR = 3.30; 95% CI 1.90–5.70).

Conclusion: The city's layering according to living conditions and occurrence of tuberculosis allowed for the identification of risk areas, supporting the local Tuberculosis Control Program.

PS-81325-18 Patient access to TB treatment at health care services in Campina Grande, Paraíba State, Brazil, 2007

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Setting: Tuberculosis (TB), a curable disease, still kills at least 5000 people per year in Brazil.

Objective: To analyze the access of TB patients to treatment in the various health services (Family Health Program/Community Health Agent Program—Programa Saúde da Família/Programa de Agentes Comunitários de Saúde–PSF/PACS—and Reference Outpatient Clinic).

Methods: This descriptive epidemiological study used a data collection instrument based on a questionnaire designed by Mackinko and Almeida(2006) and adapted to TB by Villa and Ruffino (2007). Participants were 106 patients submitted to TB treatment from July/2006 to August/2007. The studied variables' frequencies were distributed.

Results: Of the 106 patients, 83.96% performed self-administered treatment, and 16.03% supervised treatment; 55.66% reported that when they felt sick because of the medication or TB, they managed getting an appointment within 24 hours, 42.45% missed their work shift in order to attend the medical appointment, 64.15% needed motorized transportation to get to the health unit and be seen; 50.00% always paid for their transportation to attend the medical appointments; 91.50% reported they never ran out of medication during the treatment; 30.18% always waited for more than 60 minutes for their appointment; 77.35% were never visited at home by the professional responsible for following the TB treatment; 68.86% never performed the TB treatment at the health unit closest to their home.

Conclusion: Although the municipality has 81 Family Health Program/Community Health Agent Pro-

gram teams, the DOTS was implemented or assumed by only a small part of the Family Health Program team professionals as a treatment strategy. Although TB treatment is available at public health services, it remains a financial burden for the TB patient due to the need to go to the health service, as well as losing a day at work in order to attend the appointment.

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PS-81396-18 Increasing case detection of NSS+ cases through screening household contacts of smear+ TB patients

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Aim: To assess the effectiveness of household contacts screening of pulmonary smear positive patients.

Materials and Methods: An intervention study design has been used. All the smear positive pulmonary cases diagnosed and registered during the study period were enrolled in the study in two mentioned districts of the province. Household contacts of index cases were identified and evaluated through a standard investigation that included sputum microscopy, tuberculin skin testing (TST), and chest radiography. Contact register was introduced at each diagnostic facility and filled for each household contact and they were followed later on for minimum of one-year period for latent or active TB infection. The outcomes of interest in the household contacts included persistent negative PPD skin test, skin test reactivity and active TB. To determine risk factors for disease progression, all household contacts will be followed for a minimum of one-year period with standard evaluations at 6 and 12 months.

Results: Total numbers of contact were 1118, having around 746 adults of more than five years of age and 372 children of less than 5 years of age. Among 746 adults, 263 were having symptoms of tuberculosis and on screening, 29 were diagnosed as tuberculous. All 372 children were screened through symptoms, history, PPD, and X-ray. It was found that 33 children were having TB infection. It makes positivity rate of 11% in adults and 9% in children.

Conclusion: Though the study is being done on a very smaller scale and the results of follow-up screening by PPD to find out the latent infection or active tuberculosis in negative results on initial screening is still awaited, however the initial results shows that screening of contacts not only increase case detection but also help to diagnose active infection.

PS-81447-18 Georeferencing tuberculosis and HIV cases in Sao Jose Do Rio Preto, Sao Paulo State, Brazil, 2007

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Objective: To identify and describe the situation of TB-HIV coinfection in Sao Jose do Rio Preto, São Paulo State, Brazil, through epidemiological and social indicators associated with the spatial analysis of occurrence of this aggravation, in the period from 1998 to 2006.

Materials and Methods: We georeferenced TB-HIV coinfection cases residing in the municipality of Sao Jose do Rio Preto from 1998 to 2006. In order to measure the spatial autocorrelation of TB-HIV incidence coefficients, we used the Moran coefficient as well as socio-economic indicators.

Results: 295 TB-HIV coinfection cases were geocoded in the urban area of this municipality between January 1998 and December 2006. The thematic map with spatial units and characterized by the incidence coefficients of TB-HIV coinfection cases portrayed areas with non-uniform or random profile. The highest incidence coefficient ranged from 89.9 to 269/100 000 population (areas with lower socio-economic levels). The intermediate coefficient ranged from 35.5 to 89.9/100 000 and the lowest ranged from 0.0 to 35.5/100 000 (areas with higher socio-economic levels).

Discussion: We observed the existence of spatial dependence in the incidence coefficient of TB-HIV coinfection, in the period of this study. It indicates that in areas with lower socio-economic levels, the risk of being affected by disease is about eight times greater than in areas with higher levels.

Conclusion: This study made it possible to understand the geographic/spatial distribution of TB-HIV coinfection in the municipality. It also evinced the social and economical problems that directly interfere with the risk of disease occurrence.

Acknowledgments: CNPq 410547/2006-9.

PS-81543-18 The frequency of serious adverse reactions to the first-line TB drugs under NTP conditions in Kyrgyzstan

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Introduction: First-line anti-tuberculosis drugs are effective but they can cause serious adverse reactions

(SARs) and thus compromise treatment outcome. A multi-center study on SARs was initiated by the IUATLD, Kyrgyzstan was included in this survey. Project HOPE, with support from USAID, was involved in data collection.

Objective: To determine the frequency and timing of SARs causing at least 1 week's treatment discontinuation or death, identified under program condition.

Method: Prospective survey based on reports of SARs by NTP district TB coordinators. District TB coordinators were instructed to fill in a standard questionnaire whenever a SAR occurred for each TB patient on category I, II or III treatment registered from April 1st, 2006 until March 31st, 2007.

Results: Altogether 6959 patients were registered; SARs were reported in 72 cases (1%). Most common SARs were rash (23 cases), abdominal pain (20 cases) and jaundice (16 cases). There were 4 cases of sudden collapse, 3 cases of visual disturbances, 1 case of bruises/abrasions and 5 other cases. Treatment duration at the time SARs occurred ranged from 1 to 137 days; 72% of all SARs were observed during the first 4 weeks of treatment, 86% within the first 2 months.

Conclusion: Serious adverse effects necessitating interruption of treatment are uncommon with the standard 1st line drugs used in Kyrgyzstan. The fast majority of such side effects occur during the intensive phase.

PS-81544-18 Results of operational research on rational drug use

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Setting: At independence in 1991, Uzbekistan inherited the Soviet system of tuberculosis control. Faced with poor results and lack of resources, in 1998 Uzbekistan started implementing the DOTS strategy with support of Project HOPE and USAID. Despite adequate supplies of good quality anti-TB drugs, treatment success rates so far did not reach the 85% target.

Objective: To provide a quantitative assessment of drug prescription and dispensing practices.

Methods: Cross sectional study among a random sample of 180 patients, registered during the second half of 2006 all over Uzbekistan. Patients were interviewed and had their records reviewed.

Results: Ninety seven percent of new smear positives and 99% of smear negative pulmonary TB patients were on adequate regimens. Dosages of pyrazinamide prescribed were low in 13% of patients, for streptomycin in 6%. For other 1st line drugs less than 5% were prescribed too low a dose. Out of 50 patients who had completed treatment at the time of the study, only 1 had interrupted treatment more than 2 weeks. DOT was not always observed in 67% of continuation

phase patients. In addition to TB drugs, the average patient was prescribed 8 non-TB drugs, without any apparent relation to concomitant diseases. Though TB drugs are free, patients spend on average 218 USD on their treatment, mostly on these additional non-TB drugs.

Conclusion: Treatment regimens and dosages prescribed are adequate. Treatment is administered regularly though DOT is poorly adhered to. Patients incur substantial costs as a result of non-TB drugs being prescribed.

PS-81580-18 Usefulness of a simplified tool for quality assessment for chest radiograph

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Background: There is an increasing need for rapid diagnosis for lung diseases, especially in PLWHA or children who may have smear-negative TB, but the quality of chest radiograph (CR) in resource-limited settings does not always satisfy the requirement. Improvement in the quality of radiograph contributes to health system strengthening as well.

Objectives: To develop and evaluate a tool to easily and practically assess the quality of CR at district hospital.

Methods: We developed a simplified tool as an existing model: Japan Anti-tuberculosis Association (JATA) version. By this tool, the quality of 30 CRs taken in a developing country was assessed. We compared the results to those by the JATA version.

Results: The simplified tool does not need any special devices except for a film viewer, a model film with good quality, the Handbook for reference and the assessment sheet. An assessment is made by scoring the six factors including patient positioning, density and contrast of the film assessed according to the three-grade system: 1. 'Good', 2. 'Fair', and 3. 'Poor'. The overall assessment result with four-grade system ('Excellent', 'Good', 'Fair' and 'Poor') is obtained by summing up each score. The trial of the 30 films showed that the overall assessment results by the tool were comparable to those by JATA version with the concordance rate of 0.93 and the kappa coefficient of 0.86 by the cutoff point as 'Good' or over by the simplified tool and 'upper C' or over by JATA version. A few discrepancies were observed in assessing the density at mediastinal portion and the contrast at lung periphery and cardiac shadow.

Conclusion: This simplified tool makes it possible to easily and practically assess the quality of CR in resource-limited settings. Further field tests are required in order to enable us to carry out organized

activities for quality assurance for CR in developing countries.

PS-81652-18 Access to tuberculosis diagnosis from the client's point of view, Itaboraí, Rio de Janeiro, Brazil-2007

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Setting: The study was conducted in Itaboraí city, Rio de Janeiro, Brazil, a high priority area for tuberculosis (TB) control (2006 prevalence = 89/100 000). The WHO DOTS strategy was implemented in all facilities in 2002.

Objective: To evaluate differences in the quality of TB diagnostic access available to patients at a Family Health Program-FHP vs. Reference Health Unit-RHU.

Methods: From July to October 2007, a cross-sectional study of consecutive 100 TB patients reported in the city's TB Control Program was carried out. Quality of access to a TB diagnosis was measured through a standardized questionnaire, containing a 25-item scale in different dimensions (access to diagnosis, bonding user/team, range of services, focus on the family and community, and professional education). The distribution's 3rd tertile was used as a cutoff point to take into account the high quality of access to diagnosis.

Results: Among those interviewed, 44 (65.9% male) were monitored in the FHP, and 56 (64.3% male) in the RHU. The mean age of FHP users was 42.1 vs. 37.7 in the RHU ($P = 0.164$) and had lower education (FHP = 70.5% vs. RHU = 60.7% [$P = 0.311$]). The frequency of diagnosis considered of good quality was found to be twice as high (48.8%) for users of the FHP than for those of the Central Ambulatory (20%, $P = 0.003$). Regarding the dimensions evaluated, adequate access to diagnosis was identified for 20% of the FHP users and for 18% of the RHU users; bonding for 39% of FHP and 29% of RHU ($P = 0.003$); focus on the family for 36% of FHP and 16% of RHU ($P = 0.020$); focus on the community for 34% of FHP and 14% of RHU ($P = 0.019$). The professional education dimension was very similar for both units.

Conclusions: According to patient response, FHP offer better access to a TB diagnosis compared to RHU. Complementary studies are under way to analyze the effectiveness of community health agents in the search for respiratory symptomatic and the patient's option regarding the location of diagnosis and treatment.

PS-81703-18 Is a forced exhalation shorter than 6 s in the elderly always caused by incorrect performance?

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Objective: Forced exhalation of less than 6 s is the most often reason for non acceptance of a spirometry test. It is usually attributed to a poor patient effort and/or insufficient education of technicians, but we question if it can be a correct finding even in the elderly.

Methods: Spirometry and plethysmography (Master-screen, Jaeger) were performed according to the 2005 ATS/ERS recommendations before and after a bronchodilator in a group of 31 healthy non smokers, from 50 to 84 years of age (mean 61 ± 9). Experienced technicians performed the tests. Two pulmologists independently reviewed the results.

Results: Mean FVC and FEV₁ were 114 ± 17 and 113 ± 16 before, and 117 ± 17 and $116 \pm 15\%$ predicted after the bronchodilator. Despite the normal lung function, 14 patients did not meet the 6 s criterion at baseline and significantly less, 11, after the bronchodilator. Insufficient expiratory effort could not be ruled out in three patients before and four after a bronchodilator. All other acceptability criteria were fulfilled. Mean time of expiration at baseline was 6.3 ± 1.76 s, and 6.5 ± 2.11 s after the bronchodilator. There were no statistically significant correlations between expiratory time, FVC and age.

Conclusion: It seems that a considerable number of the elderly complete forced exhalation for less than 6 s and that leads to a need of careful evaluation of a spirometry maneuver before rejection merely on the basis of this end-of-test criterion.

TUBERCULOSIS IN HIGH BURDEN COUNTRIES-I

PS-81222-18 Achieving results through the childhood TB programme: City of Valenzuela, Philippines, 2007

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Background: Because of existing cases in children, difficulty in the diagnosis, and presence of groups interested in their welfare, the need to implement a tuberculosis control program among children was realized. In 2004, the Health Department issued a Management Guideline for Childhood Tuberculosis Control. Valenzuela City was chosen to initially implement the program prior to its nationwide adoption.

Methods: Children within the city were screened using standardized forms from 1 October to 31 December

2006. A tuberculosis disease case was anyone who satisfied the criteria based on the Childhood Tuberculosis Management Guidelines of the Philippines Health Department. Management was based on the Directly-observed Treatment Strategy. Cases were assessed monthly until the end of the treatment.

Results: Fifteen thousand children were screened. Six hundred and eleven (4%) were classified as tuberculosis disease. Sixty-two percent (380) of adult tuberculosis exposure occurred within the household, mainly (55%; 209) from their parents. Age-group most (43%; 263) affected was the 4–6 year-old group. The majority (55%; 336) were female. The majority (71%; 434) of those affected were well-nourished. Most common (89%; 522) manifestation was loss of appetite. Most frequent (97%; 593) criterion present was positive tuberculin test. Ninety-nine percent (605) initiated treatment. Ninety-six percent (581) was treated successfully.

Conclusion: For a successful management of tuberculosis in children, standardized approaches are needed. The engagement of all health providers (including paediatricians and other clinicians), as well as other sectors is crucial. Reducing the tuberculosis burden in children entails changing and improving many existing practices, such as those that relate to contact investigations.

PS-81226-18 Online electronic R & R system for surveillance of laboratory and EQA data of the TB control program in Pakistan

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Aim: To see the effectiveness of electronic recording and reporting system for laboratory and EQA data management and analyze the country data.

Setting: 134 districts and 1123 diagnostic centers of Pakistan.

Design and methodology: Online software was developed for management of laboratory and EQA data with the support of a programmer. Online data entry is done quarterly by the trained staff of the Provincial Reference Laboratories. Data analysis was done quarterly and annually according to Diagnostic Centers, Districts, Provinces etc. System automatically highlight the wrong and illogical data.

Results: In year 2007 laboratory data came from 103 districts and 845 diagnostic centers. 531174 patients were examined out of which 368790 were suspects and 162384 were follow up cases. Total 983852 smears were examined and out of which 156094 were positive with positivity rate of 14.1%. Smear positivity rate is good in Sindh and NWFP (16%) and low in Punjab and Baluchistan (12% and 10%) respectively. EQA data of 41 districts was entered in 2007 and 26384 slides were blindly rechecked. Agreement rate

was 97%, FPR was 5% and FNR was 2%. Province and District wise analysis was also done.

Conclusion: The electronic software is good for surveillance system and provides accurate and quick data analysis. Data of case finding and treatment outcome comes from all districts and diagnostic centers of the county, but the laboratory data is not as much regular. County is implementing EQA in phase manner and gradually number of districts implementing EQA will be increased. This data collection system will be very useful once data will be coming from all districts and centers.

PS-81260-18 The burden of childhood tuberculosis in Papua New Guinea: 2005–2006

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Background: Childhood tuberculosis (TB) is common in Papua New Guinea (PNG) but recent data of the burden of disease and treatment outcomes are not available. As part of initiatives to improve TB control in PNG, we undertook a study to describe the burden of childhood TB in four provinces of PNG including its two largest cities.

Methods: Data of children (<15 years) treated for TB between 1st January 2005 to 31st December 2006 were collected and analysed from all available TB registries, TB treatment cards and hospital admission books in four provinces of PNG (National Capital District, Eastern Highlands Province, Morobe Province, East New Britain Province). Data included demographics, number of cases, type of TB and treatment outcomes based upon standard TB programme evaluation definitions.

Results: There were 2689 children diagnosed with TB over the 2-year period. Median age was 3 years (range: 28 days–14 years). Estimated annual incidence was 84.2 cases per 100 000 children (95% confidence interval 81.0–87.6; range of provinces 39.4–162.7). Child TB contributed to 31% of the total TB caseload in the four provinces, with new diagnoses accounting for 93% of cases. Sputum smear-positive pulmonary TB (PTB) accounted for only 0.5% of cases, while 55% were registered as sputum smear-negative or sputum unknown PTB, and 43% as extrapulmonary TB (EPTB). The commonest types of EPTB were TB adenitis (31%) and TB meningitis (23%). Only 43% of cases completed treatment and 1.6% were known to have died. Other treatment outcomes included defaulted (23%), transferred out (8%) and unknown (23%).

Conclusion: The high incidence and caseload of childhood TB in PNG, comparable to those found in high TB burden countries in Asia and Africa, are a reflection of poor adult TB control. As exemplified by poor treatment outcomes, more resources are required to strengthen the TB control programme as part of national efforts to improve childhood TB control.

PS-81277-18 L'amélioration organisationnelle du programme antituberculeux permet-elle une performance plus homogène ?

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Cadre: Les programmes de lutte anti-tuberculeuse sont avant tout structurés autour de normes et de directives standardisées définies au niveau national et international et rarement adaptées aux contextes des districts sanitaires.

Objectif: Déterminer l'impact de l'amélioration organisationnelle du programme antituberculeux à Madagascar sur la performance quant au suivi des malades sous traitement.

Méthodologie: Une étude longitudinale des indicateurs épidémiologiques la tuberculose à Madagascar, de 1996 à 2006, a été menée. Les 24 districts parmi les 111, inclus dans cette étude sont ceux qui ont pris en charge au moins 100 malades par an. L'évolution de ces indicateurs a été analysée suivant les étapes administratives et financières franchies par le programme antituberculeux.

Résultats: Le programme antituberculeux à Madagascar a connu une bonne évolution organisationnelle depuis 1996 et a acquis du financement assez important. Toutefois, pour l'ensemble des 24 districts étudiés, le taux d'abandon, considéré comme critère de performance, ne présente pas de diminution significative durant les 11 années étudiées. Les valeurs médianes sont, dans la majorité des cas, supérieures à 16%. Par ailleurs, l'analyse des taux d'abandon par district a montré une grande disparité sur la performance de chaque district quant au suivi des patients.

Conclusion: Malgré l'amélioration menée par le programme sur le système de suivi des tuberculeux sous traitement, le taux d'abandon médian reste quasiment stable. Une étude plus approfondie des facteurs contextuels potentiels serait utile.

PS-81310-18 Silent tuberculosis disease among HIV patients attending care and treatment in rural northern Tanzania

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Background: Tuberculosis is the commonest opportunistic infection and the number one cause of death in HIV/AIDS patients in developing countries.

Setting: Haydom Lutheran Hospital in rural northern Tanzania.

Objective: To report on the prevalence of tuberculosis and drug susceptibility among HIV patients in rural Tanzania.

Design: A cross-sectional study including HIV/AIDS patients attending a care and treatment clinic from September 2006 to March 2007. Sputum samples were collected for microscopy, culture and drug susceptibility testing.

Results: The prevalence of tuberculosis was 8.5%. Twenty (8.5%) sputum samples were culture positive. Eight of the culture positive samples (40%) were smear positive. Fifteen (75%) of these patients neither had clinical symptoms nor chest X-ray findings suggestive of tuberculosis. Nineteen isolates (95%) were susceptible to rifampicin, isoniazid, streptomycin and ethambutol. One isolate (5%) from TB-HIV coinfecting patients was resistant to isoniazid. No cases of multi-drug-resistant tuberculosis were identified.

Conclusion: We found high prevalence of tuberculosis disease in this setting. Chest radiograph suggestive of tuberculosis and clinical symptoms of fever and cough were uncommon findings in HIV-TB coinfecting patients. Tuberculosis can occur at any stage of CD4+T cells depletion.

PS-81323-18 Increase in TB in gold miners: contributions of time since HIV seroconversion and secondary TB transmission

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Background: HIV increases the risk of TB directly, through immunosuppression. There is also an indirect effect of HIV on TB incidence due to onward transmission of *M. tuberculosis* from HIV positive patients to others in the community. This indirect effect may be

even more important in terms of numbers of TB patients: increased transmission can affect the whole population as well as further increasing rates among HIV-positive individuals. Data on this indirect effect are, however, limited.

Objective: To assess the contribution of these two mechanisms to the increase in TB in HIV-positive miners.

Methods: The incidence of new pulmonary TB was estimated in a retrospective cohort study of South African gold miners over 14 years. HIV tests were done in random surveys in 1992–3, and in clinics. 1950 HIV-positive men with seroconversion intervals <3 years were identified and linked to medical, demographic and occupational records. They were compared to 5693 men HIV-negative in a survey, with no later evidence of HIV.

Results: Around 4% of miners develop TB annually. TB incidence rises soon after HIV infection, reaching 1.4/100 pyar (95%CI 1.0–1.8) at 2 years, and 9.2/100 pyar (5.8–14.6) at ≥10 years. By 11 years from seroconversion, nearly half the men had had TB. Among HIV-negative men, TB incidence was 0.44/100 person-years (0.31–0.66) in 1991–1993 and doubled over the period of the study. Age-adjusted model estimates suggest that half of the increase in TB incidence by time since HIV infection was attributable to calendar period, i.e. the indirect effect.

Conclusion: For the first time, we have shown that the increase in TB risk by time since seroconversion reflects both direct effects of HIV increasing susceptibility, and indirect effects due to onward transmission. Innovative and sustained public health measures directed at both HIV-positive and -negative people are needed to reduce *M tuberculosis* transmission.

PS-81327-18 Estimating the effect of DOTS in China: a spatial analytic approach

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Background: China has the second largest burden of tuberculosis (TB) in the world. Between 1990 and 2000, 13 of 30 Chinese provinces initiated DOTS (directly observed therapy, short-course) programs. A previous evaluation found that the program substantially reduced TB prevalence in these provinces relative to non-DOTS provinces; however, that analysis did not adjust for potential province level confounders such as socio-economic index and tobacco smoking.

Objective: We evaluated the province level effect of DOTS after adjusting for measured potential confounders including illiteracy level, unemployment and

prevalence of tobacco smoking. A spatial statistical model was used to further adjust for unmeasured confounders that may be spatially correlated with DOTS at a large spatial scale.

Method: The 1990 and 2000 national tuberculosis surveys of China contain geo-referenced information on TB prevalence. Information on illiteracy level, unemployment and tobacco smoking was obtained from the national census and prevalence surveys. We used thin-plate smoothing splines for disease mapping. A generalized additive model with a spatial smooth term was constructed to estimate the effect of DOTS after adjusting for measured confounders and unmeasured confounders that are spatially correlated at a large scale.

Results: We detected substantial spatial structure of TB prevalence at the scale of 1000 km for the 1990 TB survey. The spatial pattern and complexity changed significantly during 1990 to 2000, and can be partly attributed to the impact of DOTS. DOTS was estimated to decrease TB prevalence by 29% over 10 years. This estimate is similar to previously published results.

Conclusion: The implementation of DOTS in China was associated with a substantial reduction of TB prevalence in the 10-year period. Geo-referenced information on TB prevalence and spatial analytic tools provide a novel method of studying TB epidemiology.

PS-81389-18 Relationship between socio-economic status and prevalent tuberculosis in Zambia

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Setting: Two communities of Lusaka, Zambia.

Objectives: To assess the association household socio-economic position (SEP) and prevalent tuberculosis (TB).

Methods: A case-control study of persons aged >14 years was nested within ZAMSTAR-TB-HIV population baseline prevalence survey. Cases were defined as people enrolled in the TB survey with at least one positive sputum culture for *Mycobacterium tuberculosis*. Controls were defined as people with negative cultures. Variables accounting for four different dimensions of SEP were recorded: human resources; food availability; housing quality; and access to services. These were combined into a SEP composite index using principal component analysis.

Results: TB was associated with low SEP (odds ratio [OR] = 3.1, 1.5–6.2 95%CI). TB was associated with not having a BCG vaccination scar (OR = 5.5, 95%CI 1.7–18.3), HIV infection (OR = 2.8, 95%CI 1.4–5.6), and migration (OR = 3.8, 95%CI 1.7–8.2). None of these variables confounded or modified the association between TB and SEP. Being without enough

food for ≥3 months was the only household SEP proxy associated with TB (OR = 5.3, 95%CI 1.6–17.2). Of all SEP dimensions, food availability was most strongly associated with TB (OR = 3.0, 95%CI 1.6–5.6). There was no association between TB and access to services ($P = 0.5$).

Conclusions: Low SEP is associated with TB after adjusting for BCG, HIV status and migration. Food availability is the most relevant dimension of SEP affecting the risk of TB. Lack of adequate nutrition, which increases disease vulnerability, is a plausible pathway explaining the association between SEP and TB in these two communities.

PS-81412-18 Missed opportunities for HIV testing among TB patients in Machakos, a peri-urban district in Kenya

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Aim: To identify barriers to the uptake of HIV testing among TB patients in Machakos District, Kenya.

Design: A cross sectional study.

Methods: Four DOTS centers were purposively chosen for this study. Fourteen health care workers and 312 TB patients were interviewed consecutively with a standardized questionnaire that included background characteristics, awareness of the relationship between TB and HIV, and routine offer of HIV testing.

Results: Among study participants, 73% were offered HIV testing, 65% specifically by a physician. Patients seen at Machakos Hospital were more likely to be offered CT services than in the other three facilities combined (36% vs.16%). Patients from urban settings were significantly more likely to be offered CT than their rural counterparts ($P < 0.001$). Overall, 67% were tested for HIV; seroprevalence among this group was 41%. Most individuals who declined an HIV test reported stigma as the main barrier (15%). Residential status, facility, and not knowing partner's HIV status were significantly associated with declining HIV test. Individual perception of high risk for TB and/or HIV positivity was associated with being tested. Among HIV positive TB patients, 77% did not access ARVs due to reasons including lack of awareness about availability of care and treatment services (28%) and cost (27%). Health care workers also reported lack of adequate time for post test adherence counseling (79%, $n = 14$) (a precondition to ARV access in Kenya HIV program), and lack of counseling rooms for privacy (14%). However, the facility with a fulltime counselor did not appear to have better access to ARV among HIV positive TB patients (27%).

Conclusion: HIV testing is not yet standard practice in TB clinics. A key barrier to implementation is lack

of acceptance by health care workers to offer testing. We recommend implementation of diagnostic counseling and testing as an essential element of diagnostic care in cough.

PS-81479-18 High incidence of tuberculosis in HIV-infected infants: the need for improved tuberculosis control strategies

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Aim: There are limited population-based estimates of tuberculosis incidence in HIV-infected and uninfected infants. We aimed to estimate the population-based incidence rates of culture-confirmed tuberculosis in HIV-infected and uninfected infants in the Western Cape Province, South Africa, a setting highly endemic for tuberculosis and HIV and where BCG is routinely given at birth.

Design: Prospective hospital-based surveillance study.

Methods: The incidence rates of pulmonary, extra-pulmonary and disseminated tuberculosis were estimated using prospective hospital surveillance data of the annual number of tuberculosis cases over a 3-year period (1 January 2004–31st December 2006), as numerator. The denominator, the total number of HIV-infected and uninfected infants, was calculated using population-based estimates of the total number of live infants, the maternal HIV prevalence and vertical HIV transmission rates.

Results: There were 245 infants with culture-confirmed tuberculosis. The estimated incidence rate of tuberculosis was 83.1 per 100 000 in all infants, 65.9 per 100 000 in HIV-uninfected and 1595.9 per 100 000 in HIV-infected infants [relative rate (RR) in HIV-infected vs. uninfected infants: 24.2]. The incidence rate of disseminated tuberculosis was 16.6 per 100 000 in all infants, 14.1 per 100 000 in HIV-uninfected and 240.9 per 100 000 in HIV-infected infants (RR: 17.1). Infants born to HIV-infected women were more likely to have a tuberculosis contact than those born to HIV-uninfected women (OR: 1.76; 95%CI 1.12–2.77).

Conclusions: The excess risk in HIV-infected infants suggests increased risk of tuberculosis exposure, increased susceptibility and/or limited protective efficacy of BCG. Improved tuberculosis control strategies including contact tracing, preventive chemotherapy and

effective vaccine strategies are needed in HIV-exposed and infected infants.

PS-81484-18 Prevalence of drug resistance 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 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, 1163 patients (1016 new) were included. Of these, 955 new patients and 126 retreatment patients had a positive culture. Sensitivity results are currently present for 75% of these cultures (table). MDR was seen in 6 (0.6%) of the new patients and 4 (3.2%) in the retreatment patients. Mono resistance to rifampicin was not seen, while mono resistance to isoniazid was seen in 2.6% and 2.4% of new and retreatment patients, respectively. Resistance to any drug was seen in 67 (7%) of the new patients and 22 (17.5%) of the retreatment cases.

New patients positive cultures <i>n</i> = 955			Retreatment patients positive cultures <i>n</i> = 126		
Mono-resistance	Poly-resistance	MDR	Mono-resistance	Poly-resistance	MDR
Isoniazid (H) 25	HS: 7	HR: 0	H: 10	HS: 3	HR: 0
Rifampicin (R) 0	HE: 3	HRS: 4	R: 0	HE: 4	HRS: 0
Streptomycin (S) 22	SE: 0	HRE: 0	S: 1	SE: 0	HRE: 1
Ethambutol (E) 3	HSE: 1	HRSE: 2	E: 0	HSE: 0	HRSE: 3

Conclusion: These preliminary data show that the prevalence of MDR among both new and retreatment cases in Tanzania is low. This reflects a strong performance of the NTP in recent years despite the noticeable HIV-epidemic in the country. It is expected that with the remaining results, the estimates will not change substantially, given the random order in which the cultures were processed.

PS-81557-18 Detection of TB multidrug resistance spread in Russian Federation using modified real-time PCR

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Using the method based on the real-time PCR technique, we developed diagnostic kits for quantitative detection of *M. tuberculosis* complex in diagnosed materials and for identification of *M. tuberculosis* strains mutations, associated with resistance to basic TB drugs (isoniazid, rifampicin, ethambutol). Assay was conducted by using simultaneously a set of 5'-fluorescent allele-specific primers and a complementary to the common part of the primers oligonucleotide labeled with a quencher at 3'-end. Additionally, the control DNA probe complementary to the central conservative part of the fragment was included into the reaction mixture. The assay allows detection up to three independent point mutations in one tube. Detection mutations of *rpoB* gene responsible for sensitivity to rifampicin can be tested as well as genes *katG*, *inhA* and *embB* responsible for sensitivity to isoniazid and ethambutol respectively. Two thousand *M. tuberculosis* strains isolated from new-onset (70%) and previously treated patients (30%) from 24 Russian regions were tested by real-time PCR (one strain per a characterized patient). The study revealed, in average, 21.9% MDR prevalence among TB strains received from new-onset patients and 58.5% among previously treated patients. Additionally, 18% of isoniazid resistance were found among isolates from new-onset patients. PCR data for 1092 strains were compared with results of 11 regional bacteriologic laboratories (absolute concentration method) with 94% concordance for MDR. Prospective comparison of proportion bacteriological method and real-time PCR methods on 100 randomized strains showed 100% coincidence of results for rifampicin resistance and 99% coincidence of results for isoniazid resistance.

PS-81562-18 HIV and MDR-TB: a systematic review

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Objective: Tuberculosis (TB) is an important cause of morbidity and mortality, with an estimated 8.8 million new cases and 1.6 million deaths in 2005. Human immunodeficiency virus (HIV) and multidrug-resistant TB (MDR-TB) pose important challenges to TB control. The attributable risk of HIV on MDR-TB has not yet been fully investigated. We conducted a sys-

tematic review to summarize and evaluate the evidence for an association between HIV and MDR-TB. **Methods:** We searched PubMed and ISI Web of Science databases for studies assessing MDR-TB among HIV-infected and uninfected individuals with TB. Studies published before April 2007 were eligible for analysis. Prevalence ratios were calculated for MDR-TB, as well as primary and acquired MDR-TB, based on data provided by the authors. Heterogeneity between studies was assessed and summary measures were calculated when appropriate.

Results: The search identified 33 studies with study populations varying from 46 to 19 646. Most studies were cross-sectional and not designed to assess the HIV attributable risk to developing MDR-TB. Nine (26%) studies assumed those with unknown HIV status to be uninfected, leading to potential misclassification bias. MDR-TB prevalence ratios ranged from 0.21 (CI: 0.03, 1.5) to 41.5 (CI: 2.5, 680.2). Assessment by geographical region did not reveal any noticeable patterns. Considerable heterogeneity across studies precluded the systematic assessment of the overall association between HIV and any MDR-TB, and between HIV and primary MDR-TB. The summary prevalence ratio for acquired MDR-TB was 1.17 (CI: 0.86, 1.60).

Conclusion: This comprehensive review could not reveal an association between HIV and MDR-TB: some studies showed a positive association between HIV and MDR-TB while others did not, with few noticeable patterns. HIV infected individuals may be more likely to present with acquired MDR-TB. Future well designed studies are needed to clarify the relationship between HIV and MDR-TB.

PS-81566-18 Causes of death in HIV-infected patients diagnosed with TB in Thailand

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Background: In Southeast Asia, the reported case-fatality rate for HIV-associated tuberculosis (TB) is as high as 50%. No studies have been published about causes of death in this population.

Methods: We conducted a prospective, observational study of HIV-infected TB patients in three provinces and one national referral hospital in Thailand from

5/2005–9/2006. For any patient who died, staff conducted a verbal autopsy by interviewing family members about events leading up to death. A team of physicians ascribed the cause of death after reviewing verbal autopsies, laboratory data, and medical records. **Results:** Of 849 HIV-infected TB patients enrolled, 142 (17%) died. The cause of death was TB for 38 (27%), an HIV-associated condition other than TB for 50 (35%), and a condition unrelated to TB or HIV in 22 (15%); 23 (16%) patients who died were judged not to have had TB. TB or HIV-associated conditions other than TB were equally likely to have caused death in 32 (23%) patients, of whom 6 had disseminated mycobacterial disease with unknown identification. Of 38 TB deaths, 6 (16%) had multidrug-resistant (MDR) TB and 20 (53%) disseminated TB. The most common other HIV-related causes of death were non-tuberculous mycobacteria (NTM) (20%), fungal infections (16%), and pneumocystis pneumonia (14%). Of the 849 patients enrolled, 371 (44%) received antiretroviral therapy (ART). Death from all causes except for those unrelated to TB or HIV was less common in persons receiving ART compared to those not receiving ART.

Conclusion: Mortality among HIV-infected TB patients may be reduced by increased use of ART. Interventions which may improve mortality include early identification of MDR-TB, earlier diagnosis of TB before it is disseminated, appropriate discrimination between TB and NTM, and ruling out TB so that other causes of illness can be diagnosed. Expanding modern TB diagnostic techniques may achieve these goals and should be evaluated.

PS-81577-18 Weak hospital DOTS linkages causing high default in tertiary care hospitals in big cities of Punjab, Pakistan

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Background: Pakistan is progressing to achieve MDG targets but some areas are still left where, there is room for improvement. In big cities in Punjab there are fifteen tertiary care hospitals both in public and private sector, working under DOTS strategy. These hospitals are providing quality TB control services to patients but the default rate in most of the hospitals is very high which has negative impact on treatment cure rate. This study has been designed to find out the possible causes of this limitation.

Objectives: To determine reasons of high default in tertiary care hospitals in big cities of Punjab Pakistan. **Study Design:** Descriptive Cross Sectional study.

Study Area: 15 tertiary care hospitals in big cities of Punjab.

Study Subjects: Cohort of patients registered in Qtr3 2007.

Sampling: Seven hospitals selected by simple random sampling.

Data Collection: Data collected with help of questionnaire.

Results: In TB 03, 1166 patients were found to be new sputum smear positive, but out of these only 888 were registered in TB03. Thus there was 24% of pre registration default. Mapping of registered patients shows out of total registered 888 patients 471 (53%) were from inside the district while 417 (47%) were from outside the district. There was no referral of patients to primary health care from any of the hospital except one, who referred 41 (6%) patients. There was no feedback from receiving unit. In the same cohort of 888 patients, 18% were defaulted (early). Mapping of default shows that out of total default patients (163 patients). 63 (39%) were from district and 100 (61%) were from outside the district. (*P* value 0.00)

Conclusion: Both internal and external DOTS linkages are weak in all hospitals. High default rate is significantly associated with the patients registered from outside the district. Recommendations: Patients seeking health care from outside the district should be referred to their nearest diagnostic center ensuring strong HDL.

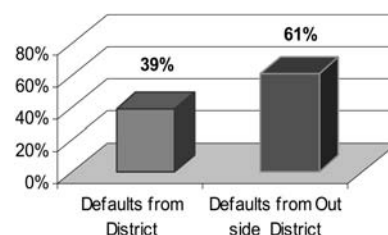


Figure Defaults; mapping from district and outside district.

PS-81617-18 Contribution of microbiology to the therapeutic management of tuberculosis in Rwanda

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Aim: The paper we present is a result of fruitful north-south collaboration between Belgian universities; ULB (Saint Pierre Hospital, Erasme Hospital), Institute of Tropical Medicine and the National University of Rwanda. In Rwanda, no national survey on the prevalence of resistance to antituberculosis drug or any study on the molecular epidemiologic typing of *M. tuberculosis* strains had been undertaken prior to this work.

Design: In this research, two prospective investigations established the first basis of national data on resistance profiles of TB bacilli isolated in Rwanda; and using molecular typing methods we have been able to associate therapeutic failures to disease recurrence; the first involved sampling from four provinces in Rwanda and the second by a representative sampling at national level according to Union/WHO standards.

Methods and Results: In total, 644 and 701 isolates of *M. 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%). Using molecular markers [spoligotyping and MIRU-VNTR], we 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.

Conclusion: These high rates of resistance to first line antituberculosis drugs underline the need for improving the campaign for the fight against TB in Rwanda.

PS-81629-18 Disease-related stigma and knowledge among HIV-infected tuberculosis patients in Thailand

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Background: Disease-related stigma and knowledge are believed to be associated with patients' willingness to seek treatment and adherence to treatment. HIV-associated tuberculosis (TB) presents unique challenges, because TB and HIV are both medically complex and stigmatizing diseases. In Thailand, we assessed knowledge and beliefs about these diseases among HIV-infected TB patients.

Methods: We prospectively interviewed and examined HIV-infected TB patients from three provinces and one national referral hospital in Thailand from 2005–2006. We asked patients standardized questions about TB stigma, TB knowledge, and HIV knowledge. Responses were grouped into scores; scores equal to or greater than the median were considered high. Multivariate logistic regression analysis was used to identify factors associated with scores.

Results: Of 769 patients enrolled, 500 (65%) reported high TB stigma, 177 (23%) low TB knowledge, and 379 (49%) low HIV knowledge. High TB stigma was independently associated with being hospitalized at enrollment (adjusted odds ratio [aOR] 1.7; 95% confidence interval [CI] 1.1–2.6), taking antibiotics before TB treatment (aOR 1.5; CI 1.0–2.1), first visiting a private provider (aOR 1.7; CI 1.1–2.6), and not knowing that monogamy can reduce HIV risk (aOR 2.2; CI 1.1–4.2). Low TB knowledge was associated with being treated at the national referral hospital (aOR 3.0; CI 1.6–5.8), severe TB disease (aOR 1.7; CI 1.1–2.5), being hospitalized at enrollment (aOR 1.7; CI 1.1–2.6), and low HIV knowledge (aOR 2.2; CI 1.5–3.3). Low HIV knowledge was associated with knowing a TB patient (aOR 1.5; CI 1.1–2.1) and low TB knowledge (aOR 2.3; CI 1.5–3.4).

Conclusions: We found that stigma and low disease-specific knowledge were common among HIV-infected TB patients and associated with similar factors. More research is needed to determine whether reducing stigma and increasing TB and HIV knowledge reduce delays and improve outcomes.

TUBERCULOSIS IN SPECIAL POPULATIONS AND INSTITUTIONS/ TUBERCULOSIS OUTBREAKS AND CONTACT INVESTIGATION

PS-81238-18 Burden of non-national patients on the TB prevalence in Lebanon

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Setting: Despite the decreasing of TB prevalence during the last 10 years and the free control of TB patients whatever is their nationalities, a retrospective study using the data of the NTP Lebanon, demonstrates the increasing number and percentage of non national TB patients from 11.27% in 2002 to 25% in 2007. During the last 3 years, the average age of non national patients was between 27 and 29 years, in national it was between 38 and 40 years. Ethiopians represent 50% of the total pool of non-national TB patients. In prisons, the situation is also similar, 40 to 50% of TB prisoners are non-nationals.

Conclusion: Screening is highly needed for residence work/permit: clinical, PPD, X-Rays, smear and culture in case of pathology consistent with TB. Other practical steps are taken to face out this difficulty that is putting the national tuberculosis programme in trouble.

PS-81264-18 Risk factors for death during tuberculosis treatment in prisons of Azerbaijan, 1995–2006

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Setting: Specialized Treatment Institution, Ministry of Justice, Azerbaijan.

Aim: To identify risk factors for death during category II TB treatment in prisons of Azerbaijan, based upon data collected from 1995 to 2006.

Methods: This abstract analyzes data from the retrospective cohort study which was conducted jointly by the MOJ and the ICRC in prisons of Azerbaijan from 1995 to 2006. Bivariate analyses were used to assess the relationship between different risk factors and dichotomous treatment outcome variable (death/non-death). Crude Risk Ratios (RRs) and 95% Confidence Interval (CI) for the outcome variable and each of the independent predictors TB treatment history (never treated before or previously treated) and sputum-smear status at the integration to treatment (positive or negative) were calculated.

Results: From 1995 to 2006, overall 778 patients died during the course of treatment. All default cases were excluded from the study. In general, 5342 cases were cured/completed treatment or failed the treatment. In bivariate analysis the treatment outcome variable was significantly associated with the TB treatment history variable (crude RR = 1.60; 95%CI 1.40–1.84) and the sputum-smear status variable (crude RR = 1.68; 95%CI 1.37–2.06). In other words, this analysis suggests that previously treated cases are 1.60 times more likely to die during treatment compared to new cases. Moreover, sputum-smear positive patients are 1.68 times more likely to die during TB treatment compared to smear-negative patients.

Conclusions: We have performed a crude analysis; the possible influences of other confounding variables were not taken into account. A more in-depth multivariate analysis, incorporating other potential covariates, needs to be performed.

PS-81436-18 Coverage and yield of TB screening at entry in prisons in the Netherlands, 1994–2006

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Setting: Since 1993 screening for TB on entry into the prison by chest x-ray with Mobile miniature X-ray Unit (MXU) is performed in the Netherlands. Overall TB detection rate in 2004, 2005 and 2006 was 74, 52 and 97/100 000 persons screened.

Objectives: To determine the yield of TB screening of detainees by MXU by subgroup according to country of origin.

Methods: Trend analysis from 1994–2006 and stratified analysis of yield of TB-screening 2004 and 2006 according to country of origin.

Results: From 1994 to 2006 TB prevalence among detainees decreased from 368 to 97 per 100 000 persons screened. TB prevalence decreased mostly among Dutch born detainees. TB prevalence in this group was 13/100 000 screened persons in 2006. In non-Dutch born detainees the overall TB prevalence was 258/100 000 persons screened. 50% of the Dutch born detainees with active tuberculosis belong to known TB risk groups.

Conclusion: TB screening at entry in prisons for Dutch born populations can be discontinued provided early passive case finding and contact investigation is ensured and subpopulations of TB risk groups are identified and monitored.

PS-81437-18 Effectiveness of screening and treatment outcome of prisoners in the Netherlands

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Setting: Since 1994 screening for TB on entry into the prison by chest x-ray with Mobile miniature X-ray Unit (MXU) is performed in the Netherlands. Overall TB detection rate in 2004, 2005 and 2006 was 74, 52 and 97/100 000 persons screened. Overall percentage of abnormal chest X-rays not followed up was 18% from 2004–2006.

Objectives: To determine the effectiveness of TB screening by MXU and treatment result of detainees in the Netherlands.

Methods: Analysis of treatment outcome from 2001–2006 according to country of origin and TB risk group.

Results: From 2001–2006 in total 209 967 screenings were performed. Follow-up of an abnormal chest X-ray was requested in 3188 (2%) cases. Active TB was found in 154 cases (5% and 0.1% of all screenings), while 485 cases (15% of follow-up cases) were not further evaluated. The main reason for no follow-up was early release from detention or expulsion of illegal detainees out of the country. The treatment outcome of detainees improved from 62% in 2001–2004 to 83% treatment completion in 2005. The percentage of detainees who were treated with directly observed treatment increased from 47% in 2001–2004 to 78% in 2005. Treatment results among illegal detainees were 55% treatment success in 2001–2004 and 60% in 2005. The treatment results are unfavorable due to a high proportion of patients that interrupts treatment. In comparison treatment results among

illegal persons who were not imprisoned were 79% treatment success in 2001–2004 and 60% in 2005.

Conclusion: The follow up of detainees with an abnormal chest X-ray on TB screening should be properly ensured because of the high rate of active tuberculosis among these cases. The treatment outcome of detainees has improved considerably, but can be further improved if continuation of treatment of illegal detainees is safeguarded after release.

PS-81497-18 Epidemiology of TB among children in the Dominican Republic

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Introduction: Child TB is a sentinel indicator that there is active transmission of the disease. From epidemiological point of view little importance has been given to Child TB, because the clinical forms are paucibacillary, with a lower risk of disease transmission.

Aim: To know the epidemiological situation of children TB on Dominican Republic.

Design and Methods: Descriptive study, the PNCT information system provided data in order to analyze epidemiological information related to TB cases on children.

Results: Between 2000 and 2006, Incidence on TB child decreased from 18.8 cases/100 000 to 9.6 cases/100 000 and the infant mortality rate decreased from 2.4 deaths/100 000 to 0.2 deaths/100 000. During that period 2339 TB child cases were diagnosed corresponding to 6.9% of total registered cases. 7.5% (177) of these cases had TB/AIDS co infection. 97.5% (2282) were new cases and 74% (1734) pulmonary cases, of which 37% (639) were smear positives.

Conclusion: Specific strategies to control TB in children helps to control the transmission of the disease, improve quality of life for this population and assess PCT achievements.

PS-81672-18 Is travelling a risk factor for tuberculosis in immigrants living in a low endemic country?

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Background: In the Netherlands over 60% of the tuberculosis (TB) patients are of foreign born origin. Tuberculosis incidence among foreign born persons is 17 times the incidence of Dutch born persons, and remains high many years after immigration. Travel to

the country of origin poses a potential risk of TB infection among immigrants. Few studies have documented the contribution of traveling to tuberculosis incidence among immigrants.

Objective: To determine the recent travel history of immigrants who are diagnosed with tuberculosis.

Methods: Seventeen Municipal Health Services were involved in this study. During one year, TB nurses asked immigrants who were diagnosed with active tuberculosis, and were living for at least 2 years in the Netherlands, about their travel history in the preceding 3 years.

Results: 180 tuberculosis patients originating from 38 different countries were included in the study. Of these 76.1% had traveled in the preceding 3 years, 73% traveled to their country of origin. The average stay in the country visited was 5.7 (sd = 7.9) weeks and the most often recorded aim of the journey was visiting family (69.6%).

Conclusion: Immigrants with tuberculosis have often traveled to their country of origin in the preceding years. Travel to endemic countries could be a contributing factor for the high incidence of tuberculosis among immigrants who are living in the Netherlands for more than 2 years. These results will be used for a case control study to assess the contribution of traveling to tuberculosis among immigrants.

PS-81677-18 Evaluation of tuberculosis control strategies in a hyperendemic prison through a mathematical model

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Background: Tuberculosis (TB) is a major health problem in Rio de Janeiro (RJ) state prisons. For operational reasons, TB control strategies in prisons cannot be compared through population based intervention studies.

Objectives: Hence, we propose a mathematical modelling based approach to simulate the dynamics of TB in prison and evaluate the potential impact of several intervention strategies.

Methods: We developed a stochastic compartmental model to simulate several TB control strategies and evaluate their impact on the dynamics of TB in a RJ prison (active TB prevalence 4.6%).

Results: We simulated the DOTS strategy reaching the objectives of 70% of bacteriologically-positive cases detected and 85% of detected cases cured; this strategy reduced only to 2.8% the average predicted TB

prevalence after 5 years. Adding TB detection at entry point to DOTS strategy had no major effect on the predicted active TB prevalence. But, adding further a yearly X-ray mass screening of inmates reduced the predicted active TB prevalence below 1%. Furthermore, according to this model, after applying this strategy during 2 years (three annual screenings), the TB burden would be reduced and the active TB prevalence could be kept at a low level by associating X-ray screening at entry point and DOTS.

Conclusion: Our model provides a rational approach to public health deciders. X-ray mass screenings should be considered to decrease rapidly TB burden in highly endemic prisons. The cost-effectiveness of the different strategies we studied remains to be ascertained.

PS-81710-18 Investigation of the status of TB infection in HIV AIDS patients

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Aim: To investigation the condition of TB infection in HIV infectors or AIDS patients, we wish to attain fundamental information for the preventing and treating of TB-HIV co-infection.

Methods: We developed the questionnaire investigation among the followed HIV infectors or AIDS patients in 11 counties or districts. At the same time, cell counting for CD4, PPD experiment, X-ray examine and sputum smear were developed.

Results: Total of 702 HIV infectors or AIDS patients were investigated, including 383 males and 319 females. The average age was 41.6 years old. The most frequent infection approach was blood presenting (67.39%), the second was transfusion (18.09%). During the 631 cases for both X-ray and sputum smear, the prevalence rate of tuberculosis is 6.50% (41 cases, 7 cases' sputum smears were positive). The other 54 cases (8.56%) had other pulmonary infection. During the 700 cases accepted the PPD experiment, there were 164 cases (23.43%) positive and 536 cases (76.57%) negative for PPD detection.

Conclusion: The co-infection of TB-HIV is a serious problem of public health. It is emergency to frame a project for the prevention and treatment of TB infection in HIV infectors or AIDS patients.

PS-81751-18 Aspects of tuberculosis illness among the gypsy population in the pulmonary medical unit of Tecuci

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Aspects regarding TB illness were studied in the urban and rural territory of the Pulmonary Medical Unit Tecuci in 2005 (population estimate at 21 900 gypsies).

It was used the dates of tuberculosis register and of the informational system frequently used in the TB control activity.

In 2005, in the territory of the Pulmonary Medical Unit Tecuci were registered 261 cases (CN + R) which means a global incidence about 175.16‰. Among these, 44 cases (16.85%) were made up the illness among gypsies. The pulmonary localization was observed in 35 cases (79.54%), the bacteriological confirmation was about 85.71%. The male sex was prevailing: 70.45% (31). A percentage of 15.90% (7) was the illness in the age group 0–14 year (without severe forms). The most frequently anatomo-radiological forms in the pulmonary localization cases were the caseous-cavitary forms, shown a delay ill diagnosis. A number of 16 cases (36.36%) was presented to a doctor after more than 16 weeks from the appearance of cough and others suggestive tuberculosis symptoms. The evaluation accomplish to the end of the treatment, possible at 23 patients, was pointed out a percentage of success about 52.17%, placed still away by the objective of 85%. There were difficulties regarding assurance of DOT, especially in the rural. The dates of the study, even just on one year, indicate a gravity concerning the tuberculosis illness among the gypsies. It is imposing a better management in the application of TB control measures among these 'target' population, concomitant with the increase of the educational and social level of these population category.

PS-81773-18 Analysis of HIV-TB co-infection in Taiwan, 1997–2006

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Background: To access the clinical characteristics and prognosis of tuberculosis (TB) in HIV-infected patients in Taiwan.

Methods: Registered HIV and TB datasets in Taiwan CDC from 1997 till 2006 were reviewed and HIV-TB co-infected persons were identified. All medical records were reviewed for further analysis.

Results: Among the 13 103 HIV-infected persons, 478 cases (525 episodes) were co-infected with tuberculosis. There were 278 cases (58.2%) with culture confirmed tuberculosis (303 episodes, 24 cases relapse); 75 cases (15.7%) with positive acid-fast bacilli finding through sputum or tissue smear; 102 cases (21.3%) diagnosed by chest X-ray findings and 23 cases (4.8%) were diagnosed by clinical and laboratory evidences. There were no significant differences in mean CD4 count and age in TB diagnosis in each group. The mean age of the cases was 41.0 years

(range, 4–82 yr) and the mean CD4+ lymphocyte count was 97/mm³ (range, 0–912) at the time TB was diagnosed. Forty-nine patients had isolated extrapulmonary TB and 238 patients had isolated pulmonary TB. The mean CD4+ lymphocyte count between patients with isolated pulmonary TB was significant higher than those with extrapulmonary involvement, 102.8 vs. 84.5/mm³, $P < 0.05$. TB was the initial presentation at the time of HIV diagnosis in 227 patients (43.2%). Among the 247 patients developed TB after HIV infection, 76 cases (30.5%) is under regular HAART but the mean CD4 count is only 192/mm³. Cases with older age and female gender were delayed HIV diagnosis, $P < 0.05$. Around 71.9% of the cases completed anti-TB therapy and cured, 23.8% died due to TB infection.

Conclusions: The risk of developing active TB is high in HIV-infected persons, even during the HAART era. Higher CD4 counts at the time of TB diagnosis and younger age predicts good prognosis. Earlier diagnosis of HIV and initiation of HAART are the best way to improve TB control.

TB treatment response	Completed treatment <i>n</i> (%)	Died <i>n</i> (%)	Default <i>n</i> (%)	On treatment	
CD4 at TB diagnosis (449 cases available)					
≤100	220 (68.1)	93 (28.8)	8 (2.5)	2	<i>P</i> < 0.005
101~200	37 (69.8)	12 (22.6)	2 (3.8)	1	
201~350	46 (90.2)	2 (3.9)	3 (5.9)	0	
≥351	20 (90.9)	0	2 (9.1)	0	
Risk factor for HIV transmission					
MSM	163 (71.5)	51 (22.4)	12 (5.3)	2	
Heterosexual	165 (66.5)	76 (30.6)	5 (2.0)	2	
IDU	26 (74.3)	7 (20)	2 (5.7)	0	
Others	7 (50)	6 (42.8)	1 (0.7)	0	
Age					
≤45 y/o	272 (72.3)	84 (22.3)	18 (4.8)	2	<i>P</i> < 0.005
>45 y/o	89 (59.7)	56 (37.6)	2 (1.3)	2	

PS-82084-18 Tuberculosis incidence on the medical staff in a pneumophthisiology department

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Lung tuberculosis is an aerogenous transmitted disease and the risk of infection cannot be avoided in spite of all protection measures.

Aim: The analysis of the risk factors regarding the TB disease at the permanently employed medical staff on the PN Department of the V.Babes Clinical Hospital in Craiova.

Methods: A retrospective study among TB patients registered and treated with antituberculous drugs between 1985–2005 at the PN Hospital in Craiova.

Results: 78% of the employed medical staff was diagnosed with tuberculosis, 90% of them being women.

Regarding the location: 80% of them have suffered from lung tuberculosis, 10% of them from pleural tuberculosis, 5% of the individuals have suffered from tuberculous pericarditis and 5% of them from hepatosplenic tuberculosis. 76% of the cases represented extended forms, 90% of them being bacteriologically confirmed. In 33% of the cases, the disease manifests after 30–35 years of exposing, prevalent being at nurses (61%).

Conclusion: The risk of disease is permanently present reaching the top between 3–5 years after the individual has been employed and after 30 years of working (the retiring period) when the power of defence of the human body is lower. The results of the analysis say that the most affected of the whole medical staff are the nurses for they are numerous comparatively to all the other medical staff.

PS-81250-18 Investigating a prevalent TB genotype cluster: should we invest our resources?

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Universal tuberculosis (TB) genotyping is now available in the US. Genotyping can be used to detect TB outbreaks; however, investigating all genotype clusters is cost-prohibitive. It is difficult to determine whether cases of a prevalent genotype indicate ongoing transmission, and whether public health interventions targeted at prevalent genotype clusters will curb transmission. A genotype cluster of 13 tuberculosis cases in South Carolina during 2005–2007 was identified through the National Tuberculosis Genotyping Service. This 'Beijing family' genotype is common and widely distributed across the U.S. We conducted a field investigation to determine if this cluster represented recent TB transmission.

Methods: We included TB cases with identical genotypes based on spoligotype and mycobacterial interspersed repetitive unit patterns or, in the absence of genotyping results, cases with known epidemiologic links to a genotypically linked case. All cases were reported from three adjacent counties during 2005–2007. We interviewed patients to identify potential contacts, activities, and venues of TB transmission.

Results: Twenty-one cases were included, of which 13 had matching genotypes. All 21 patients were African-American. Among the 16 adult cases, all had pulmonary TB, 4 (25%) had cavitary disease, and 11 (69%) had sputum-smear-positive disease. Of 168 community contacts, 76 (45%) had positive tuberculin skin test results. While spatiotemporal epidemiologic linkages were established among 17 cases within

County A, we failed to establish linkages between the cases in two neighboring counties.

Conclusions: Ongoing, widespread, and recent transmission of TB occurred in County A. Failure to establish inter-county linkages, in this case, suggests that the yield of field investigations of genotypically linked clusters may be improved if restricted to well-defined spatiotemporal parameters, even for TB clusters with a prevalent genotype.

PS-81252-18 The role of public health care authorities in providing antituberculsis treatment

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Because of the tense epidemiologic situation with tuberculosis in Armenia at present, it has become urgent to increase the role of all links of the public health care system for prophylaxis and detection of tuberculosis. From the specific methods of prophylaxis among children population still the important role belongs to BCG vaccination among newborns. In Armenia, in spite of the financial difficulties during the recent twenty years, the involvement of newborns in vaccination makes more than 90%, the healthy children are revaccinated at the age of 6–7 years by ‘direct method’ without preliminary tuberculin test. Among adults, the accent is put on the sputum examination for MBT among the suspicious for tuberculosis people in all polyclinics, and in case of necessity—X-ray examination, including the risk groups.

An important role belongs to examination of the contacts. The analysis of their morbidity during the recent 9 years (1998–2006) has shown that this index has increased from 1189.9 to 1518.5 for 105 contacts, which exceeds the morbidity among the whole population (37.7–48.6) by 40–50 times. Many of these contacts (about 30.0%) are detected not in the specialized institutions, but in the general treatment network, which dictates the necessity of increasing the role of the public health care system in detection of tuberculosis and of the hidden infection foci.

PS-81459-18 High prevalence of latent tuberculosis infection among contacts of tuberculosis patients in Rio de Janeiro

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Introduction: One third of the world’s population has latent *M. tuberculosis* infection (LTBI). Treatment of

LTBI reduces by 60 to 90% the risk of developing TB and constitutes an important strategy for TB control. At present, LTBI treatment is recommended in Brazil only for children, HIV-infected and other high-risk subjects.

Objective: To estimate the prevalence of LTBI among TB patients’ close contacts and to analyze the association of a positive TST with prior BCG vaccination.

Methods: TB adult (≥ 18 years) contacts were submitted to a tuberculin skin test (TST) in three health centers of poor areas in Rio de Janeiro between 2006 and 2008. Prevalence of LTBI was analyzed using 5 and 10 mm as the cut-off value.

Results: Among 759 tested contacts, 291 (38.3%, 95% CI 34.9%–41.8%) had a TST ≥ 10 mm and 364 (50.6%, 95% CI = 47.0%–54.1%) had a TST ≥ 5 mm. A BCG reaction was searched for in 354 subjects. BCG was not associated neither with a positive TST (any cut-off value) nor with small reactions (1–4 mm) when compared to no induration.

	TST	TST	TST	TST
	0	1–4 mm	5–9 mm	≥ 10 mm
BCG scar				
Absent	26 (33.8%)	5 (6.5%)	11 (14.3%)	35 (45.5%)
Present	91 (33.2%)	21 (7.7%)	35 (12.8%)	127 (46.4%)
OR (95% CI)	1	1.2 (0.4–4.0)	0.9 (0.4–2.2)	1.0 (0.6–1.9)

Discussion: TST results were not associated to BCG scars, suggesting that it can be used as a marker of LTBI even in populations with a very high coverage of BCG vaccination. LTBI was frequent among close contacts in Rio de Janeiro and deserves attention of health programs for the control of tuberculosis. The prevalence found in this study was much higher than the one found among medicals students in the same city (6.9%, 95% CI = 5.8%–8.6%), a group also exposed to TB. This result suggests a high risk of TB transmission to contacts and the need for further studies to evaluate the cost-effectiveness of LTBI treatment in close adult contacts suggested by guidelines in developed countries.

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PS-81618-18 Contact tracing in adolescents at risk for tuberculosis

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Aim: To assess transmission of tuberculosis at scholar settings. Adolescents can develop pulmonary disease and become as contagious as adults.

Design: Cross-sectional.

Methods: Two years contact tracing (2006–2007) at secondary school, by principal of the rings, to class mates of adolescents with all forms of pulmonary tuberculosis (positive culture with or without sputum smear

positive-AFB+/-). Contacts underwent tuberculin skin tests (TST), chest radiographs, clinical evaluation, and sputum smears were performed whenever indicated. TB cases and infected patients were submitted to treatment or chemoprophylaxis.

Results: 501 contacts from 6 schools took census. Age range: 12–18 years. Median 15, 95% CI 15–15.2. 28 foreign borns (5.5%)

470 (93.8%) were first tested by TST, 36 didn't come to the lecture (7.2%)

55 (11%) were TST positives, 17 (5%), were converters

1 symptomatic TB Pulmonary Case, non cavitating, was found (0.2%)

15% LTBI among adolescents contacts of an AFB+ TB active case vs. 12% among adolescents contacts of an AFB-culture positive case. OR 1.3; 95% CI 0.7–2.5].

Higher rate (26.4%) of conversion among contacts of an AFB+ case than AFB- one (13%), OR 2.3; 95% CI 0.5–11.7. One school has higher infection per cent, school 3 (24%) and it was necessary to investigate the second ring. Results of this center were as follows:

First ring: 60 tested, 26 TST positive, 25 LTBI (41%) and one TB (1.6%) case.

Second ring: 75 tested, 6 TST positive, 6 LTBI (8%). OR latent TB infection first/second ring: 5.4 (95% CI 2.1–14).

Conclusion: Regardless sputum smear positivity, transmission is showed in all contacts. LTBI rates are higher between adolescents contacts of an AFB+ TB active case. Half converters rates are found in contacts of AFB- patients. Diligent contact tracing and the use of preventive chemotherapy are essential.

School Center	Pulmonary tuberculosis (PTB)	Totally checked	Positive TST (n)	TST conversion	Latent tuberculosis infection (%)	New TB
1	Cavitating, AFB+	38	3	0	7.9	0
2	Cavitating, AFB+	122	11	4	12	0
3	Cavitating, AFB+	135	22	10	24	1
4	Cavitating, AFB+	40	3	1	10	0
5	Non-cavitating, AFB-	76	6	2	10.5	0
6	Non-cavitating, AFB-	34	7	0	20.6	0
Total		434	69		16	1

PS-81817-18 Reporting patterns and clinical characteristics of TB cases with history of air travel, Canada, 2006–2007

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Background: Contact tracing investigations related to tuberculosis (TB) cases with history of airline travel

have received increased attention following several recent high profile incidents. In Canada, reports of TB cases on airline flights are sent to the Public Health Agency of Canada (PHAC) for risk assessment and any required contact follow-up. In order to examine the reporting patterns of incidents over time and clinical characteristics of cases, a comprehensive file review was undertaken.

Methods: Reports of TB cases with airline travel history received by PHAC between January 2006 and December 2007 were reviewed. Included were reports where PHAC was responsible for follow-up of one or more flights. Descriptive analyses were performed using variables related to reporting patterns and clinical characteristics.

Results: Between January 2006 and December 2007, 53 TB cases with a history of airline travel were reported to PHAC. The number of notifications increased during each consecutive six month period with 6, 12, 15, 20 reports received between January to June and July to December each year, respectively. The number of provinces reporting cases and the number of cases reported per province also increased. The median duration between the earliest flight taken to receipt of the notification at PHAC was 71 days (range 1 to 180 days). The majority of cases were male (54%), foreign-born (94%), with a median age of 45 years (range 13 to 84 years). Most (58%) cases were moderately to highly infectious (AFB 3+ or greater) and had cavitary disease (63%). Three cases were drug-resistant including two cases with multidrug resistance.

Conclusions: In Canada, the number of reported TB cases with history of airline travel has been steadily increasing. Possible explanations include frequency of international air travel, heightened awareness of these events related to high profile cases and greater knowledge of actions required by public health authorities.

PS-81881-18 Contact tracing and preventive therapy: experience of Turkey

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Aim: Our country is successful in TB diagnosis and treatment. Case-based data collection of TB cases and their treatment results was initiated in 2005. Contact tracing and preventive therapy had been applied for decades in Turkey. In this study, our purpose is to present contact tracing and preventive therapy experience of Turkey.

Methods: In contact examination, contact cases are invited to dispensary; chest x-ray, tuberculin skin test (TST), symptom questionnaire are done to all and sputum examinations are done for the suspected cases. Preventive drug therapy are given to, contacts of infectious cases >35 years old, TST positives >15 years

old, TST conversions, TST positive cases with sequela or immunocompromised. Data about contact tracing and preventive therapy are collected from TB dispensaries monthly as aggregated data.

Results: (Table 1). Contact tracing is done for 12 cases for each patient in some provinces, but generally it is restricted to family members. In 2004, 2005 and 2006, rates of contact examinations to TB case number are 4.3, 4.9 and 5.5, respectively. Less TB cases are detected from the contact tracing year after year. In the last few years, number of persons who were given preventive therapy increased.

Conclusion: In Turkey, case finding, bacteriological diagnosis and treatment success are increasing, at the same time, contact tracing and preventive therapy numbers are rising. The question about catching less TB cases from the contacts should be investigated. To better evaluate our experiences and to improve our practices we should collect case based data about contact tracing and preventive therapy.

	Total TB cases	Number of contact examinations	TB cases detected from contact tracing	Number of people given preventive therapy
2004	19 894	85 624	1141	12 320
2005	20 535	101 676	958	19 664
2006	20 526	112 829	721	24 137

PS-82296-18 Outcome of TB-DR and HIV co-infected cases in six hospitals in Rio de Janeiro, Brazil, preliminary results

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Aim: Tuberculosis (TB) remains a great challenge for public health in Brazil. Drug resistance (DR—resistance to at least one drug) and multidrug resistance (MDR) national rates are unknown. DR diagnosis is poor and DOTS coverage low in Rio de Janeiro.

Methods: We conduct a nosocomial survey to find DR cases in 6 hospitals of metropolitan region of Rio de Janeiro between 2004 and 2006. Information about TB outcome were obtained from TB report system and with personal contact, nine months after the TB diagnose.

Results: DR occurred in 102 (17.1%) and MDR in 44 (7.4%) patients of 595 patients enrolled in resistance survey. In DR population 33 (32.4%) were cured; 10 (9.8%) died; 2 (2.0%) default and 29 (28.5%) continue treatment. In MDR population 7 (25%) were cured; 7 (15.9%) died; 2 (4.5%) default and 17 (38.6%) continue treatment. In co-infected HIV population

(111), 11 (25%) were cured; 7 (15.9%) died; 2 (4.5%) default and 17 (38.6%) continue treatment.

Conclusion: DR, MDR and co-infected HIV population shows low rates of cure, high rates of fatality and relapse. Special attention must be given to these two groups including earlier diagnosis and DOTS implementation.

PS-82367-18 Tracking the progenitors of a *Mycobacterium tuberculosis* multidrug-resistant outbreak strain

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Aim: Tracing back the evolution of an MDR outbreak in order to identify the progenitor strains.

Design: As in tuberculosis, progression from infection to active disease greatly varies between patients, we reasoned that the progenitors of any MDR outbreak strain would coexist in the circulating pool of isolates, soon after the onset of the outbreak or at even a differed time. We also assumed that the progenitor strains would share, to the base pair, several IS6110 insertion sites with their derived MDR outbreak strain.

Methods: We first determined, to the base pair, the insertion sites of IS6110 of an MDR outbreak strain. Using these data, we next developed a robust IS6110 site-specific PCR-based assay, and searched among all the isolates recovered from the same area, those sharing, to the base pair, the highest number of IS6110 insertion sites.

Results: The strategy proved to be successful as we have been able to reconstruct the sequential events leading to the emergence of the outbreak MDR strain from the drug sensitive pool.

Conclusion: The availability of such progenitor strains provides an unprecedented opportunity to better understand, through comparative genomics, the natural molecular mechanisms underlying the emergence of the epidemic phenotype of MDR *M. tuberculosis* strains.

PS-82395-18 Implantation of DOTS and DOTS-A strategies among tuberculosis contacts control in Rio de Janeiro, Brazil

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Aim: The city of Rio de Janeiro has one of the highest tuberculosis (TB) incidence rates in Brazil. These rates justified the necessity of a major concern with the assessment of tuberculosis contacts.

Objectives: Compare the contacts identified and contacts assessed in the program of preventive therapy, in every Health Unit TB Program; evaluate and assess the potential relation between the appointment with the nurse and the rate of contacts enrolled; analyze the incidence of signs and symptoms of tuberculosis among the contacts assessed in the three different approaches; analyze the adherence to preventive therapy; analyze factors associated with each of the variables presented.

Methods: It is a retrospective cohort study, analyzing three groups: DOTS, DOTS-A, TAA, in 3 outpatient public health centers located in RJ city.

Results: DOTS-A identified 163 contacts, 104 completed the evaluation and 47 contacts had chemoprophylaxis indicated, and 19 completed it. DOTS identified 235 contacts of which 10 contacts completed the evaluation and one contact had chemoprophylaxis indicated and completed it. SAT identified 79 contacts, 9 completed the evaluation, but no contact had chemoprophylaxis indicated.

Conclusion: To perform effective contact investigations, tuberculosis control programs must pay careful attention to precisely defining variables and concepts related to the contact investigation. At DOTS-A was the best nursing participation and this strategy had the best results. These important findings should be considered at tuberculosis control activities.

POLICY AND PROGRAMME IMPLEMENTATION: DOTS EXPANSION-I

PS-81299-18 Analysis of the patients with limited access to health services in 'Shanxi FIDELIS project'

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Background: The FIDELIS project was implemented in 119 counties with the population of 33.35 million in Shanxi from Sep. 2006 to Aug. 2007.

Objective: To find the effect factors on case detection through analyzing patients with 'limited access to health services'; to document the project and share results with other counties and provinces.

Methods:

- 1 To compile EPIDATA software
- 2 To enter the 'Assessment of limited access to health services form' of patients in 50 project counties
- 3 To analyze the data using EpiData software.

Results: 9133 new smear-positive TB cases with limited access to health service were detected from Sep. 2006 to Aug. 2007, 67.6% of them visited village doctor at first when they had symptoms, and 29.9% of their duration of symptoms was 8 weeks or more; 20.1% visited township clinic and 6.2% of their du-

ration of symptoms was 8 weeks or more; 3.6% of them visited the public sector DOTS facility directly when they get sick.

Conclusion: Village doctor is the first choice for TB patients, so they should be trained for TB control. Much work is needed to improve public sector DOTS facility usage.

PS-81335-18 Fidelis innovations making a difference in Tanzania TB control

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Setting: Four Fidelis projects were implemented in 13 provinces of Tanzania with population of 25 million. The projects introduced new activities not routinely done by the National TB and Leprosy programme.

Objective: To increase case detection rate in area with limited accessibility to health services.

Methods: These included, strengthening public health facilities, public-private mix and community involvement. Major interventions were:

- Hiring of laboratory technicians
- Supporting folk drama groups both in urban and rural areas
- Transferring fixed smears from remote communities to the nearest diagnostic centre
- Using home based treatment supporters to retrieve contacts
- Enhancement of supportive supervision of district laboratory technician to AFB microscopists in the diagnostic centres
- Supporting new private diagnostic centres, mainly in the urban areas.

Results:

- 79 laboratory technicians were recruited both in urban and rural areas to work in the public facilities
- 69 folk drama groups supported to enhance TB advocacy and social mobilization
- 8636 fixed smears transferred from remote areas, producing 329 additional new smear positives (NSP)
- 16 NSP were obtained from contact retrieval by CB-DOT supporters
- Regular quarterly technical support to AFB microscopists in the diagnostic centres provided by district laboratory technologists
- 20 private labs were renovated and given new binocular microscopes to become new diagnostic centres.

Conclusion: The project has significantly increased case detection rate, especially in hard to reach areas and helped to strengthen diagnostic services in the targeted provinces.

PS-81345-18 TB services through DOTS corner in medical college hospitals of Bangladesh: an analysis

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Introduction: TB is often neglected or not properly managed in academic hospitals of the country. The management of TB is a complex in tertiary level.

Objective: To analyze practices of medical colleges in management of TB.

Methods: Lists of medical colleges in both public and private prepared. Orientation on DOTS organized and DOTS Corner operational. Quarterly reports analyzed.

Results: Analysis of Medical College Hospitals comprising of out and in patients facilities shows a considerable number of TB suspects are not taken into care for its diagnosis prior to involvement through DOTS Corner. All Government and majority of the private Medical Colleges have initiated DOTS Corner to manage TB patients. During 2006–2007, 2734 cases were registered for treatment, out of which 1711 were new smear positives, that is higher than the previous years and 87% cases treated successfully (2006). There is an increased commitment by the academicians to implement DOTS compared to 2005. Details will be presented.

Conclusion: NTP has taken considerable measures to involve academic institutes. Strategies to be in built in involving all Medical Colleges of the country for TB care.

PS-81363-18 Assessment of the TB Directly Observed Therapy Programme in KwaZulu-Natal, South Africa

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Background: Directly Observed Therapy (DOT) Programme for TB patients has long been implemented in South Africa. However, assessment of the effectiveness of this programme has received little attention. This study was therefore; initiated to assess the current DOT strategy in KwaZulu-Natal.

Objectives:

- To perform a rapid appraisal of the available DOT services.
- To identify the gaps within the services such as number of supporters, training and support.
- To make recommendations based on information gathered on how best to improve the services.

Methods: Data was collected between October 2007 and January 2008 by trained fieldworkers using a structured questionnaire. TB nurses in health facilities and DOT supporters were interviewed to obtain informa-

tion on, DOT coverage at the clinics, patient database, cure rates, referrals, DOT register, patient records kept by DOT supporters.

Results: In total 30 TB health facilities were visited and 30 DOT supporters and TB nurses were interviewed. 14 facilities had case loads above 500 per annum, 20 had less than 50% of their patients on DOT, 15 had less than 60% of their trained DOT supporters active, 16 of them had defaulter rates above 10%. These are preliminary results; the questionnaires are undergoing more detailed analysis.

Conclusion: Looking at the cure rates and defaulter rates of these facilities and relating them to their DOT strategy reveals that there are areas that are lacking within the programme itself. More detailed analysis is in progress.

PS-81378-18 Plan to Stop TB in 18 high-priority countries in the WHO European Region, 2007–2015

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The WHO Regional Office for Europe (EURO) published in 2007 the Plan to Stop TB in 18 High-Priority Countries in the WHO European Region, 2007–2015, which focuses on: Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Romania, Russian Federation, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan. The Plan is intended to guide these countries in developing their own national plans on tuberculosis (TB), and serve as a reference for EURO and all other partners. It is the result of the joint efforts by Member States and the main international partners, thus, it is not the plan of EURO but everybody's plan. The Plan is the response to the Global Plan to Stop TB, 2006–2015, which raises concerns that eastern Europe may not achieve the Millennium Development Goal targets for TB by 2015. In the European Region as a whole, the Plan refers to the European Union for TB control and TB elimination in its Member States and also briefly considers in an addendum other countries which are not part of the European Union. The Plan describes the main TB challenges, opportunities, strategies and interventions. Annual milestones are proposed to monitor progress until 2010. The Plan anticipates that new TB diagnostic tests will become available in 2008 and be widely used by 2010. Similarly, new anti-TB drugs could be introduced in the Region by 2010. Consequently, halving TB prevalence and mortality in eastern Europe would be achievable by 2015.

The total cost of implementing the Plan is US\$ 14.8 billion. The funding gap is estimated to be US\$ 8 billion. A small increase—from 0.1% to 0.3% of total

government annual expenditure per capita for health—would fill this gap, providing that countries had the necessary political commitment. Nevertheless, the cost of the technical cooperation required would most likely not be covered and other resources would be needed for this task.

P5-81448-18 Laboratory strengthening in Donetsk Oblast, Ukraine: a pilot quality assurance project

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Background: DOTS expansion has proceeded slowly in Ukraine and the quality of smear microscopy for TB diagnosis is low. Lack of trained technicians, absence of the lab network and NRL, weak laboratory infrastructure, absence of quality assurance (QA) and supervision are among the major obstacles to achievement of high quality smear microscopy. An initial assessment revealed that less than half of lab technicians have formal training in AFB microscopy. In collaboration with WHO, Oblast Health Administration, and TB Hospital, PATH implemented laboratory strengthening efforts as part of broader USAID funded TB Control Project in Donetsk Oblast. Activities included: development of infection control and QA guidelines, training of health workers, purchase of microscopes and other equipment.

Methods: To assess laboratory performance, QA exercises were undertaken among 70 primary level oblast labs. Participants were provided with a control panel and two recording cards for the protocol and technicians were given one week to perform QA.

Results: 720 slides were prepared for testing and 27 errors were identified (6.4%). Most errors were either low false positive result (10 slides, 37% of all errors) or quantification errors (8 slides, 29.6% of all errors). Broken microscopes, staining problems, and inability to recognize AFB among technicians were key problems discovered in the assessment.

Conclusions: Political commitment at the provincial and national level is critical for laboratory strengthening. Lack of a national reference laboratory is a key obstacle in accomplishing a laboratory network. Financial and human resource shortages are also major gaps in the program.

P5-81474-18 Quarterly meeting of district laboratory supervisors: new initiative to strengthen microscopy network

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Introduction: In Pakistan district laboratory supervisors have been trained to carry out EQA of sputum smear microscopy performed in microscopy units. Quarterly meetings are held every quarter at district level and laboratory staff attend these meeting and slides are also collected for blinded rechecking in the same forum. However there was no regular mechanism of supervising district lab supervisors, analysis/feedback of routine laboratory performance and quality assurance activities by the higher level provincial reference laboratories. A new initiative supported by GFATM round-6 have been taken in which district lab supervisors will meet every quarter at provincial level for review of routine laboratory and EQA performance and identify centres with problem and to make plan/provide feedback of visit to centres with error.

Aim: To ensure quality assured diagnosis by regular surveillance laboratory performance through quarterly meeting of DLS and reference lab staff.

Design: Regular on going activity.

Results: First meeting of district laboratory supervisors were held at provincial reference laboratories. In a full day structured meeting, laboratory performance and EQA reports were consolidated by DLS and laboratory indicators analyzed, presented and discussed by the supervisors. Diagnostic centres in each district with problem were identified in small groups and visit plan of DLS was prepared under supervision of Reference laboratory staff.

Conclusion: In larger countries like Pakistan quarterly meeting provide good opportunities for reference laboratory to review laboratory DATA, discuss and, provide guidance and have interaction with DLS on regular basis.

P5-81475-18 Impact of EQA implementation on AFB positivity rate in follow-up smear

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Introduction: Pakistan is classified as a 6th high-burden TB country in the world. Accelerated DOTS expansion started in 2003 and 100% coverage of public sector was achieved in 2005. Number of laboratories performing sputum microscopy increased from less than 50 to more than 1000 during this period. In 2006 National QA guideline was developed and EQA by blinded rechecking was implemented in phase manner. Indicator which are commonly used to measure quality of laboratory services includes positive rate of suspect smears and follow up smears. Positivity of diagnostic smears is influenced by accessibility of TB diagnosis and treatment. While quality of smear examination is also affected but this is clear only in case of gross deficiencies of microscope, stains or examination. Positivity rate of follow up smears is

more clearly affected by quality of the laboratory. This is so because most of these smears have low numbers of AFB, which may also be more difficult to stain since they are damaged by treatment. Poor stains or staining, a bad microscope as well as superficial readings will all result in very low or zero rates. **Objective:** To assess the impact of EQA on quality of laboratory services by analyzing AFB positivity rate in follow up smears.

Methods: Analysis of lab performance of 77 diagnostic centres in 8 district of Sindh in which EQA by blinded rechecking was implemented in initial phase in early 2005. High number of major error including both HFN and HFP were reported initially which gradually reduced in number. With improvement in agreement rate a significant increase in positive rate in follow up smears was observed.

Results: Follow up positivity rate is sensitive indicator to measure quality of laboratory services and functioning EQA system.

PS-81519-18 Strengthening of EQA through DLS quarterly meetings in Punjab, Pakistan

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Introduction: Regular feedback on routine laboratory performance and quality assurance activities is an important perspective to strengthen EQA and ultimately AFB microscopy. Punjab is the biggest province of Pakistan with 90.0 million population, 490 microscopy centres and 35 districts. For Provincial Reference laboratory (PRL) it was difficult task to accomplish EQA without regular interaction with District Laboratory Supervisors (DLS). EQA system is now strengthened through a new initiative of regular quarterly meetings of PRL with District laboratory staff funded by GFATM.

Objective: To strengthen EQA system through quarterly DLS meetings.

Design: Retrospective analysis of 1st quarterly meeting in Punjab.

Results: EQA and Laboratory performance records were collected from 455 TB diagnostic centers of Punjab, Pakistan for Q4 2007, during DLS meeting. Average diagnostic slide positivity rate was 25.5%. Mean follow up slide positivity rate was 2.7%. 18 out of 455 diagnostic centers (3.9%) had no positive suspect. 36 (7.9%) diagnostic centers had low smear positivity rate i.e less than 5%. 340 (74.7%) diagnostic centers had 0% follow up slide positivity rate. 38 (8.3%) diagnostic centers had low workload i.e. less than 100 smears per quarter.

Conclusion: Regular feedback of performance of district and sub district TB laboratories through regular interaction with DLS will greatly facilitate Provincial

Reference Laboratory Punjab in planning supervisory visits by identifying various issues of diagnostic centers and assessing laboratory parameters.

PS-81528-18 An assessment of the gaps and capacity to provide community based TB-DOTS in Tororo district, Uganda

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Aim: Directly Observed Therapy Short course (DOTS) is the WHO recommended strategy for TB management. A Community-Based approach of DOTS is a pre-condition for a sustainable and cost effective TB programme. We assessed the gaps and capacity to provide Community Based-DOTS for management of TB in Mukuru HCIV, Tororo district.

Design: Cross-sectional, utilising qualitative methods.

Methods: We carried out key informant interviews with in-charges of health facilities, TB supervisors and TB community volunteers in order understand how CB-DOTS is being implemented and the barriers involved. Data was analysed manually.

Results: Enrollment of TB patients on CB-DOTS was reported to be still low, with less than 25% of TB patients on CB-DOTS. This was attributed to the sub-county health workers (SCHWs) not actively doing their work due poor facilitation. Funding was reported to have affected the implementation of the CB-DOTS, with the SCHWs failing to carry out their duties of supplying drugs and supervising the Community Volunteers (CVs). Some CVs also reported that they were facing a challenge of having to provide material support to their patients in addition to supervising the patient take their medicines.

Conclusion: These challenges facing SCHWs and CVs could inhibit the implementation and functioning of CB-DOTS. Thus there is need to motivate health workers and CVs for a successful CB-DOTS implementation. More research is also required to see factors that influence patient and volunteer adherence to CB-DOTS.

PS-81532-18 Who makes the best treatment supporter for tuberculosis? Outcomes of implementation of DOTS in Pakistan

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Aim: To evaluate which treatment supporter contributes best to good successful treatment rates. The specific objectives include to evaluate that the outcomes of treatment are equal or better for various treatment supporters and compare study outcomes

for all treatment supporters and know who is the best treatment supporter.

Methods: The adult smear positive patients registered in the first quarter of the study were included and Treatment Supporters from the groups were allocated randomly to each patient. Records of adult smear positive patients (TB01, TB07, TB08 and TB09) will be analyzed to assess the sputum conversion and outcome according to which treatment supporter patients have chosen. Evaluation of all the treatment supporters will be done through a comparative design.

Results: Of 245 patients registered 55% ($n = 136$) selected Lady Health Worker a community based health worker. 28% ($n = 69$) selected Supporters from NGOs. 3% ($n = 8$) from local councillors (Members of local government) and 13% ($n = 32$) selected Health facility staff. It was found that DOT by Lady Health workers have better treatment out come with less default.

Conclusion: Community based dots improve the trust and better treatment outcomes for TB patients.

PS-81575-18 Are pulmonologists in Serbia ready to carry out the programme of tuberculosis control?

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Background: Education of specialists for pulmonary diseases on tuberculosis (TB) has taken a prominent place in the 'Control of Tuberculosis in Serbia', the project carried out under the supervision of Ministry of Health and financed by GFATM. Pulmonologists have to play an important role in TB control in Serbia. **Objective:** To establish how much do pulmonologists really know about the basic features of TB, its transmission, paths, diagnostic criteria, treatment procedures and epidemiological relevance; does the pre-knowledge on TB depends on the working place or on the age of the pulmonologists; to define the improvement in their knowledge on TB obtained after the active training course on TB.

Methods: A questionnaire including 20 questions on basic TB features was given to the pulmonologists participating in this study prior and after the training course. The percentage of true/false answers was correlated to their working place (they were divided in three groups according to their working place mentioned above) and their age. The training efficacy was assessed by increased number of true answers in the post-questionnaire.

Results: The study included 626 pulmonologists at the mean age of 45 years, coming from the whole Serbia, who have completed the training course proposed by the Project. Pulmonologists are found not to have sufficient up-to-date knowledge on TB: false answers in the pre-test amounted to 31%. The active

training course they received has resulted in a significant improvement of their knowledge on TB (22% on the average). Pulmonologists working in dispensaries and those younger than 40 years of age had significantly higher percentage of true answers in the pretest (78% and 89%, respectively).

Conclusion: After an active training course on the main features of TB controle, pulmonologists in Serbia are ready to carry out the Programme.

PS-81581-18 Evaluating the performance of township microscopy centres in Shandong Province, China

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Setting: In China, the county TB dispensary is the basic unit of TB care and township hospitals are below the county and close to farmers. The Ministry of Health issued the national policy of setting up microscopy centres at 1/3 townships nationally to enhance patient access to TB care in rural areas.

Objective: To evaluate the performance of township microscopy centres and its effects on patient access to TB care.

Methods: All counties in Shandong who have implemented the policy filled a questionnaire. Then 8 counties were selected according to their microscopy centre performance (if >500 suspects checked in 2006) and geography type (plain/hilly). In each county, 30 TB suspects (1:1 for patients and symptomatics) were randomly selected based on records at county TB dispensaries and township microscopy centres. Questionnaire survey was conducted with 245 TB suspects.

Results: In 2006, a microscopy centre checked 38.5 TB suspects on average, and 66.4% microscopy centres did not identify any smear positive cases. Microscopy centres contributed 3.3% on smear positive identification in Shandong province; however, the contribution was much higher in counties with hilly areas (4.2%) and densely populated (4.1%). The average government input for identifying one smear positive patients through microscopy centres was USD479. Majority of sputum positive TB patients who went to the microscopy centres either did not have sputum check (72%) or was checked but not identified (18%). Patients who visited the microscopy centres had similar diagnostic delay and transportation costs compared with patients who did not visit there. Problems were identified as lack of training for clinical doctors, adverse effect of the incentives for sputum check and low laboratory workload.

Conclusion: Microscopy centres policy had no positive effects in Shandong where road accessibility is

good. Specific policy recommendations are given for revising the national policy.

PS-81611-18 Age and sex distribution among new smear-positive TB patients in Malawi

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Objective: To determine age and sex trends of new smear positive TB cases and its impact on TB control in Malawi.

Materials and Methods: Descriptive retrospective observational study in 26 districts in Malawi.

Data collection: Data for all new smear positive cases was collected from quarterly surveillance reports.

Study Period: 1st January to 31st December 2007.

Data under consideration: All new smear positive cases registered in all TB registration centres in Malawi from 1st January to 31st December 2007.

Results: More new smear positive cases were diagnosed with TB within the age group of 25–34 year (39%), followed by the age groups of 35–44 years (23%) and then 15–24 years (18%). Only 1% and 3% of new smear positive cases were diagnosed within the age groups of 65 years and over and 0–14 years respectively. There were more males than females diagnosed with TB in all the age groups, except age groups of 0–14 years and 15–24 years.

Conclusion: TB is still a very big public health problem in Malawi, as most cases are seen within the economically productive age group of 25–44 year of age. The Government needs to invest more in TB control for the better of our economy. Gender issues need to be incorporated in TB control in Malawi so that more females should also seek TB services just like males.

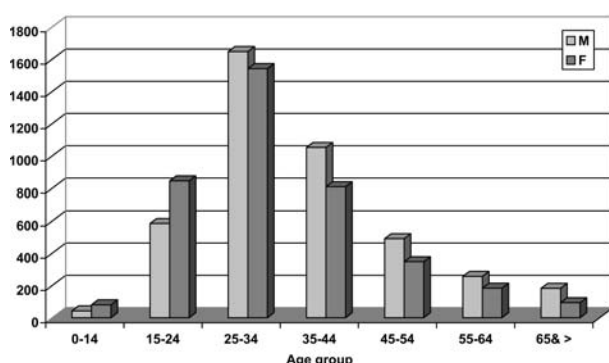


Figure Age and sex specific for new smear positive cases in Malawi (2007).

PS-81612-18 Gender differences in the economic burden on patients prior to starting TB treatment in Nepal

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Setting: Kathmandu valley, Nepal. The valley accounts for 7.2% of the national population and about 18% of estimated TB cases in Nepal.

Objective: To explain gender differences in the economic burden on tuberculosis patients prior to starting treatment.

Methods: Direct interviews, using a structured questionnaire, were conducted among 616 TB patients, who were enrolled at 37 randomly selected DOTS centres between January and August 2006. Direct medical cost (money spent on consultation, investigations, medications), direct non-medical costs (money spent on travel, lodging, food/special foods), indirect cost (loss of wages due to illness), and total costs (expenditure incurred under direct and indirect costs) were calculated. Incomes were calculated based on the information given by the patients.

Results: Of the 616 people interviewed, 379 (61.5%) were male and 237 (38.5%) were female. The mean total direct expenditure for male and female patients was Nepalese rupees (NRS) 1933 (US\$29.7) and 2306 (US\$35.5) respectively. They accounted for 34.7% and 57.1% of the mean monthly income for males and females respectively. Indirect costs were calculated only for 169 male and 70 female patients. The mean indirect cost was NRS 5555 (US\$85.5) for males and 6070 (US\$93.4) for females. The average total cost for males was NRS 4682 (US\$72) and 4381 (US\$67.4) for females. This cost represented 84.1% and 108.4% of the mean monthly income for male and female patients respectively. The mean frequency of visits to different health care providers before enrollment for DOTS was substantially higher in females than males (7.5 vs. 5.3).

Conclusions: Collaboration with different providers including private sector can reduce costs and enrollment delays. Public awareness programmes should highlight availability and high quality of DOTS services, and should include a gender variable.

PS-81630-18 Assessment of the practices in anti-tuberculosis drug management in Punjab Province, Pakistan

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Setting: Forty-four public TB centers and 18 private pharmacies in 5 districts.

Aim: To review the current practices in TBDM of the provincial TB control program and to measure TB drug availability in the private sector.

Methods: Documents and treatment record reviews, inventory checks and structured interviews.

Results: Fifty per cent of TB drugs listed either on the

national or provincial essential medicines list were included on the WHO Model Essential Medicines List. In 3 of 5 districts, the budget was allocated for TB drug purchase during the 2005 fiscal year. The dosage check list for TB drugs was available in 75% of the TB centers surveyed. About 74% of the TB patients reported receiving correct TB drugs in correct dosages. The proportion of the interviewees (community lady health workers, intensive and continuation phase patients, DOTS facilitators and medical doctors who prescribe TB drugs) who had correct knowledge about TB treatment ranged from 13% to 60%. Sixty-nine percent of the intensive phase patients and 78% of the continuation phase patients reported being observed by someone whenever they swallow TB drugs. The proportion of the drug storerooms, where the discrepancy between stock records and physical counts for all the TB drugs is $\pm 5\%$, was 25%. Stock-outs were observed for all the TB drugs in 8–42% of the storerooms on the day of visit. TB drugs were sold in 100% of the district private pharmacies surveyed, and in 83% of them, drugs were sold without a prescription. The treatment cost for TB drugs purchased in Pakistan private pharmacies was 1.3 times as much as the reference prices of the Management Sciences for Health and the Global Drug Facility prices.

Conclusion: An indicator-based TBDM assessment survey can measure the current situation and quality of DOTS, identify any weaknesses or changes in practice from the norm, and serve for training of TB service providers and storekeepers.

PS-81654-18 Factors affecting the implementation of RNTCP: experiences from rural Pune District, Maharashtra, India

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Setting: Two TB units in rural areas of Pune District in Maharashtra, India.

Objective: To identify factors affecting the implementation of the Revised National TB Control Program (RNTCP).

Methods: A cohort of 347 new TB cases registered with the RNTCP during May 2004–December 2006, was screened using WHO guidelines. Patients were selected using laboratory registers and treatment cards.

Results: Eleven per cent (37/347) patients presenting as new cases admitted prior anti-TB treatment for >1 month. Their erroneous categorization was attributable to a lack of screening for prior anti-TB treatment by the system, ambiguity in categorizing the case as 'new' or 'relapse' and patient's reluctance to disclose previous treatment details due to fear of refusal of treatment by the system. About 13% (45/347) patients clas-

sified as sputum negative in the laboratory registers at the time of screening, were found recorded as positive at month end during cross-checking; perhaps to achieve the given case-target. Further, 40% (138/347) patients reported having anti-TB treatment for more than a week in the private sector before approaching RNTCP, indicating their first preference for private doctors. Difficulty in accessing microscopy center (median distance = 8 kilometers; interquartile range 2–15 kilometers) was seen as a major reason for delayed diagnosis. Nearly 36% (43/119) patients mentioned about splitting of doses, inconsistent to RNTCP guideline. Here a lack of information about the method of tablet consumption, fear of intolerance and side-effect such as vomiting were reported as major reasons.

Conclusion: Effective TB control measures require re-orientation of health personnel to the above-mentioned factors.

POLICY AND PROGRAMME IMPLEMENTATION: OTHER-I

PS-81268-18 Operations research: managing second-line anti-tuberculosis drugs at MDR-TB treatment site level

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Background: Managing second-line anti-tuberculosis drugs (SLD) is a challenge to countries implementing MDR-TB control programs. Currently, most drug management courses focus on first-line anti-TB drugs and are directed to health professionals at central levels. Realizing this gap and with efforts to mainstream MDR-TB services in the Philippines' National TB Program (NTP), Tropical Disease Foundation (TDF) conducted an operations research on SLD management. **Objectives:** Enhance local health workers' capacity in managing SLD and determine discrepancies between delivery and inventory based on records and drug counts.

Process: In July 2007, tools and procedures on SLD delivery, storage, dispensing, retrieval and monitoring were developed and introduced to 10 MDR-TB treatment sites from 6 local government units (LGU) in Metro Manila. In February 2008, TDF and NTP Coordinators from the 6 LGU conducted a joint assessment where 26 local health workers were interviewed on the procedures and tools' functionality. Monitoring of SLD was conducted by comparing total deliv-

ery based on Delivery (Issue) Forms/Receipt Forms against total inventory through physical counts of drugs in storage bins and boxes, patients' drug intake reflected in Category IV treatment cards and SLD retrievals based on Internal Drug Return Forms.

Discussion: Treatment site staff understood SLD management. However, those that managed more MDR-TB patients experienced confusion and needed to be monitored more closely. Discrepancies were noted between total delivery and total inventory with discrepancy rates ranging from 0.1% (Ofx) to 16.9% (Cs). Possible reasons for discrepancy: delivery or retrieval error, inadequate or excessive dosing and packaging error.

Conclusion: Training of treatment site staff on SLD management is practical. Simple tools and procedures ensure uninterrupted SLD supply at local level and increase the absorptive capacity of the health system in MDR-TB management.

Summary table of delivery and inventory (per MDR-TB treatment site)

TREATMENT SITE	DRUG	TOTAL DELIVERY	TOTAL INVENTORY	BALANCE	DISCREPANCY RATE
MDR-TB Treatment Site A	Mfx	104	104	0	0.0%
	Pto	208	209	+1	0.5%
	Cs	208	209	+1	0.5%
	B6	416	417	+1	0.2%
	E	312	313	+1	0.3%
MDR-TB Treatment Site B	Mfx	342	360	+18	5.3%
	Pto	692	707	+15	2.1%
	Cs	692	809	+117	16.9%
	B6	692	688	-4	0.6%
	PAS	640	641	+1	0.2%
MDR-TB Treatment Site C	Mfx	104	104	0	0.0%
	Pto	208	207	-1	0.5%
	Cs	208	208	0	0.0%
	B6	208	208	0	0.0%
	PAS	208	208	0	0.0%
MDR-TB Treatment Site D	Ofx	624	637	+13	2.1%
	Pto	468	473	+5	1.1%
	Cs	546	549	+3	0.5%
	B6	468	471	+3	0.6%
MDR-TB Treatment Site E	Z	312	313	+1	0.3%
	Mfx	104	104	0	0.0%
	Cs	208	208	0	0.0%
	B6	208	208	0	0.0%
	PAS	208	208	0	0.0%
MDR-TB Treatment Site F	Ofx	795	796	+1	0.1%
	Pto	598	597	-1	0.2%
	Cs	599	594	-5	0.8%
	B6	597	597	0	0.0%
MDR-TB Treatment Site G	Mfx	111	110	-1	0.9%
	Pto	222	219	-3	1.4%
	Clr	210	208	-2	1.0%
	PAS	222	220	-2	0.9%
MDR-TB Treatment Site H	Mfx	111	111	0	0.0%
	Pto	222	221	-1	0.5%
	Cs	222	222	0	0.0%
	B6	222	211	-11	5.0%
	PAS	222	222	0	0.0%
MDR-TB Treatment Site I	Ofx	1,128	1,160	+32	2.8%
	Pto	612	625	+13	2.1%
	Cs	846	857	+11	1.3%
	B6	768	781	+13	1.7%
	PAS	156	156	0	0.0%
MDR-TB Treatment Site J	Mfx	170	152	-18	10.6%
	Pto	340	346	+6	1.8%
	Cs	340	347	+7	2.1%
	B6	340	343	+3	0.9%
	Clr	240	248	+8	3.3%

Notes: In the case of MDR-TB treatment site B, there was a mistake in the retrieval of Cs, of which 100 units were not reflected in the IDRF. This development would change the discrepancy rate from 16.9% to 2.5%. In the case of MDR-TB treatment site J, a box containing Mfx of 20 tablets was found by the treatment site staff on February 8, 2008; this was reported to the treatment center staff who made a visit on the same day. This development would change the discrepancy rate from 10.6% to 1.2%.

PS-81287-18 Evaluation of implementation of paediatric TB management guidelines in ten districts

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Aim: National TB Control Programme planned an evaluation of implementation in order to get first hand knowledge of the status of implementation.

Design: Evaluation design. A combined approach, using both quantitative and qualitative data analysis was applied. A quantitative analysis of monthly reporting forms and a quantitative and qualitative review of key project documents/reports, interviews with field personnel submitting data and consultative workshops with key implementers and stakeholders were adopted. Interviews with GF Project staff, to share their experiences and views were also conducted.

Methods: The activity was conducted through an independent consultant To assess Project implementation in the Programme's perspective, assistance of a provincial TB Control Programme officer was taken as an independent observer.

Results: Out of a total of 169 721 pediatric patients presenting in medical OPD 2812(1.7%) were suspected of TB. 24% children suspected of TB had a positive history of contact. Seventy-two percent (694/998) cases had a defined age group 59% were below 5 years age. Among the diagnosed cases with specified gender 55% were males. Eighty-seven percent (867/998) had pulmonary, 11% extra-pulmonary and 2% unspecified TB. This distribution is slightly more than that reported (>75%) in literature. National TB Control Programme procured and distributed PPD to the pilot sites. Out of total suspects identified 84% of suspects had PPD pilot sites. Out of total suspects identified 84% of suspects had PPD testing done.

PS-81344-18 MDR-TB in the National Institute of Diseases of Chest and Hospital, Dhaka, Bangladesh: an insight analysis

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Introduction: The response to the call for information about MDR-TB patients, together with the observation that all but two HBCs plan to introduce appropriate MDR-TB management within two years, shows that the National TB Control Programs are beginning seriously to address the problem of drug resistance. The Global Plan, the new Stop TB Strategy, the 2005 World Health Assembly resolution on sustainable financing for TB Control and the new International Standards of TB Care has all encouraged countries to expand their monitoring, diagnosis and treatment programs for drug resistant TB. The National TB Control Program Bangladesh planned to initiate DOTS-Plus

Project from this year at the National Institute of Diseases of Chest and Hospital, Dhaka. However the National Institute of Diseases of Chest and Hospital, Dhaka has started implementing management of MDR-TB since 1998.

Objective: To analysis the outcome of MDR-TB being registered and treated by the National Institute of Diseases of Chest and Hospital, Dhaka.

Methods: Cohort analysis of enrolled MDR-TB patients by the National Institute of Diseases of Chest and hospital, Dhaka.

Results: MDR-TB management started since 1998. Separate block introduced since January 2002. Total beds 47; males: 34 and females: 13. Intensive phase 6 months with kanamycin, pyrazinamide, ethionomide, ofloxacin/ciprofloxacin and ethambutol and the continuation phase 18 months with ethionomide, ofloxacin/ciprofloxacin, ethambutol and pyrazinamide. Till 2007, 290 patients registered for treatment; 130 were cured (44.8%); presently 81 are admitted, 32 getting ambulatory treatment, 12 failed to treatment, 15 defaulted, 20 died. Details will be presented.

Conclusion: The National TB Control Program Bangladesh has intensified its 2006–10 Strategic Plan and gave priority to this challenging area and is expected to treat 700 MDR-TB cases within the next 5 years approved by Green Light Committee.

PS-81374-18 Response to tackle tuberculosis in the WHO European Region

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To strengthen commitments to improving tuberculosis (TB) control, the WHO Regional Office for Europe, in collaboration with partners, held the WHO European Ministerial Forum 'All against Tuberculosis' in Berlin, Germany on 22 October 2007, hosted by the Government of Germany. Over 300 participants attended the Forum, including 20 health ministers and high-level decision-makers from 49 of the 53 Member States (MS) in the WHO European Region (EUR), along with representatives from various organizations. Objectives of the Forum were:

- to strengthen political commitment to implementing the WHO Stop TB Strategy throughout the Region and include high-quality TB control in the strengthening of health systems
- to strengthen commitment from all MS to ensuring full and appropriate financing of TB control in line with World Health Assembly resolution WHA 58.14 on sustainable financing for TB prevention and control
- to adopt a European regional declaration on TB
- to endorse the Stop TB Partnership for Europe.

The most important outcome of the Forum was the

endorsement of the Berlin Declaration. It is recognized that TB is a health security threat in EUR and it is therefore crucial to strengthening political and financial commitment to reach the global targets for TB control as well as to establish adequate fora and mechanisms to assess progress in EUR every 2 years starting from 2009.

The next steps to take in order to respond on Berlin Declaration are to strengthen:

- TB control within strengthening health system and MDR/XDR-TB interventions
- advocacy, communication and social mobilization including empowering people with TB and affected communities
- multilateral partnerships (high level advocacy, national movements, civil society, etc.)
- fundraising through different mechanisms: TGF, EC, UNITAID, etc.
- better use of the current effective tools for TB control
- basic and applied research on new diagnostics, treatment and prevention tools.

PS-81375-18 Implementation of guidelines for difficult complicated adult TB cases

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Background: In the management of tuberculosis, health care providers at primary health care centers (PHC) maybe unable to take decisions and thereby refer the patient. National TB Control Programme, with GFATM Grant support, developed and implemented guidelines to manage such cases.

Objectives:

- To reduce over diagnosis and diagnostic delay of smear negative cases.
- To standardize management of extra pulmonary tuberculosis cases, adverse reactions to ATT, cases with complications and in special situations.

Implementation methodology: Included development of guidelines, trainings of chest specialists of secondary level care facility and doctors of PHC diagnostic centers on referral followed by use of suggested protocols. Implementation was evaluated and guidelines were revised.

Results: Out of the difficult to diagnose cases, 74.46% were diagnosed on CXR. Gastric lavage contributed to diagnosis in 47 patients. Repeat sputum microscopy confirmed diagnosis in 6% cases. Out of 1039 extra pulmonary cases, 30% presented with TB lymphadenitis. 59.42% were diagnosed on FNAC and 42% on excision biopsy. 464 (47%) had pleural effusion, confirmed by a pleural tap. 5.5% cases were with adverse reactions and 1.7% with special situation. Regarding referrals 14.39% patients came from PHC and 72.93% were self-referred. After management, 77.63% cases registered at DHQ, 19.05% were referred to PHC. Only 3.3% were referred to tertiary care facilities.

Conclusions: Chest specialists were sensitized to evidenced based diagnoses. Despite limited resources, there is commitment to practice advised protocols. However, the qualities of data, referral mechanisms need improvement.

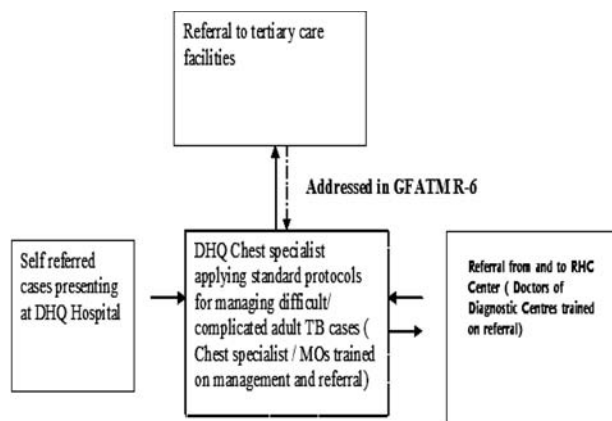


Figure The process of implementation.

PS-81414-18 Implementation of guidelines for the management of childhood tuberculosis: a process evaluation

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Background: The diagnosis of TB in children requires careful assessment of evidence derived from history, clinical examination and relevant investigations. National TB Control Programme, with GFATM support, developed and piloted childhood TB management guidelines in ten districts of Pakistan. An independent process evaluation was conducted after a year of implementation.

Objectives: The main objective was to get first hand knowledge of the status of implementation.

Evaluation design: A combined (quantitative and qualitative) approach was used.

Results: Out of total 169 721 children presenting in medical OPD, 2812 (1.7%) were suspected of TB. 24% of suspected children had a positive history of contact. 35% of suspects were diagnosed as TB. Majority of diagnosed cases were of Pulmonary TB. Fifty-nine percent of diagnosed cases were below 5 years age and 55% were males. Eighty-four per cent of suspects had PPD testing done. Out of these 14% were PPD positive. The sputum smear positivity was 9% and 46% CXR done were suggestive of TB. Majority of the clinicians and programme person's feedback was that a standardized protocol for diagnosis and management of pediatric cases is in place through this guideline. The major issue was the non-availability of pediatric anti TB drugs.

Conclusions: Pediatricians have started using evidenced base diagnoses. Non-availability of pediatric

preparations, PPD are the main reasons for decreased involvement of pediatricians in TB Control. Present NTP recording reporting formats need revision to clearly highlight pediatric TB case load.

PS-81422-18 Lung health, air pollution and transport

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The problem: One of the greatest causes of poor lung health is urban air pollution, which is mostly caused by fuel-dependent transport. The more polluted the city, the more lung disease in the population. Those living closest to major roadways suffer from substantial deficits in lung function. Air pollution from motor vehicles is associated with asthma, lung cancer, and premature death. Without significant reductions in car and truck use, other measures to improve lung health will be palliative at best.

Solutions: Many car trips are of such short distances that they could easily be replaced by foot or bicycle. Substantial improvements in air quality in most cities could occur if short car trips were replaced with active transport and if most freight were moved by rail rather than truck. People often prefer to drive due to a poor environment for active transport. Conditions should be improved for those on foot and bikes, by reducing speed limits for cars to improve safety, providing grade-separated cycle lanes, ensuring and improving sidewalks, and giving pedestrians priority at all street crossings, as in Switzerland and Sweden. Policies to promote rail should also be encouraged. Economic measures to address the problem include the recent decision to charge the most heavily polluting trucks £200 a day to enter Greater London's Low Emission Zone. Economic measures can also reduce car use, for instance by charging significant amounts for car parking and thus further discouraging car use. Economic and policy measures to reduce car and truck use and thus reduce air pollution should be supported by all those seeking to improve lung health.

PS-81443-18 Evaluating an intervention to reduce delay in pulmonary tuberculosis diagnosis

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Introduction: Identifying potentially infectious patients as early as possible has long been accepted as an epidemiologically sound method of limiting TB transmission. Despite this, in Catalonia 60% of pulmonary tuberculosis (PTB) patients with positive sputum smears for AFB remained undiagnosed more than

30 days after the onset of symptoms being a considerable room for diagnostic improvement. A project aimed to reduce TB patient and health care delays was designed with a before and after type of evaluation component incorporated in its design. The objective of the before-intervention phase was to determine the extent and components of TB diagnostic delay and to assess factors associated with it.

Methods: Study population included confirmed PTB patients with positive sputum smear for AFB who initiated TB treatment between 1 January and 30 June 2007. Patients were interviewed to ascertain the date of onset of symptoms, as well as the date, place and diagnostic procedures undergone during their first health care contact. Information collected in the case report form for TB surveillance was linked. 'Patient delay' and 'Health care delay' were defined as the number of days from the first consultation with a medical provider and the number of days from the first consultation to the initiation of treatment for TB respectively. Median delays associated with all covariates were calculated.

Results: 236 patients were interviewed. Median total delay was 63 days, median patient delay was 25 days and median health care delay was 16 days. Greatest delays were occurring among patients who first contacted private primary care physicians.

Conclusion: TB diagnostic delay can be reduced with comprehensive interventions. Monitoring diagnostic delay and evaluating the efforts to reduce it can be integrated in to the TB surveillance system.

PS-81476-18 TB drug use study in Tajikistan

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Setting: Tajikistan started DOTS implementation in 2002, supported by Project HOPE and USAID. By autumn 2007 the whole country was covered. So far a treatment success rate of 85% and a case detection rate of 38% have been achieved. The standard formulation used for 1st line anti-TB drugs is a 4-drug fixed dose combination (4-FDC).

Objectives: To assess TB drug prescribing and dispensing practices. We assessed regimens and dosages, regularity of treatment intake, adherence to DOT and cost implications for patients.

Methods: Cross-sectional study based on review of records and interviews with 212 new TB patients randomly sampled among those registered in 2007, in accessible rayons implementing the DOTS strategy.

Results: Of 212 new TB patients assessed, 211 (99.5%) were prescribed an adequate intensive phase regimen, 61 among those (29%) were prescribed an additional (5th) first line drug. Dosages prescribed were adequate; only 3 patients (1.4%) were on too low a dose of any drug. Three patients (1.4%) were prescribed 2nd line anti-TB drugs. Interruptions of 3–7 days were

observed in 17 cases (8%), interruptions of more than 8 days in 5 cases (2.3%). 98 patients (47%) had received anti-TB drugs to take home. On average 7 non-TB drugs were prescribed per patient, average patient expenditure on these drugs was US\$46.

Conclusion: Treatment regimens prescribed are adequate, probably related to use of 4-FDCs. Treatment is dispensed regularly but DOT is poorly adhered to. Patients incur substantial costs as a result of being prescribed additional non-TB drugs.

PS-81499-18 Improving TB pharmaceutical management with individualised treatment kits: Paraguay and Bolivia case studies

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Setting: Tuberculosis (TB) treatment suspension can lead to higher default rates, contributing to the development of multidrug-resistant tuberculosis (MDR-TB). A TB kit is a box assembled for each patient before beginning treatment, which contains all the medicines needed to complete the full treatment course. Although it has been assumed this strategy simplifies inventory management, guarantees an uninterrupted supply of TB medicines, and improves patient adherence, no studies document these effects. To address the growing threat of MDR-TB in Paraguay and Bolivia, the South American Infectious Disease Initiative supported pilot testing the TB kit strategy in Asuncion, Paraguay, and Santa Cruz, Bolivia.

Objective: To determine the effect of TB kits on facility-level management of TB medicines.

Methods: Data for epidemiological and pharmaceutical management indicators were collected by reviewing records, assessing medicine inventories, and interviewing patients and TB managers. In Paraguay, a cross-sectional study compared 21 DOTS health centers implementing the TB kit strategy to 21 control DOTS health centers not using kits. In Bolivia, a nine-month pre-post TB kit observational study was performed in 54 DOTS health centers.

Results: TB kit use was correlated with: improved TB medicine inventory management systems, fewer stock-outs and treatment suspensions, better informed patients, and higher treatment adherence rates (although other factors may have also contributed to this finding).

Conclusion: TB kits improve TB medicine pharmaceutical management, ensure an uninterrupted medicine supply, minimize loss due to expiration, and are a valuable patient education tool. These studies suggest TB kits increase treatment adherence rates, contributing to improved TB cure rates and better control of MDR-TB. This research documents TB kit implementation in Paraguay and Bolivia and makes recommendations for applying the intervention at the provincial or national levels.

PS-81501-18 DOT for TB according to the geopolitical historical context, Sao Paulo State counties, Brazil

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Setting: The sustainability of the DOT is directly related to the geopolitical historical context of Brazilian counties.

Objective: To analyze the implementation of DOT in the main counties of the State of São Paulo (Bertioga and Ribeirão Preto) 1998–2004.

Methods: For the data research, secondary sources were used—State Data Systems (EPI-TB and SEADE).

Results: The results indicate that one could notice that the larger populated counties have a larger autonomy, structural/management/regulation/institutional capacity. Smaller counties have a lower stability of the human resources and qualification for the management functions. In relation to the social vulnerability one could identify that the larger populated counties have a higher capacity to offer social protection to its population.

Conclusion: The nature and the singularity of the counties in relation to the vulnerability aspect and the socio-economic standard/life cycle attributes to these proper particularities that should be considered by the management. One has to consider the reality for counties that present medium and high vulnerabilities and low wealth indicators deserve a differentiated outlook in the negotiations of health actions. It should be noted that the social participation should be intensified for all the health policies and specially the TB control through the creation of permanent nets/forums of education/discussion and the increase of the digital inclusion process so that the information flows more rapidly.

PS-81504-18 Stakeholder perceptions of existing and new first-line regimens for drug-susceptible tuberculosis

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Aim: The design and adoption of new tuberculosis (TB) regimens requires a close understanding of the opinions of those who approve, prescribe and receive TB treatments: what they like and dislike about cur-

rent regimens and what they would value, tolerate, or reject with regard to a new, shorter regimen.

Methods: To assess these opinions with regard to first-line regimens for drug-susceptible TB, we conducted interviews with 211 stakeholders in Brazil, China, India, Kenya, and South Africa—five countries with high TB burdens—as well as with 11 global stakeholders working in TB prevention and control.

Results: The efficacy, safety and side effects of current regimens were generally judged to be acceptable. A treatment frequency of five to seven days a week was common for current regimens and preferred for new regimens, with some exceptions in China and India. Avoiding interaction with antiretroviral drugs was a significant priority for African and global stakeholders, as was the availability of fixed-dose combinations (FDCs) in all but China and the Indian public sector. The potential for a shorter (four or two month) regimen was positively received, with the exception of some stakeholders in China. Policy-makers and program managers in other countries listed several acceptable trade-offs for a shorter regimen, including increased drug costs. For adoption of a new regimen, stakeholders said they would require data including results from trials in their own countries (for Brazil, China, India, and South Africa) and the analysis of efficacy data for various subgroups, including patients co-infected with HIV and TB.

Conclusion: Stakeholder feedback provides a guiding framework for the development of new TB drugs, but the diversity of those opinions underlines the challenges ahead and the need for continued exchange of data and information.

PS-81510-18 Analysis of implementation effects of tuberculosis control project from 2001–2006 in Qinghai province

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Aim: To analyze the implementation progress of TB control project in Qinghai province, find the problems and constraints and to provide the suggestions for the future TB control sustainability.

Design: Retrospective research.

Methods: Collected and analyzed the epidemiological materials of quarterly and annual reports and financial reports from project units during 2001–2006 in the whole province.

Results: Since 2005, the coverage of DOTS with a county as a unit reached to 100% in Qinghai. There were total 10 637 smear-positive TB cases who were detected and provided with free treatments for TB during 6 years. The new smear-positive pulmonary TB detection rate reached and maintained and maintained above 73%, cure rate reached to 90.5%. The counterpart fund for TB control increased annually.

Conclusion: Through extending the optimal strategy of DOTS in TB control in Qinghai province, the government, the case management, detection and cure rate are obviously strengthened and improved.

PS-81595-18 Implementation of HRM, appraisal report 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 2006–2007.

Methods: NTP Pakistan is mixture of Government, WHO and several NGO employees working under one roof and supervision of National Manager. Ministry of Health is authority of approvals, instructions and monitoring activities.

Key Findings: NTP Pakistan has implemented DOTS program all over Pakistan. Expansion and development of comprehensive strategy for PPM DOTS, Quality assured sputum smear microscopy are main challenges but HRD is one of key challenge. Management and leadership development programs need to be implemented.

Conclusion: Professional hiring and retaining trained staff and justified professional trainings, performance based increase will increase the output of an employee. In experience microscopist increases their performance by providing professional trainings and better incentives. HRIS is implemented, Retain trained staff. Mostly the components of HRD started to implant in Central and provinces level. Organization mission goal is clear for all employees; Annual Confidential Reports for Govt. employees already exists. But there has been no system setup for establishing appraisal report and appraisal review process for non governmental staff hired on annual contract basis. It needs to be devised and implemented. The HRM management personnel require proper orientation how to generate and sustain the process.

PS-81596-18 Progress of Nepal DOTS Plus programme on completion of two years and key challenges faced by NTP and patients

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Objective: To review the progress of the DOTS PLUS pilot project on completion of two years and to determine key challenges faced by NTP and patients.

Background: The Nepal National Tuberculosis Control Programme started GLC approved DOTS PLUS PILOT project in September 2005 using standard

treatment regimen. Project started initially in 5 treatment and 16 Sub centres covering all Regions of the country.

Methods: Standardized treatment (kanamycin, ethionamide, cycloserine, pyrazinamide, ofloxacin) is offered for Category 2 failures and other culture demonstrated multidrug 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 of August 2007, 343 patients were enrolled. Initial treatment results show 245 patients have completed 6 months of second-line drug treatment, 80% are smear and culture negative, 5% remain smear or culture positive, 4% died, 7% defaulted, and 4% do not have full culture and smear data. DOT is performed at five DOTS-plus centers and 21 DOTS-Plus sub-centers. Key challenges observed during the initial two years are lack of socio economic support for patients e.g. cost of transportation, food and accommodation which may result in increased default rate. Another key issue is the 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.

PS-81600-18 Introduction of mSupply stock management software at Nepal National TB Centre

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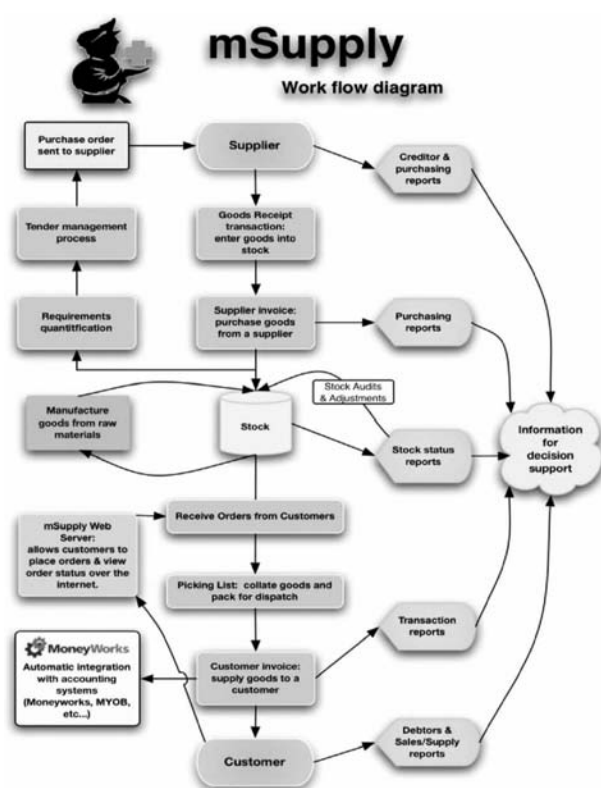
Objective: To share experiences of introduction of computerized TB stock management at Nepal NTC.

Introduction: NTP was using paper stock management tools till 2007. With introduction of MDR-TB management programme and pediatric TB drugs stock management has become complicated and requires revision. NTP introduced computerized stock management software 'mSupply' software with GDF support. **Methods:** mSupply stock control software was selected due to suitability for pharmaceutical products and ease of use. Standard Operating Procedures were written to ensure consistent and correct handling of stock issues e.g. creating purchase orders, receipt of goods. mSupply software was installed, products, customers and suppliers were created and stock data were entered. Two day training of staff on mSupply was conducted.

Results: Installation and setup of mSupply was done in February 2008. mSupply offers all functionality needed by NTC. mSupply ensures stock issued are ac-

cording to First Expiry First Out. As transactions are recorded in mSupply, there is instant insight in the stock and consumption, allowing easy and accurate reporting. Two most common transaction types in mSupply are supplier invoice and customer invoice. These transactions record stock purchases from suppliers and stock supply. mSupply records full audit trail by allowing stock adjustments through a transaction. Given an opening balance of stock mSupply can show series of transactions that result in recorded closing stock.

Conclusion: mSupply stock control software offers all functionalities for stock management. A relatively short training is sufficient to enable staff to use mSupply and generate/export wide range of stock reports.



TB-HIV PROGRAMME LINKAGES-I

PS-81328-18 Engaging the private health care sector to provide TB and integrated TB-HIV services in Tanzania

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Introduction: Integrating TB and HIV services is critical to meeting the healthcare needs of people throughout Sub-Saharan Africa. The National TB/Leprosy Programme (NTLP) and the Program for Appropriate

Technology in Health (PATH) are collaborating to engage the private health care sector as a key strategy to achieve global TB targets and the Millennium Development Goals.

Approach: Private sector providers were engaged through collaboration with the Association of Private Health Facilities in Tanzania (APHFTA) and NTLP. With support from PATH, the partners introduced integrated TB-HIV services in facilities with existing TB clinics. In facilities without TB services, the partners introduced TB services as a stepping stone for TB-HIV integration.

Successes: In 2006, PATH and APHFTA signed a memorandum of understanding. Soon, the NTLP will sign a similar MoU with APHFTA for provision of TB services. A total of 56 private facilities provide TB and integrated TB-HIV services and 97 private sector health workers were trained on TB and TB-HIV through the collaboration. A total of 4437 new TB patients received care, representing 31.6% of all TB clients seen in PATH-supported districts from October 2006 to September 2007.

Challenges: Two key challenges include a weak HIV test kit procurement and distribution system and lack of a service agreement between NTLP and private sector to compensate private providers for TB services.

Lessons learned: The contribution of the private sector is significant and cannot be underestimated. Involvement of an umbrella private sector organization expedites introduction and scale-up of TB and TB-HIV services. A private sector strategy for TB and TB-HIV is essential for organized private sector engagement, and experience-sharing between private and public sector health workers improves quality of services.

PS-81359-18 Diagnostic counselling and testing in TB patients: successes and challenges in a resource-limited setting

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Introduction: Tanzania ranks 14th among 22 high TB burden countries globally; about 50% of newly diagnosed TB patients are HIV positive. Given this rate of co-infection, the National TB and Leprosy Programme (NTLP) initiated collaborative TB-HIV services at three pilot sites in 2005 as a step towards introducing and scaling up the services throughout Tanzania.

Successes: In 2006, the Program for Appropriate Technology in Health (PATH) in collaboration with NTLP and Association of Private Health Facilities in Tanzania (APHFTA) introduced and scaled up Diagnostic Counseling and Testing for HIV (DCT) as part of integrated TB-HIV services in four regions with PEPFAR

funding. From October 2006 to September 2007, 13 996 TB patients were offered DCT in 140 TB clinics and 9416 (67.3%) were tested. Uptake gradually increased from 57% to 72% from the first to the last quarter with staff training and as the intervention was rolled out to additional service outlets.

Challenges: Key challenges included resistance by some health workers to accept DCT as a standard procedure comparable to VCT, human resource shortage, lack of physical space for DCT, erratic supply of HIV test kits and absence of staff trained on DCT at DOT centers. Lack of free HIV test kits in private facilities has forced patients to seek counseling and testing services in public sector or to not test for HIV at all. **Lessons learnt:** Frontline workers are supportive and can provide DCT but they need to be well sensitized. Group counseling facilitates acceptance of DCT; most TB patients accept DCT since HIV/AIDS care and treatment services are available and individuals on ART respond very well and influence others to be tested. A robust procurement and distribution system of HIV test kits is essential. DOT centers can provide testing for patients who 'filter' through diagnostic centers untested.

PS-81521-18 A cohort analysis of patients on TB treatment in Tororo district, Uganda

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Aim: Understanding the functioning of a TB program is very crucial more so in the era of HIV/AIDS. We carried out a cohort analysis of TB patients in Mukuru Health sub-district.

Design: Retrospective cohort.

Methods: Records review using TB registers and reports was carried out for all the quarters for 2005 and 2006. Data was collected on number of patients who enrolled on CB-DOTS, new smear positive, who were cured, completed treatment, defaulted, died and those who were counselled and tested for HIV in each cohort. The data was analysed using excel.

Results: No patients were registered as enrolled on CB-DOTS. The proportion of smear positive was 63% overall. Data on cure rates was lacking. Lack of records on cure rates was partly attributed to lack of laboratory services at lower health centres i.e. HC IIIs where majority of TB patients are treated and when referred to high levels for sputum exam at the end of treatment, where they are lost for follow up. Treatment completion was 63%, default rate of 30% and death rate of 8%. The proportion of TB patients Counsellor and Tested for HIV was 17%.

Conclusion: Lack of records on cure rates and a low proportion of TB patients counselled and tested for HIV calls for support to health centre IIIs to do spu-

tum exam and HIV counselling and testing by training staff and equipping the laboratory at this level.

PS-81541-18 The costs of TB-HIV care at public health facilities in Tanzania

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Objectives: The incidence of tuberculosis (TB) among HIV positive patients has risen over the past years in Tanzania. To respond to the dual nature of the TB-HIV epidemic, TB-HIV services were initiated in Tanzania in 2006 in three pilot districts. Following lessons learned from the ProTest initiative in Southern Africa health facilities in these districts implemented a range of activities to decrease the burden of HIV among TB patients and activities to decrease the burden of TB among people living with HIV. However to-date there is no accurate and reliable information on the costs of providing TB-HIV services and on the cost to access and use these services. This study presents a comprehensive analysis on the costs of providing and accessing TB-HIV services in the public sector in Tanzania.

Methods: Costs were assessed from the perspective of the health care provider and the household. Data on providers' costs were collected retrospectively from 6 TB-HIV pilot sites using a combination of bottom-up costing and standard step-down costing methodology. Direct and indirect economic costs incurred by the patient were assessed using a structured questionnaire administered to approximately 450 respondents. Direct costs include treatment and transportation costs, while indirect costs represent the loss of income. **Findings:** The study estimated the cost per inpatient day, outpatient visit, voluntary counselling and testing, intensified case finding for TB, cotrimoxazole and isoniazid preventive therapy. Costs incurred by the patient prior and during treatment are also presented. **Next steps:** The unit costs from this study are essential for comprehensive planning and budgeting of TB-HIV services and will be used to estimate the resources required to implement and scale-up TB-HIV interventions nationwide. An understanding of the costs incurred by the patient will provide information on improving access and adherence to TB-HIV services.

PS-81552-18 Quality improvement in TB-HIV programmes in South Africa in the face of severe human resource constraints

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Setting: The escalating HIV epidemic within South Africa (SA) has been further complicated by the emerging dual epidemic of HIV-TB co-infection. Within this context, integration, capacity building of existing staff and supervision remain essential to successful implementation of TB and HIV programs in resource-constrained countries such as SA.

Objectives: The University Research Co.LLC works with the Department of Health to expand quality of care and support initiatives for TB and TB-HIV programs at a national level and in five provinces in SA.

Methods: URC staff provide ongoing technical assistance and mentoring to health facility staff, thereby enhancing TB-HIV screening, referral, diagnosis, and treatment programs. A focus on utilization of continuous quality improvement methodology to improve health care worker knowledge regarding the management of patients infected with TB and TB-HIV coupled with onsite infection prevention and control skills development has ensured rapid scale-up of integrated services.

Results: These measures have provided opportunities for review of programmatic data, as well as identifying key quality gaps at health facility level. Data from supported areas indicate improvements in successful TB treatment outcomes by at least 15%, with a 10% defaulter rate reduction, an increase in TB screening of HIV-infected patients by 50%, an increase in HIV screening of TB patients by 30% and an improvement of 45% in ART referrals for co-infected individuals.

Conclusion: Utilization of existing staff, despite a rapidly expanding TB and TB-HIV program is essential if scaling up of quality improvement initiatives is to be replicable and sustainable. Reorganization of services and capacity-development of staff working in these programs further enhances integration and augments efforts towards infection prevention and control.

PS-81665-18 Challenges of reducing burden of tuberculosis in people living with HIV

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Background: The WHO policy on TB-HIV collaborative activities recommend that TB screening be offered to all HIV positive clients in order to reduce the burden of TB in HIV Positive individuals. The ZAMSTAR study, a community randomised trial to reduce the prevalence of tuberculosis in 24 communities in Zambia and South Africa aims to deliver improved TB-HIV collaborative activities in its study sites.

Methods: We evaluated the VCT at two ZAMSTAR intervention areas in Choma District of Zambia, which comprises two communities. Shampane predominantly urban with a population of 23 397 and Pemba

is rural with a population of 34 784. The HIV prevalence in the two communities is 18.7% with TB notification rate of 975/100 000 and 280/100 000 for Pemba and Shampane, respectively.

Results: Shampane community in 2007 tested 1177 people of which 358 (30%) were HIV positive, 40 (11%) were screened for TB and 11 (27.5%) were diagnosed with TB, while at Pemba, 2422 were tested 474 (19.6%) were HIV positive 80 (16.9%) were screened for TB and 6 (7.5%) were diagnosed with TB.

Discussion: Little attention has been given to TB screening of HIV positive clients. It remains an area that can give good yields in TB case finding. Data collection tools have not been routinely implemented for VCT or PMTCT programmes and so it is difficult to collect the data and also to ensure that it is being done.

Conclusion: Improved TB screening at VCT and PMTCT units in the health facilities can improve TB case detection rates by providing data collecting tools.

PS-81675-18 Evaluation of integrated management of adolescent and adult illness guidelines for TB-HIV co-management, Ethiopia

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Background: Tuberculosis (TB) is one of the most common opportunistic infections in HIV-infected individuals, and the leading cause of HIV-related mortality in Ethiopia. WHO has developed simple, standardized guidelines for integration of HIV care and treatment into health systems known as Integrated Management of Adolescent and Adult Illness (IMAI), which include TB screening, diagnosis and referral for TB treatment as part of routine care at first-level health facilities. Globally, and in Ethiopia, cotrimoxazole preventive therapy (CPT) is recommended for all HIV-infected TB patients, and antiretroviral therapy (ART) for those with CD4 < 350 cells/ μ L. Hospital-based ART clinics in the Southern Nations, Nationalities, and Peoples Region (SNNPR) of Ethiopia have recently seen implementation of IMAI guidelines, but the impact of these guidelines has not been assessed.

Methods: We retrospectively evaluated TB screening among patients attending ART clinics at all 16 hospital-based ART clinics in SNNPR. Data were collected from medical records for all patients enrolled in care from September 2006 through March 2007. We determined whether, as of January 2008, patients were assessed for TB with symptom screening, chest radiography, or

sputum smears; and if diagnosed with TB, whether they were registered for TB treatment; and whether they received CPT and ART.

Results: Data were collected for 3349 HIV-infected persons, of which, TB was diagnosed in 591 (18%) HIV-infected persons. Of the patients with HIV and TB, 472 (80%) were receiving (CPT) and 397 (67%) were receiving ART. Detailed results on TB screening, TB treatment practices and outcomes are pending.

Conclusions: In Ethiopia, TB screening in HIV-infected persons using IMAI guidelines has a high yield. Additionally, uptake of CPT and ART in this routine programmatic setting was high. Further analysis will be available to describe TB treatment practices and exact methods of TB screening.

PS-81812-18 Du projet pilote au passage à l'échelle : l'expérience de la prise en charge des patients coinfectés TB-VIH

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Contexte: Projet IHC de L'Union, dont une composante vise l'identification de mécanismes de passage à l'échelle et de financement des coûts récurrents de l'intervention.

Méthodes: Fourniture d'un paquet VIH standardisé construit sur le modèle DOTS. A chaque obstacle les contraintes sont analysées par les partenaires et les leçons tirées.

Résultats: Depuis mi-2006, 3931/4215 (93%) tuberculeux ont accepté le test VIH et 15% étaient séropositifs. 98% ont bénéficié d'une prophylaxie au CTM et 47% d'un traitement antirétroviral. La survie à 1 an sous ARV est de 75%, et à 2 ans de 48%. Les résultats arrêtés fin 06 2008 seront présentés. L'approche IHC a été retenue par la Banque mondiale pour la révision de la programmation nationale du MAP.

Discussion: Dans un état fragile, un modèle de couverture VIH reposant sur des ONG aboutit à une perte de l'indispensable leadership du Ministère de la santé. Un financement par projets sape la viabilité d'un programme national. Déjà implanté, le PNT offre une porte d'entrée et des solutions adaptées en termes de paquet, technologie, logistique, et système d'information. Il peut servir de canal d'intégration pour d'autres groupes cibles. Le financement de la gratuité de la prise en charge est indispensable à l'équilibre financier des centres. Une collaboration étroite entre programmes et une communication des résultats VIH sous forme de cohortes sont essentielles pour obtenir la confiance des financeurs. Plus que les mécanismes institutionnels, les relations interhumaines sont essentielles.

PS-81856-18 Integrating TB and HIV services into general health care system in Russia

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Aim: TB and HIV services in Russia are weakly integrated and have little coordination with the general health care system. A lack of clinical knowledge about HIV infection among general health care providers and TB specialists, and a lack of clear national guidance on IPT provision pose serious barriers to integrated care. A high quality system needs to be developed for HIV-positive patients to be tested for TB, receive IPT and, if necessary be treated for TB.

Design: In 2004, the USAID-funded Quality Assurance Project began to work with selected organizations in four pilot cities. Key partners included local health authorities, infectious disease specialists from AIDS Centers and polyclinics, TB specialists, substance abuse specialists, social service providers, NGOs, and People Living with HIV (PLWH). Interdisciplinary teams of providers were formed to design an integrated system of TB-HIV services. In 2007, the project began a scale up of innovations through St Peterburg city and Orenburg oblast.

Methods: The improvement collaborative approach was used to organize shared learning among interdisciplinary teams of participating providers.

Results: Over 200 PLWH are now tested for TB every month in polyclinics in Togliatti, and there was a 30% increase in PLWH tested for TB in St. Petersburg in 2007 comparing to sporadic testing. Similarly, over 100 PLWH are now screened for TB at the AIDS Center in Orenburg each month, and testing of PLWH for TB is began in polyclinics of the oblast. With newly developed criteria for IPT and patient record forms, IPT has been implemented among 328 PLWH. An analysis of data on 167 of these patients contributed to the preparation of national guidelines on provision of TB-HIV services that are now widely available.

Conclusion: An interdisciplinary team approach is a practical way to build links and coordination between HIV and TB services that results in better service quality, planning and budgeting.

PS-81927-18 Integration through outreach education improves HIV/AIDS and TB primary care: the PALSA PLUS trial

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Setting/objectives: New health challenges often elicit single purpose 'vertical' healthcare delivery systems, as in South Africa's antiretroviral treatment (ART) program. We added integrative educational outreach on the management of HIV/AIDS, TB and other adult respiratory diseases and evaluated the impact of this more comprehensive, 'horizontal' approach.

Methods: Pragmatic cluster randomised controlled trial, during the first year of ART provision by public-sector health services in the Free State province, South Africa. 8 intervention and 7 control clinics were randomised, stratified by referral hospital. The trial followed 10 136 program patients aged 16 years or older, and 150 nurses working in these clinics. One or more designated ART nurses from each clinic attended didactic training on ART, and received a practice guideline. At intervention clinics these and all other nurses then received on-site interactive outreach education on HIV/AIDS, TB and other respiratory illness care, delivered by specially trained nurse managers, and the guideline. Primary outcomes were patients enrolled in the ART program through new HIV testing, cotrimoxazole prophylaxis provision and TB case detection.

Results: In intervention clinics enrolment into the program more often followed new HIV testing (55% (357/653) vs. 43% (214/499), odds ratio 1.58, 95% confidence interval (CI) 1.01 to 1.58 during the first month and 53% (3048/5793) vs. 50% (2187/4343), odds ratio 1.19, 95%CI 0.51 to 2.77 during the first year), eligible patients were more likely to receive cotrimoxazole (73% (1762/2419) vs. 65% (1025/1572), odds ratio 1.88, 95%CI 1.07 to 3.31), and TB was more likely to be detected (7.2% (417/5793) vs. 5.6% (245/4343), odds ratio 1.25, 95%CI 1.01 to 1.55).

Conclusion: Integrated outreach education covering most presenting respiratory illness led to more inte-

grated and effective care delivery for HIV/AIDS and TB, compared with vertical programming alone.

PS-81936-18 Empowering nurses to adopt innovative training approaches for lung health and HIV/AIDS: the PALSA PLUS programme

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Setting: The Practical Approach to Lung Health and HIV/AIDS in South Africa addresses the lack of skilled primary care health workers by equipping usual nurse managers as trainers, who in turn deliver outreach training to nurses responsible for diagnosing and treating patients in primary care. It is based on the South African guideline adaptation of WHO's Practical Approach to Lung Health but also includes the management of HIV/AIDS and STIs. Two randomized trials have shown it substantially improves quality of care. **Objective:** To equip nurse managers with minimal prior training experience to provide group educational outreach training that is focused, interactive and encourages active learner participation.

Methods: 83 Nurse managers attended a five-day intensive train-the-trainer course (in groups of 12–13) which familiarized them with the content of the guideline but focused on equipping them in training and facilitation skills. Managers were provided with repeated opportunities to practise training delivery, and were skilled in adult education principles to enable them to build on the nurses' prior knowledge and tailor the training to suit their needs.

Results: The nurse managers embraced the modern training approaches, breaking the mould of didactic training which characterizes health worker training. They have since delivered engaging, interactive small group training to 1766 nurses in 243 clinics. They have developed creative training tools that highlight how clinic and individual clinician practices must change to comply with guidelines, and stimulate lively discussion and engagement by all participants.

Conclusion: Nurse managers can be rapidly equipped as effective and engaging trainers, through training programs which attribute equal weighting to training techniques as they do to content.

PS-81947-18 Enhancing TB case-finding among people living with HIV/AIDS in China: pilot experience

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Setting & objectives: Collaborations between the National AIDS Program (NAP) and the National TB Control Program (NTP) in China is not well-established. We piloted a new collaborative program to increase the identification of TB in persons living with HIV/AIDS (PLWHA).

Methods: We piloted the program in three high HIV-prevalence counties in Henan (county A) and Sichuan province (county B & C) with a combined population of 2.5 million. Primary route of HIV transmission is illegal blood plasma donation in Henan and injection drug use in Sichuan. From September 2006 to February 2007, we established a system to screen PLWHA (with a TB symptom questionnaire) and refer symptomatic patients for TB evaluation; evaluations include sputum smear, chest x-ray, and diagnostic treatment (if appropriate). In Henan, patients were referred from village to township to the county Center for Disease Control (CDC). In Sichuan, patients were referred from methadone maintenance clinic, drug treatment programs, antiretroviral treatment centers, and voluntary counseling and treatment centers to county CDC.

Results:

County	PLWHA followed by NAP <i>n</i>	Screened with TB symptom questionnaire <i>n</i> (%)	TB symptoms <i>n</i> (%)	Successfully referred to TB program <i>n</i> (%)	No. with TB <i>n</i>	TB among entire screened population %	TB among symptomatic population %
A	2496	2230 (89.3)	787 (35.3)	787 (100)	36	1.6	4.6
B	304	210 (69.1)	54 (25.7)	54 (100)	16	7.6	29.6
C	117	110 (94.0)	39 (35.5)	39 (100)	5	4.5	12.8

Conclusion: Enhanced case-finding of TB using symptom questionnaire was successfully implemented in various HIV care settings. Referral of symptomatic patients for TB evaluation worked well. This collaboration facilitated the diagnosis of TB in PLWHA in China.

PS-81954-18 Evaluation of provider-initiated HIV testing and referral for HIV care in rural health centers in Zambia

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Background: With up to 70% of TB patients co-infected with HIV, access to HIV testing and care for TB patients is a priority of the Zambian Ministry of Health. We evaluated a model for provider-initiated HIV testing and referral to HIV care in 18 rural health centers (RHC) in Chongwe District, a setting where patient numbers are small and access to antiretroviral therapy (ART) clinics is limited.

Methods: Testing and referral systems were implemented and evaluated in 18 RHC. These RHC refer HIV-infected TB patients to 2 permanent and 4 mobile ART clinics in Chongwe District. Data was collected from national TB registers and treatment cards. A comparison of the proportion of patients tested for HIV and accessing HIV care at specified dates pre- and post-implementation was evaluated using the Mantel-Haenszel estimator of the common relative risk.

Results: Overall, there were 124 patients receiving TB treatment pre-implementation and 175 patients post-implementation. Post-implementation, patients were more likely to test for HIV [83% vs. 68%; relative risk (RR) 1.3; 95% confidence interval (CI) 1.1–1.5], enroll in HIV care [68% vs. 37%; RR 1.6; 95% CI 1.1–2.4] initiate ART [54% vs. 13%; RR 2.8; 95% CI 1.4–5.5] and initiate co-trimoxazole preventive therapy (CPT) [64% vs. 15%; RR 3.3; 95% CI 1.7–6.4] when compared to patients under the previous health care approach.

Conclusion: Preliminary data from this rural setting demonstrates that a provider-initiated HIV testing model can increase HIV testing, enrollment into HIV care, and treatment with ART and CPT for TB patients. Although some degree of improvement might be related to better documentation and increased awareness for coordinated TB-HIV care, this data demonstrates that such approaches may be feasible for successful scale-up in rural settings.

PS-81989-18 Linking TB and HIV care: adaptation of an urban model for use in rural health centres in Zambia

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Background: Rapid scale-up of access to HIV testing and treatment for TB patients is a priority in rural areas of Zambia. The Centre for Infectious Disease Research in Zambia (CIDRZ) and the Ministry of Health modified an urban model for provider-initiated Diagnostic Counseling and Testing (DCT) to meet the needs of isolated rural health centers (RHCs) with small patient numbers and limited access to HIV care. At urban sites, CIDRZ provided on-site implementation

help and frequent follow-up while the rural model was designed to operate with little CIDRZ oversight.

Methods: The new model was piloted in a rural district that has 21 RHCs providing TB treatment and 6 HIV clinics (2 permanent and 4 mobile sites). One health worker per RHC and several district officials attended a centralized training in DCT skills, implementation and referral systems. Trained staff implemented the new systems at their RHC and monitoring was managed primarily by the district TB-HIV focal person.

Lessons learned: Challenges in rural and urban settings were similar and included staff shortage, lack of private counseling rooms and low uptake of referral systems. Centralized training facilitated rapid scale-up to many RHCs compared to the urban model which implemented only 2 clinics per month. Patient tracking was enhanced at urban clinics through DCT registers and identification numbers; these were less helpful in RHCs with small patient numbers. Training should have included development of implementation plans and more discussion of expected challenges. Lastly, buy-in from district officials was crucial since they provided program oversight and oriented new health center staff.

Conclusion: Despite challenges, scale-up of DCT and HIV referral systems to 21 RHCs at one time was feasible. The lessons learned have been used to modify the rural model, which will be scaled-up and evaluated in 6 more districts in 2008.

TUBERCULOSIS: SOCIETY AND POVERTY/ADVOCACY AND HUMAN RIGHTS

PS-81357-18 Delay in the diagnosis of tuberculosis in Banke District, Nepal

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Background: Delay in starting TB treatment increases the risk of mortality, severity and transmission of the disease in the community.

Objectives: To assess the duration of delay in the diagnosis of TB and to investigate its determinants.

Method: A cross-sectional survey using a structured questionnaire to 307 newly registered TB patients who were on anti-TB treatment under National TB Programme during June to July 2007.

Results: Median patient delay was 49.5 days, median health system delay was 18 days and the median total delay was 60 days. Patient delay was associated with occupation and income. Patient delay was not associated with type of TB, age group, sex, education level, smoking habit, alcohol intake and distance to DOTS

centre from patient resident. Health system delay had no significant association with socio-demographic variables.

Conclusion: Total delay in the diagnosis of tuberculosis in Banke district is shorter compare to other places in Nepal and neighbouring countries. Rising public awareness of the disease and expansion of the facilities with assured quality could be helpful to reduce delay in the diagnosis.

PS-81468-18 Evaluating the effects of providing travel incentives to TB patients in a Fidelis project in China

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Settings: A Fidelis project was implemented in 50 counties of Shanxi province to provide cash incentives to poor TB patients for their first transportation for TB diagnosis.

Objectives: To evaluate the effect of travel incentives on TB case detection, and explore the reasons of the effect through patient experience.

Methods: A group of 51 non-project counties in the Shanxi was selected to compare case notification. Data from the TB reporting were collected at two window periods: baseline time (January–September 2004) and project time (January–September 2005). Patient survey was conducted in two project counties and two non-project counties with a total of 119 TB patients treated during the project time. In-depth interviews were conducted with 32 patients, 20 TB doctors and 6 project staff to reflect their experience and concerns on travel incentives.

Results: New smear positive case notification rate improved rapidly in both groups; however, the improvement of project counties was slower (20.01 to 33.95/100 000, 70% increase vs. 15.33 to 30.53/100 000, 102% increase, $P < 0.05$). Providing travel incentives did not reduce patient delays and doctors delays of the project counties as compared with non-project counties ($P > 0.05$). Patient receiving the incentives had a similar annual per capita income compared with patients not receiving the incentives. In-depth interviews revealed that the Fidelis Project did not have a practical tool of accessing patient's poverty status which made it difficult of make the incentives know publicly. Patients reported that they only knew the incentives available after they visited the TB dispensary and the cash was often received later. The majority of patients who received the incentives reported that they would continue TB treatment even without the travel incentives as they considered the travel incentive too little.

Conclusion: Providing travel incentives did not have special add-on value on TB case finding due to the lack of operational details.

PS-81490-18 Patient costs during the intensive and continuation phases of tuberculosis treatment in Central Asia

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Setting: Tuberculosis (TB) puts a heavy economic burden on households. Patient costs of TB in the former Soviet Union, a setting with high informal payments for health services, have hardly been studied. This study measured the costs of TB at the household level in a DOTS program in Tajikistan.

Methods: Adult pulmonary TB patients who were newly registered in the 12 study districts over a four month period were enrolled. Each patient was interviewed twice, once during the intensive phase (IP) and once during the continuation phase (CP). Comprehensive information on direct costs (expenditure for drugs, consultation fees, other medical services, transport, changes in expenditure for food, other non-medical items) and indirect costs (loss of income to the patient and caregivers) was collected. For missing data, multiple imputation was applied.

Results: 205 patients completed the first interview, and 143 patients completed both. Mean total costs of TB at the household level were extrapolated to \$1197. There was high variation in self-reported loss of income; losses were generally higher among patients with Russian work history. Direct costs amounted to \$412 per patient, of which 34% (\$140) were incurred before the TB diagnosis. Direct costs per month were \$69 in IP and \$27 in CP. Medical costs constituted 53% of total direct costs during treatment. Drug costs, mainly for vitamins and IV rehydration, made up 27% of total direct costs, while increased expenditure for food contributed 23% and transport 22%. Hospitalised patients' costs for drugs and transportation were more than double those of ambulatory patients.
Conclusions: The total costs of a TB episode at the household level amount to 350% of the per capita gross national disposable income (GNDI) of \$342. The direct costs alone exceed per capita GNDI by 20%. The economic burden to households was most acute during IP, as monthly expenditure was more than twice as high during IP than during CP.

PS-81679-18 Do food supplements reach tuberculosis patients in Central Asia?

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Setting: Project Sino, funded by the Swiss Agency for Development and Cooperation (SDC), is supporting primary health care and the introduction of DOTS in its pilot districts in Tajikistan. Tuberculosis (TB) puts a heavy economic burden on households. As an incentive for treatment adherence, the project distributes food to TB patients three times over the course of treatment.

Methods: A questionnaire-based survey was conducted among TB patients in Tajikistan. The six study districts lay in mainly rural and periurban areas of this extremely poor country. Patients were interviewed about the number of food supplements received, about the local market value of the food supplements, informal payments and costs to bring food supplements home from the distribution points.

Results: 116 pulmonary TB patients were interviewed. 73% of the patients had already received all three food supplements at the time of the interview; 27% had received two food supplements. 13% of patients reported having paid a fee to service providers for the food supplements—\$2.8 on average for each of three food supplements. 94% of patients had paid to bring the food stuff home—a mean amount of \$4.1 for each food supplement. Patients estimated the local market value of each food distribution at a mean \$52. Subtracting the payments related to food supplements, three food supplements contribute about \$144 to the household economy. This roughly corresponds to the estimated program costs of \$172 per beneficiary in a similar program.

Conclusions: TB patients receive food supplements as foreseen by the program. The food supplements constitute a substantial contribution to the household budgets of TB patients during economically difficult times. While some informal payments in connection with food supplements were reported, they were relatively rare in the context of a highly informal economy. Food distributions contributed to the livelihood of TB patients thereby improving the basis for adherence.

Item	Value (US\$)
Estimated value of three food supplements	156
Mean informal fee reported	1.1
Mean payment for transportation of food	11.4
Estimated net contribution to household economy	144

PS-81814-18 A study of gender roles of TB patients and communities' perceptions of TB in peri-urban areas of Khartoum

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Aim: This study examines communities living in high TB prevalence areas in Khartoum. It focuses on the social situation of these patients, especially their gender roles. This includes factors such as social background, marital status, age group and economic condition. This focus is expected to facilitate the understanding of the stigmatization of TB patients and how that is associated with the communities' perceptions of the disease. These perceptions are considered to be shaped by social experience with TB, government and NGO programs of health education, and other sources of information and awareness.

Methods: The research works out details of these processes through informal and formal interviews with patients, their families and other community members. A further analysis uses observations of the daily life of patients, the variation in social participation, restrictions that are connected to the having the illness, and other elements relevant to the community. A set of interviews is conducted with government and NGO health workers in the areas are of study.

Results: The findings of the study suggests that especially in peri-urban areas of Khartoum, with a high poverty level, there are a number insufficiently coordinated government and NGO programs of treatment and prevention which resulted in high diversity of awareness levels. It is likely, that the specific conditions of the targeted communities are not given attention in the design of programs, and therefore fail to implement an effective health communication with the community.

Conclusion: Therefore every effort for health education must carefully consider the social structure of the targeted community and the social status of the patient. This is true especially where gender roles are concerned, and when it considers diseases that closely connected with poverty, such as TB.

PS-81956-18 Former TB patients: an effective source of referral of TB suspects

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Setting: The Damien Foundation implements Tuberculosis control programme in Bangladesh in collaboration with the National TB control programme. The services are provided through 165 diagnosis and treatment centers, covering 27 million populations.

Methods: TB suspects identified at the clinics are interviewed for their source of information and duration

of illness and recorded in the Laboratory register. These information were collected and compiled quarterly.

Results: In 2007, among 225 547 TB suspects the sources of referral were: 23% by former TB patients, 14% by Village Doctors,* 17% by graduate doctors, 10% by Government Public Health staff, 29% suspects were self referred (result of different Information, Education & Communication campaigns) and 7% from other sources. Their contribution to the Smear +ve TB case detection were respectively 24%, 15%, 25%, 8%, 19% and 9%. The mean duration of diagnostic delay were 8.8, 10 and 12 weeks for Former TB patients, village doctors and medical graduates respectively.

Conclusion: Former TB patients' contribution to smear positive case detection is almost equal to graduate doctors and the diagnostic delay is lower than any other sources. Effective involvement of former patients in TB control can significantly decrease the diagnosis delay and breakdown the chain of transmission.

* Non-graduate rural medical practitioners.

PS-82103-18 Poverty—important risk factor for tuberculosis

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Setting: Taking into account the slower economic growth in the Dolj county, the significant number of persons with no income and the increase of the tuberculosis incidence in this region (in 2006, the second after Bucharest), we have intended to analyse certain aspects of pulmonary tuberculosis that these patients faced.

Method: Retrospective study on 841 patients with pulmonary tuberculosis admitted in the Hospital of Pneumology Leamna, Dolj between 1.XI.2004–1.XI.2006, using the information provided by patient files on age, gender, environment, occupational categories, bacteriological status, radiological extensions, co-morbidities, evolution under specific treatment.

Results: 58.97% of patients (56.82% of men and 70.76% of women) were unemployed, 63.48% of them came from a rural background; 76.96% of the new cases appeared at people with no income, but only 25.38% of chronic patients were people with no income; Radiological patterns: cavitary forms were found in 31% cases, in 81% of cases extension was bilateral 44.6%. The most frequent co-morbidities were secondary anaemia (32%), hepatic and gastric pathology (12%), casexia (4.5%), diabetes mellitus (3.2%); 63% of cases were tobacco dependence, alcohol abuse or bi-dependences; under correct treatment,

75% had a favourable evolution, only 5% deceased during hospitalisation.

Conclusions: 58.97% of patients with pulmonary tuberculosis received in our hospital were unemployed, 37.65% retired, only 0.53% had jobs. Poverty, misery, alcohol consumption and tuberculosis represent a vicious circle that is difficult to break. It is essential to develop special programs, which would provide support for those persons.

PS-82156-18 Knowledge, attitudes and beliefs about tuberculosis among antiretroviral clinic patients in rural South Africa

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Setting: In rural South Africa, 80% of TB patients (pts) are co-infected with HIV. Mortality rates are exceedingly high among co-infected pts with drug-susceptible or drug-resistant TB, and associated with late presentation and diagnosis. TB education and early diagnosis in HIV-infected individuals in clinical care sites is critical.

Objective: To characterize knowledge, beliefs and skills related to TB amongst an HIV-infected population, in order to identify and address barriers to TB diagnosis and care.

Methods: Questionnaire among HIV-infected persons attending an antiretroviral (ARV) clinic at a rural district hospital with high rates of drug-susceptible and resistant TB. Pts were defined as 'TB suspect' if they had one or more TB symptoms (e.g., cough, night sweats, fever, weight loss). Questions were designed using the information, motivation and behavior skills model with a planned enrollment of 720 patients.

Results: Among the first 91 pts enrolled from January–March 2008, 88 (97%) thought TB was treatable, 87 (96%) thought TB could be cured. Overall, 66 (73%) believed some forms of TB cannot be treated, and 73 (80%) that having TB meant you also had HIV. Almost all felt that they could tell a family member if they had TB (99%). However, several barriers to seeking care were identified: 70 (77%) stated they lived too far to be treated, 67 (74%) lacked finances for transport to the hospital, and 78 (86%) would be unwilling to stay in the hospital for TB treatment.

Conclusion: The majority of HIV-infected pts attending an ARV clinic were knowledgeable about TB treatment, did not report TB-related stigma, but identified barriers for accessing care, including distance to hospital, lack of transport money, and unwillingness to be hospitalized for TB treatment. These findings support further development and strengthening of decentralized care for both drug-susceptible and drug-

resistant TB in HIV co-infected patients in rural South Africa.

PS-82279-18 Getting your message out: utilising mass media for public health campaigns

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Setting: The World Lung Foundation will discuss building effective, measurable communications campaigns. The workshop will cover paid media, earned media strategies (media relations, press conferences, op-eds) and web-based communications. WLF will also include a component on the critical roles that clinicians and physicians can play in mass media messaging.

Objective: After this workshop, participants should have an excellent overview of how effective public health communications campaigns are executed, how successful messaging is developed, and what potential roles they could play within those campaigns. Participants should leave with an understanding of what types of media strategies are effective at reaching disparate audiences such as policy makers, public, health professionals, elected officials.

Format: The workshop format will feature four panelists from the World Lung Foundation and include a PowerPoint presentation, multimedia components from several different countries and sample worksheets for participants to take away.

Part I: Paid Media. WLF Marketing Manager Yvette Chang will discuss the elements of paid media campaigns, including working with Ad agencies and developing effective messaging.

Part II: Earned Media. WLF Public Relations Manager Jorge Alday will discuss the basics of how to become a trusted resource for journalists and how to generate news coverage using limited resources.

Part III: The Web and New Media. WLF Online Communications Manager Stephen Hamill will discuss websites, email marketing, direct advertising online and new media opportunities such as YouTube, MySpace and Facebook.

Part IV: Clinicians' Critical role in Mass Media Campaigns. WLF Communications Associate Vinita Chopra, a registered nurse with clinical field experience, will talk about the unique and vital role that clinicians play within mass media campaigns.

Part V: Questions and Answers

PS-82398-18 Creation of a Stop TB Partnership in Japan and its role in G8 advocacy

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Aim: To communicate the process, role and efficacy of launching a Stop TB Partnership Japan, and utilizing it as a convening mechanism for G8 advocacy on tuberculosis.

Design: Qualitative analysis of advocacy activities and project implementation.

Methods: The authors share lessons learned in the creation of Stop TB Japan and its role in G8 advocacy leading up to the 2008 Hokkaido-Toyako Summit.

Results: Over 800 individuals participated in the 2007 launch of Stop TB Japan, including officials from the Ministries of Health, Labour and Welfare and Foreign Affairs; Diet members; JATA/RIT; RESULTS Japan and civil society. Stop TB Japan has played a leading role in conceptualizing and building support for a global Stop TB Japan initiative, which it presented to the Government of Japan for consideration and support. G8 Summit outcomes surrounding a Stop TB Japan Initiative and other TB commitments will be available in June 2008.

Conclusion: Stop TB Japan has served as a critical body for advocating for strong commitments from the Government of Japan and other G8 member states toward increasing resources and leadership for the elimination of TB globally. Stop TB Japan has also been critical to mobilizing civil society involvement in the G8 and TICAD (Tokyo International Conference on Africa's Development) process around health issues more broadly. Stop TB Japan will continue to play a key part in G8 advocacy and ensuring TB's place among national and international health agendas.

PS-81352-18 The Malawi NTP's ACSM strategy: implementation and monitoring using a technical working group

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Background: Health promotion for TB control in Malawi is done through the application of different communication strategies. The NTP developed IEC strategy (2001 to 2006) that was used to promote positive health behaviors by disseminating TB messages to the general public and educating the patients on the importance of adhering to treatment. As a monitoring process of implementing the strategy, the NTP formed a technical working group to provide technical support and advice on the ACSM strategy implementation to the ACSM Office in the NTP. The group comprises NTP staff, media, WHO, Health Education Unit from the Ministry of Health, ex-TB patients and lay people.

Methodology: The group meets every three months to monitor the progress on the ACSM strategy implementation countrywide. A progress report is prepared and presented at every meeting. Almost 95% of the 25 member group is available at every meeting.

Results: ACSM strategy implementation in the NTP has improved tremendously in message dissemination and community TB education. There is now more focus on the use of the community TB education approaches. The quality of TV and radio programs has improved to being more interactive and community based. There has been strategic TB education in the community emphasizing on the benefits and availability of TB services in the nearest health facilities using the locally available communication channels. World Stop TB day commemorations have been successfully commemorated and a TB media network was established to improve media collaboration and reporting on TB.

ACSM has now been recognized as playing a central role in many arms of TB control than before.

Conclusion: In countries like Malawi where literacy levels are low, TB education requires more strategic communication methods to reach the most vulnerable and susceptible.

PS-81391-18 Community participation in tuberculosis research

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Background: Increasing community participation in TB and TB-HIV clinical trial design and implementation is necessary to ensure that clinical research addresses community priorities. The Consortium to Respond Effectively to the AIDS TB Epidemic (CREATE) and the Tuberculosis Trials Consortium (TBTC) are conducting TB research studies in Africa, Europe, South America, and North America that have the potential to change TB treatment. Both consortia have partnered with the Treatment Action Group (TAG), a community-based AIDS research and policy think-tank to develop community input mechanisms for TB research.

Objective: To describe some of the lessons learned and ongoing challenges of including communities that are most affected in the design, implementation, and translation of TB research.

Results: CREATE's study site in Brazil has successfully involved community members, researchers, and local health officials in their community advisory board (CAB). The TBTC's multi-national Community Research Advisors Group consists of persons affected by TB and/or HIV who represent 9 of the TBTC's 28

study sites. The experiences of CREATE, TBTC, and TAG have provided similar lessons learned and ongoing challenges as follows: 1) CABs must be adapted to meet the needs of each unique group; 2) substantial training and funding are needed to develop the capacity for, and comfort of TB advocates with technical information; 3) stigma associated with TB and HIV/AIDS affects advocacy efforts; 4) knowledge of the interaction between TB and HIV is an incentive for becoming involved; 5) many community advisors work for organizations with limited resources and are not compensated for their time; and 6) researchers are often unsure of how to meaningfully include non-researchers.

Conclusion: To improve the translation of scientific data into relevant policies and programs, efforts need to focus on engaging and building the research capacity of affected communities.

PS-81839-18 Plaidoyer pour un outil de prise en charge de la TB et du VIH : la charte des soins intégrés TB-VIH au Cameroun

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Contexte: Au Cameroun comme dans plusieurs pays africains, les professionnels de la question de TB et celle du VIH ont longtemps travaillé en vase clos. De plus, les informations sur la co-infection TB-VIH sont restées confinées en milieu hospitalier, tandis que les associatifs qui encadrent les PVVIH ne savent presque rien sur la co-infection TB-VIH. Or avec 26% de taux de co-infection, le Cameroun est l'un des pays les plus touchés, et le problème revêt une forte dimension sociale, interpellant à la fois les décideurs, les spécialistes, les associatifs, les patients et les familles.

Objectif: Mobiliser les parties prenantes autour d'une Charte de Soins Intégrés TB-VIH au Cameroun.

Methode: Consultation des milieux médicaux et des responsables du MINSANTE pour sensibilisation et collecte des statistiques. Ateliers et séminaires de travail avec les experts, les informateurs clés et les mouvements associatifs pour l'élaboration de la charte; et mobilisation des médias pour sa diffusion.

Resultats: Une Charte des Soins Intégrés TB-VIH a été élaborée et adoptée avec la pleine participation des responsables du PNLTB, des mouvements associatifs, des PVVIH et patients TB-VIH. La Charte a été officiellement remise au Ministre de la Santé Publique et au Représentant de l'OMS, puis a été utilisée comme instrument de plaidoyer auprès de l'Assemblée Nationale. Elle sert d'outil de travail des associations, et de référence documentaire pour les patients TB-VIH.

Conclusion: La co-infection TB-VIH n'est plus un simple problème médical. Les actions de promotion

de la prise en charge conjointe TB-VIH doivent se poursuivre, avec l'implication de toutes les parties prenantes.

PS-82144-18 One-in-ten campaign on drug-resistant TB

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Objective: The One-in-Ten campaign aims to increase awareness, bring front-line perspectives to current MDR- and XDR-TB discussions, and to advocate for TB patients to receive the best possible care.

Method: Leading up to World TB Day (Saturday 24th March, 2007), Health & Development Networks and the AIDS-Care-Watch Campaign organised the One-in-Ten Campaign focusing on drug resistant TB. According to latest estimates, 10% of all new TB infections are resistant to at least one anti-TB drug (One-in-Ten). Drug-resistant TB poses a grave global public health threat, especially in populations with high rates of HIV, and requires an immediate and urgent global response.

One-in-Ten Information Summaries were produced on Drug Resistant TB on the following topics to increase dialogue and awareness:

- * How widespread is drug resistant TB? Can it be treated?
 - * HIV challenging accepted truths about TB control and drug resistance;
 - * Addressing TB drug resistance: What's in the new tools pipeline?
- More than 4000 members of the Stop-TB eForum and other online discussion groups participated by:
- * Contributing to the on-line discussion on drug-resistant TB;
 - * Signing on to the One-in-Ten campaign appeal;
 - * Passing on Campaign information to others—or adding a link to their website;
 - * Informing their local network and media contacts about the campaign, and regularly updating them as the campaign moved forward;
 - * Organizing local advocacy initiatives around World TB Day and the One-in-Ten messages.

Result/Conclusion: The One-in-Ten campaign has been timely. Since its implementation there has been an increase in reporting on drug-resistant TB by the media and also by global agencies as seen in the recent WHO report on drug-resistant TB.

PS-82273-18 Combat or reinforce TB stigma: analysis of two Brazilian videos for health education

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Settings: Civil society political support to tuberculosis (TB) control requires public awareness of TB as a public health problem. Advocacy and health education are powerful tools to achieve this goal.

Objective: To analyze one video produced in 2005 (video A) and one produced in 2007 by the Global Fund project on TB (video B), both using famous Brazilian artists and actual TB patients as characters.

Method: Analysis of the explicit message and concepts brought by the images.

Result: Although the explicit message is almost the same in both videos, video A does not show any interaction between the characters and shows TB patient in an inferior position in relation to the artists (high, dressing, time on image), while video B shows the artist and TB patient in the same level and having a friendly conversation.

Conclusion: Messages on TB may reproduce social prejudice and reinforce stigma or, on contrary, create identification between the public and affected persons. Only in the last case it can contribute to generate political support for TB control. The production of advocacy and health education materials requires a firm option to combat the stigma or it will be present brought by prevailing common sense view of the disease.

PATIENT TREATMENT ADHERENCE/ MANAGEMENT

PS-81236-18 Delay in diagnosis and treatment of pulmonary tuberculosis between 1987 and 2007

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The delay of TB treatment among new smear-positive patient pulmonary tuberculosis and strategies were reviewed. The literatures were searched by electronic engine on the internet assessing to the Sciencedirect.com, Pubmed.com, Google scholar, Cochrane Library, and Scopus.com. Thirty nine eligible articles from 1987 to 2007 were reviewed and described by essay, tables, and figures. The duration of delay varies differently in different settings, the shortest of patient's delay was seen in Gambia (0.3 week), and the longest was seen in Tanzania (120 days). The shortest of health sys-

tem's delay was seen in China (2 days), and the longest was seen in Iran (75 days). The factors associated to longer total delay period were in those who visited traditional healer, orthodox care, grocery shop, local venders, private physician or pharmacies, 2–6 times of health care seeking, rural residence, far distance (more than 30 minutes walking distance), uncertain about where to go for care, anticipated with high cost, longer waiting in office, far appointment, fear of immigration authorities, unemployment, and for another background variables were in older age, female, low education, smoking, religiousness, history of sexually transmitted diseases treatment within 3 years, poor self health being, belief efficacy of self treatment, and high degree of stigma. The initial symptoms as cough only, no hemoptysis, and loss weight caused longer total delay. For diagnostic procedures that contributed longer total delay were negatives or low grading positive sputum smear and no CXR or non-cavity CXR finding.

PS-81288-18 Involvement of traditional health practitioners in treatment adherence support in rural Uganda

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Aim: To assess how traditional health practitioners (THPs) can contribute to the case detection rate and treatment success in rural district of Uganda.

Design: A five year training program for 14 districts. **Methods:** THETA trained THPs in the basic signs and symptoms of TB that can enable them to identify and refer the suspected cases to health units. 18 months training in a module for THPs in 14 districts of Uganda were undertaken. Over 2500 THPs were trained. Referral forms given to them for referring all cases they suspect to be having TB and other diseases. Biomedical health professionals (BHPs) were involved in training the THPs as a means of increasing collaboration. Monthly support supervision was carried out. Quarterly joint meetings were convened to bring together THPs and BHPs to agree on how best they can manage a TB patient in a particular community.

Results: At the end of this training, 99% of the trained THPs appreciated the fact that they cannot treat tuberculosis using herbs but to refer to health units. BHPs were responding by receiving the referral forms from patients, treating the patients and documenting their findings. Over 4000 referral forms had been collected from all the 14 districts. In one district, Kiboga, THPs excelled in offering TB patients treatment adherence support thus increasing treatment success rate. Other districts adopted the involvement of THPs in CB-DOTs as a sustainable approach.

Conclusion: With comprehensive training, regular support supervision, issuing of referral booklets, and

encouraging collaboration between BHPs and THPs, more TB suspects can be referred for screening and CB DOTs strategy enhanced.

PS-81417-18 Factors determining TB patients' adherence and cooperation in forecasting treatment adherence

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Setting: Low efficiency in TB treatment is explained by insufficient treatment adherence of TB patients. 20 up to 50% of TB patients prematurely stop their treatment. Majority of TB patients feels psychological discomfort due to stigmatization and discrimination.

Objectives: Identify factors, influencing TB treatment adherence and early revelation of patients with higher risk of breaking off.

Methods: 65 new TB cases were researched. The main group is 28 patients who broke off treatment; comparison group is 37 fully recovered patients. Pre-treatment psychological testing by multifactor method of personality study based on MMPI was conducted. Graphical representations and profile coding were used in reports.

Results: Social characteristics and peculiarities of TB course were revealed: unemployment—50% of patients who broke off the treatment (16.2% in comparison group), excessive drinking—17.9% (2.7%), lack of family support—53.6% (37.8%), asymptomatic beginning of disease and absence of intoxication symptoms—35.7% (21.6%). Psychological status has a highest impact on treatment adherence. 46.4% those broke off the treatment belongs to sthenic type of response, characterized by over-esteem and problem denial (code 9–2/134:768L/FK). Based on factors, a diagnostic complex was elaborated to identify potential for disease overcoming.

Conclusion: Factors determining compliance and cooperation of TB patients allow elaboration of preventive measures system, i.e. advocacy, social support and complex influence on patients: positive informing, correctional block to change an attitude towards disease and psychological adaptation.

PS-81424-18 Adverse events associated with active tuberculosis treatment in the general population

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Aim: To determine adverse events associated with active tuberculosis TB treatment among all persons treated.

Design: Population cohort based on all residents of

the province of Quebec with public health insurance (>99%) over a 5 year period.

Methods: All patients dispensed at least 30 days of treatment for active TB between Jan 1, 1998 and Dec 31, 2003 were included; each was matched on age, sex, and area of residence with at least two controls, never prescribed TB treatment, who were resident in Quebec at the same time. Adverse event rates were compared between TB patients and controls over 12 months with stratification by age and sex. Adverse events were hospital admissions or outpatients visits for drug induced liver disease, allergy, gastrointestinal (GI), rheumatologic disorders, visual toxicity, neurological disorders or poisoning. We also documented the prescribing physicians' specialty.

Results: There were 1039 adverse events among 1883 patients treated for active TB (5.7/1000 person-yrs) with 1038 events in 3963 controls (2.6/1000 person-yrs). 540 TB patients (28.7%) had at least one adverse event, as did 698 controls (17.6%). Among TB patients, the most common adverse events were GI (27.1%), rheumatologic (15.8%), allergy (12.2%) and liver disease (9.7%). The overall risk ratio for at least one adverse event was 3.99 (95%CI 3.54–4.48) with 4.76 (4.06–5.57) for men and 3.26 (2.76–3.89) for women. See the table for risk ratios by age. General practitioners prescribed 51% of the initial treatments, respirologists 17%, and infectious disease physicians 11%.

Conclusion: Over half the TB treatments were started by general practitioners with almost half the patients over the age of 65. A four-fold increase in risk for an adverse event may partly reflect the older age of those with TB however, the highest risk was observed for younger men. These events account for substantial costs and morbidity, and may increase mortality.

Age (years)	Number of patients (% of total)	Risk ratio	95% confidence interval
1–20	318 (5.4)	1.44	0.89–2.35
21–35	793 (13.6)	4.95	3.57–6.85
36–50	1373 (23.6)	5.72	4.46–7.33
51–65	1011 (17.4)	4.47	3.39–5.92
65+	2332 (40.0)	3.39	2.83–4.06

PS-81718-18 Treatment outcome analysis of 348 new smear-positive TB patients among migrant workers

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Aim: This paper documents treatment outcomes of smear positive pulmonary TB patients among migrant workers and explores suitable management mode for TB patients among floating population.

Design: Cros-sectional comparisons were made to detect differences between different treatment modes.

Methods: Subjects recruited into the study were new smear positive TB patients registered to 10 county TB clinics in Anhui province from 2003 to 2005. Percentages of different treatment outcomes were calculated by different treatment modes.

Results: A total of 4897 eligible patients, including 348 migrant workers, were recruited into the study. Of the migrant worker patients, 286 were cured, accounting for 82.2%. It was far lower than the average percentage (91%) of cured non-migrant-worker patients managed by the same clinics during the same period. Of the cured migrant-worker patients, 81% were co-managed by both the TB prevention and control institute where the patients were detected and the institutes where patients were working. Of the remaining 61 migrant-worker patients, 34 (55.7%) refused contact, 14 (23.0%) remained TB positive, 5 died and 8 refused treatment. Of all the non-cured patients, 50 adopted non-monitored self-medicine-administration.

Conclusion: Migration poses huge challenges to TB case management. Management of migrant-worker patients is the key to increasing TB cure rate and should be strengthened.

PS-81737-18 Factors affecting adherence to isoniazid preventive therapy among Kawempe residents, Kampala District, Uganda

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Objectives:

- 1 To determine the acceptance and adherence rate of isoniazid preventive therapy (IPT) among TB case contacts of Kawempe division, Kampala.
- 2 To identify factors associated with adherence to IPT.

Methods: Secondary data analysis of contacts offered preventive therapy from the period of 2004 to July 2007 in a household contact study.

Results: Among 1334 household contacts, 66.9% (892) were at risk of developing active TB as they had a positive PPD. The acceptance rate was 96.4% (542) and 50.6% (201) completed preventive therapy. The defaulter rate was 13.8% (75), the rest completed at least 6 months of IPT. The number of defaulters on preventive therapy decrease dramatically after 5 months. HIV positive subjects were 2.7 times more likely to adhere to treatment compared to HIV negative subjects (87.5% vs. 72%, OR = 2.7, $P = 0.144$, Fisher's exact test). Younger subjects ranging between 0–17 years were less likely to adhere than older subjects (69.5% vs. 78%, OR = 0.6, $P = 0.13$). Subjects who have had education up to ordinary level were more likely to adhere than subjects who had no education (86.7% vs. 65%, OR = 0.286, $P = 0.015$). This is

probably because educated subjects would have a better insight and understanding when offered preventive therapy health education.

Conclusions: Preventive therapy is feasible and easily acceptable among the residence of Kawempe, Kampala district. The default rate is low 13.8% and more than half of the defaulters did so within 3 months. Age, HIV status and education are predictors for adherence to preventive therapy. Ongoing health education and counseling should be offered during the initial months of therapy to decrease on number of defaulters.

PS-81908-18 Assessing TB treatment drop-out using patient cards at a public hospital in Kampala, Uganda

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Setting: Mulago National Referral Hospital, TB Treatment Centre in Kampala.

Objectives: To assess the level, patterns of and to determine factors associated with treatment drop.

Methods: Secondary data analysis from the patient treatment cards for patients registered from January to December 2003 at Mulago hospital TB centre was done. Systematic sampling of every 10th card was applied to 4800 records excluding patients transferred out. Treatment drop out was defined as not returning to fill a prescription after initiation of TB treatment. Variables abstracted included age, sex, district of residence, baseline weight, type of disease, category of TB disease and treatment regimen.

Results: Of the 496 patients analysed, the mean age was 29 years (SD 15), median weight was 50 kg (IQR18), 45% were female and 66% resided in Kampala district. 90% were new patients with 79% having pulmonary TB and 76% started on the standard 2RHEZ/6EH regimen. The level of treatment drop out was 68%, majority (30%) of patients dropped out after receiving their month one prescription compared to 6% after month five. Age ≥ 45 yrs, Extra-PTB, and residing in a district far away from Kampala were significantly associated with treatment drop out, AOR 2.44 $P = 0.03$; 2.20 $P = 0.01$ and 2.30 $P = 0.03$, respectively.

Conclusion: Findings highlight the utility of routine clinic-based records in identifying gaps in health systems. TB Treatment drop out is high and significantly associated with age, disease type and distance from the clinic. There is need to establish a nationwide tracking system of patients who start on anti-TB treatment in order to understand this phenomenon.

PS-81924-18 Community DOTS implementation in three pilot areas in Cambodia

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Introduction: The JICA National TB Control Project started supporting the Community DOTS (C-DOTS) in three pilot areas (Bovel, Kompong Tralach and Si-hanouk Ville) in 2005, where 94 out of 374 villages were selected for C-DOTS due to the remote place.

Objectives: To improve TB control for patients living in peripheral setting of pilot areas in Cambodia.

Methods: Training of C-DOTS was conducted for health center staff and village health volunteers as DOTS watchers in 2005. Two kinds of regular meeting have been held every two months in the districts so as to report and discuss issues of TB control; one meeting is for health center staff at the district, and the other is for health volunteers at health center.

Results: The ratios of patients treated by C-DOTS were 58% and 69% in intensive and continuation phases respectively in 2007. The cure rate of new pulmonary TB was improved from 84% (528/631 in 2004) to 89% (580/650 in 2006) in 3 districts. However, case notification of smear positive TB was not changed (626 in 2004, 619 in 2007) and the number of smear negative and extra-pulmonary TB cases was slightly increased in the areas.

Conclusion: C-DOTS implementation could augment treatment outcome but increase of case finding could not be achieved easily. In order to improve the case finding, health promotion activity for the referral of TB cases from community might be necessary as a part of C-DOTS in future.

PS-81974-18 The challenge of tuberculosis in a London prison

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Setting: Large London prison serving a culturally diverse and socially deprived population.

Objective: Highlight the challenges and opportunities of managing tuberculosis in a high turnover prison.

Method: Two year follow-up study on all tuberculosis cases treated in prison with post release follow-up.

Results: 37 male tuberculosis patients imprisoned aged between 21 and 67 (average age 34 years). 49% were UK born; 57% previously homeless; 58% poly-drug users. Overall 68% had pulmonary disease. 15 cases (41%) were diagnosed in prison of whom two thirds had pulmonary disease. 6 cases had smear pos-

itive pulmonary disease while in prison. Overall 86% culture confirmed and almost half (48%) had drug resistant tuberculosis (at least one first line drug). 64% of cases were non-adherent prior to imprisonment—41% of cases who commenced treatment prior to imprisonment received DOT. 6 of the 37 cases had treatment interruptions (two weeks on average) while in custody as they refused to take medication. 21 cases were released into the community on treatment, 13 (62%) of who were homeless on release. 12 (57%) received DOT on release. Of the cases released 55% were non-adherent with treatment in the community and overall, less than half of these cases (10) completed a planned course of treatment following release.

Conclusion: This study highlights high levels of drug resistant tuberculosis and poor treatment adherence among a highly mobile socially marginalized population. Ensuring continuity of care for prisoners released on tuberculosis treatment is a major challenge in London.

PS-82025-18 In-patient TB treatment in Russian regions and TB control progress: trends, variety and outcomes

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Background: Included in the WHO list of high TB burden countries, Russia strives to resume its previously low levels of TB by updating its TB control strategy. Two executive orders (Prikazs) were implemented in 2003 and 2004 to improve recording and reporting and standardize drug regimens similar to the WHO-backed strategy.

Methods: A cross-sectional study assessed the impact of these Prikazs through two criteria reflecting the intensive phase (IPh) of TB treatment: standardization of in-patient treatment and treatment outcomes. 5023 new pulmonary TB cases discharged during two compared periods (2001/2002 and 2005/2006) from 4 regional TB hospitals located in the European part of Russia were analysed.

Results: Analysis showed that: the median length of stay has decreased from 143 to 122 days ($P < 0.001$) and the rate of patients receiving the required drug regimens has increased by more than two-fold (OR: 2.4; 95%CI 2.1–2.8). At the same time, smear conversion during in-patient treatment remained at 53%, with time until bacteriological conversion being shorter (OR: 1.4; 1.1–1.8). Treatment interruption by patients, although still high, decreased from 30% to 24% ($P < 0.0001$).

These results were achieved despite a worsening of the social profile of TB patients; the proportion of patients that were unemployed, retired and disabled increased from 61.7% to 64.6% ($P < 0.05$). Meanwhile, the rate of patients who were sputum smear positive at discharge increased from 3.3% to 9.9% ($P < 0.001$). **Conclusion:** The transition period for these orders may not be complete. However, results imply that standardisation and administrative treatment control play a profound role in the national TB program in Russia.

PS-82136-18 Willingness of private health providers to supervise directly observed treatment in Uganda

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Aim: To assess the factors limiting private-for-profit medical providers to supervise daily pill swallows for patients, assessment of the attitudes of health providers and the difficulties they faced when implementing PPM-DOTS and establishment of the effect of incentives and enablers on provider acceptance of PPM-DOTS. **Methods:** The study was a descriptive cross sectional study employing both qualitative and quantitative methods of data collection conducted in 5 divisions of Nakawa, Makindye, Lubaga, Kawempe, and Kampala central. In all 45 respondents were used, 20 patients were purposively selected with 4 chosen from each division of residence. For Private health workers, 2 health workers were chosen from each of the two private clinics proportionately chosen from each of the five divisions in Kampala district. 5 key informants were also selected with one selected from each of the 5 divisions.

Results: The biggest factor limiting private health care providers to supervise DOTS was lack of training as evidenced by (24.4%) of the respondents. Others included distance (8.9%), patients defaulting from TB treatment (6.7%), lack of anti-TB drugs (20%), lack of diagnostic materials (15.6%), lack of facilitation (13.3%) and a belief that DOTS implementation is for government aided health units (11.1%).

Recommendations: These included; increasing motivation (22.2%), providing incentives (26.7%), adequate training (17.8%), increase funding (11.1%), increasing community sensitization (8.9%), and extension of TB drugs to private clinics (13.3%).

The DOTS strategy would efficiently work towards reduction of TB if there is effective procurement and distribution of adequate anti-TB drugs and medical supplies; involvement of private medical providers, development and implementation of a comprehensive mechanism for contact tracing, new cases and defaulters; training health workers in the diagnosis and treatment of TB; and implementation of a comprehensive surveillance system.

PS-82192-18 Using the open source medical record system for MDR-TB and TB-HIV in resource-poor environments

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Background: The WHO has estimated 450 000 new patients with MDR-TB will require treatment every year. Scaling up treatment requires careful monitoring of data including sputum smear, culture and drug susceptibility testing, drug regimens, treatment status and side effects. The PIH-EMR medical information system created by Partners In Health has assisted the Peruvian National TB program to treat over 7000 MDR-TB patients.

Objectives: To develop a free, open source, web-based electronic medical record system (EMR) to support the treatment of MDR-TB and TB-HIV co-infection in many sites.

	12/07/2007	07/09/2007	14/09/2007	10/03/2008
INH	R	R		R
RMP	S	R		R
EMB		S		S
PZA		R		R
STM		R		S
Km		S		S
Cm		S		S
Ofx		S	treatment started	S
Eto		S		S
Cs		S		S
Am		S		S
CIP		S		S
MXF		S		S
Gfx		S		S
Pto		S		S

sample collection date	culture	smear
07/07/2007	+	
10/07/2007	+	
05/09/2007	++	
14/09/2007		treatment started
10/10/2007	+	-
12/12/2007		-
02/02/2008		-

Methods: OpenMRS is an open source, web-based electronic medical record architecture (www.openmrs.org).

org) developed by Partners In Health and the Regentrief Institute, supported by a growing group of programmers worldwide and funded by the WHO, CDC and the Rockefeller Foundation. First deployed in Kenya, Rwanda and South Africa in 2006, it is now used in ten countries, mainly to assist HIV treatment programs. With support from WHO Stop TB, we created new forms, reports, and workflows based on WHO guidelines for MDR-TB treatment and our experience with the PIH-EMR in Peru.

Results: OpenMRS-MDR-TB provides core data collection, display and analysis tools for managing MDR-TB and is a scalable system customizable by non-programmers. It includes tools for calculating medication requirements, and functions for managing HIV treatment or co-infection. The system is being piloted in Lesotho and Haiti. OpenMRS supports medical data exchange standards including HL7 allowing it to link to other information systems, and includes tools to export data for further analysis.

Conclusion: Managing the treatment of thousands of MDR-TB patients will require effective information management. OpenMRS-MDR-TB is an open source EMR which is customizable for new sites, workflows, and languages, and has now been extended for MDR-TB and TB-HIV co-infection programs.

PS-82437-18 Evaluation of community TB care implementation in Kenya

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Introduction: Community involvement in TB care implies establishing working partnership between the health sector and the community. Ensuring that patients and communities are informed about TB, enhancing awareness and sharing responsibilities for TB care which can lead to effective patient empowerment and community participation, increasing the demand for health services and bring care close to the communities. Community involvement is part of NTP strategy for tuberculosis patient care, it is important that the strategy achieves desired objectives.

Methods: The main aim of the evaluation was to evaluate the impact of community based TB care (CB DOTs) in the 31 implementing districts in Kenya and to find out challenges and lessons learnt in implementation structure of the initiative for TB control. Data was collected on the nature of trainings done for health care workers, community opinion leaders and community health care workers (Volunteers) and their current level of involvement.

Design: Random selection was done to pick the 24 districts out of 31 implementing the strategy after stratification based on the provincial TB control zones.

Results: It was found out that 90% of directly observed therapy was done by the family members whereas community health care workers were involved of the in defaulter tracing (86%), case referral (93%), active case find 50% and health education (86%).

Conclusion: Focus on the family member supervision should be enhanced and community volunteers should be reoriented to new roles of supervising families with TB patients, active case finding, case referral and health education within the community.

PS-81680-18 Nurses' practice in the tuberculosis control programme in the family health programme in Vitoria, Brazil, 2007

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Setting: The study was conducted in Vitória, capital of Espírito Santo State, Brazil, which comprises eight priority cities for The National Program for Tuberculosis Control. The WHO DOTS strategy was implemented in Vitória in 2000, covering 60% of its population.

Objectives: To analyze the implication of the nurses' practice limitations for the tuberculosis control in the city of Vitória, Espírito Santo.

Methods: A case study with the participation of 34 nurses that work in the PSF of Vitória. A questionnaire of open and closed questions was used to collect data.

Results: Among the interviewees, 50% work in the city for less than 3 years, have previous experience with PSF (55.9%), and 64% have taken at least one specialization course. The nurses' practice in the health treatment of individuals/families/communities consisted of: identifying respiratory symptoms (41.17%); performing SR and informer's clinical examinations (32.35%); supplying medicines after medical consultation (11.76%); searching for defaulters (26.47%); applying BCG vaccine, researching informers (35.29%); doing home visits (26.47%); feeding and analyzing the information system (35.29%); and performing educative actions (23.52%). Limiting factors encountered in the nurses' practice were: incomplete professional team; clientele disinterest; and difficulty in teamwork.

Conclusions: The PSF Nurses have shown to develop and execute a significant number of activities, to be always involved and to act upon all minimal actions. However, we noticed that their actions do not seem to be obtaining positive and impacting results regarding TB prevention, since their time is still concentrated in curative actions, what exposes fragility between ideal

and real. The quantity of workload attributed to the nurses demonstrates an important difficulty for the adequate fulfillment of their duties, as the productive practice prevents the necessary moments of reflection about the daily routine and their actions.

PS-82217-18 Strengthening tuberculosis control in London among hard to reach groups—the patient review process

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Setting: Controlling tuberculosis among homeless people, problem drug users and prisoners (hard to reach groups) in London is a major challenge. Drawing on the successful experience of New York we implemented the Patient Review Process (PRP) for hard to reach cases referred to Find & Treat, a specialist health and social care project that works across London. PRP is a systematic quarterly review of cases and their contacts to monitor important aspects of case management and treatment outcomes, often not routinely captured, learn from this experience and share and disseminate good practice with relevant service providers.

Objective: To explore the feasibility and practical value of implementing the PRP among hard to reach tuberculosis cases in London.

Method: Definitions for complex and challenging tuberculosis cases and suspected cases were developed with frontline workers at tuberculosis treatment services across London through direct visits and workshops. In order to investigate issues of case management we captured detailed information on all cases referred. This included delays and routes of presentation; use of DOT, incentives, enablers and peer support; housing initiatives and referrals to allied services and outcomes to investigations, contact screening and treatment.

Results and conclusion: In the first three months of the Find & Treat project 100 hard to reach tuberculosis cases and 32 suspected cases were referred from treatment services across London. Approximately one-third of cases were referred due to loss to follow-up. A high proportion of cases are homeless, problem drug users or prisoners. We will present PRP data for the first six months of this project and discuss the challenges and opportunities of implementing the PRP in London.

PS-82277-18 La problematique de la prise en charge post exposition du VIH et SIDA

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Période: 2 Février 2007 au 15 février 2008.

Problématique: L'exposition au sang ou ses dérivés est très contraignant à l'heure du VIH et SIDA par rapport à celle de la tuberculose. La complexité, la pauvreté et la routine qui engrent cette catégorie du personnel soignant fait en sorte que plus de 70% des soignants (nursing) n'ont pas des notions sur la prise en charge post exposition du VIH et SIDA. Suite à ceci leurs clients sont aussi exposés au risque d'attraper le VIH et SIDA pendant l'exécution des soins. Car une mauvaise approche du soignant lors de l'administration des soins ou une mauvaise remise en ordre après cette administration des soins peut exposer soit son collègue soit son client à la contamination du VIH et SIDA.

Activités:

- Administration d'un questionnaire à 100 infirmiers dont 77 ont répondu aux questions ;
- Observation des attitudes des filles de salles de deux structures de deux hôpitaux ;
- Réunion d'échange avec les infirmiers de deux hôpitaux sur la prise en charge post expositionnelle et sur le traitement des déchets hospitaliers ;
- Partage d'expériences entre soignants.

Résultats:

- 2% de 77 soignants ont semblé avoir des connaissances sur la prise en charge post expositionnelle au sang l'heure du VIH/SIDA ;
- 0% des filles de salle avaient des connaissances sur l'existence d'une prise en charge médicale de la post exposition au sang à l'heure du VIH/SIDA ;
- 98% des soignants ignorent l'existence d'une prise en charge médicale à la post exposition au sang à l'heure du VIH/SIDA ;
- 20% des soignants connaissent leur statut sérologique ;
- 30% de 77 soignants respectent les règles des précautions universelles pendant l'administration des soins.

Leçon apprise:

- Etendre l'étude dans d'autres structures pour un échantillonnage significatif.

PS-82464-18 Selection and training of MDR-TB-HIV treatment supporters in Lesotho

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Aim: To evaluate the effectiveness of the selection criteria and training materials for community MDR-TB-HIV treatment supporters.

Design: Lesotho has a high burden of TB and HIV co-infection, and a growing problem with MDR- and XDR-TB-HIV. Since 2004, patients with MDR-TB have been provided with second-line TB drugs; this treatment has been largely self-administered. In 2007, an MDR-TB treatment program was started by the National TB Program in collaboration with Partners

In Health. This treatment program relied heavily on community treatment supporters to provide DOT of second-line TB drugs and antiretroviral therapy for all cases of MDR-TB diagnosed in the country.

Methods: The selection criteria for community MDR-TB-HIV treatment supporters were built on existing criteria community health workers; additional criteria were added to suit the increased load and complexity of work required for MDR-TB-HIV treatment. These criteria reflect the reality of largely rural Lesotho, and allow for a wide range of literacy, educational, and socioeconomic levels. Training materials were written to be appropriate for low-literacy community people with limited previous health-related training.

Results: MDR-TB treatment supporters include a wide range of community people. Some are existing village health workers or community HIV counselors, but others are lay people without previous health-related training. All types of treatment supporters have been effective in supporting and monitoring patients with MDR-TB-HIV. Treatment supporters are also involved in screening household contacts for TB and HIV.

Conclusion: The use of MDR-TB treatment supporters has proved to be effective in improving compliance of patients. The creation of jobs for people at community level has assisted in raising the socioeconomic status of the treatment supporters. Treatment support for MDR-TB patients, whether HIV co-infected or not, is more intensive than ART treatment support.

ABSTRACT PRESENTATIONS SUNDAY 19 OCTOBER 2008

THEMATIC SLIDE PRESENTATIONS

TB AND HIV AND SPECIAL POPULATIONS

TS-81525-19 Rapid scale-up of provider-initiated HIV counselling and testing for TB patients in Ho Chi Minh City, Vietnam

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Aim: The World Health Organization recommends that TB patients receive provider-initiated HIV counselling and testing (PITC). Few successful PITC models have been described in Asia, a region in which many countries, such as Vietnam, have a high TB burden but concentrated HIV epidemics. We reviewed results from a PITC program in Ho Chi Minh City (HCMC), the largest city in Vietnam.

Design and method: From 7/2006–12/2007, we provided PITC to all TB patients registered at a national TB hospital and 16 of 24 district TB units (DTU) in HCMC. TB program staff were trained to perform PITC, and space was dedicated within each DTU for counseling. TB patients diagnosed with HIV were referred to HIV clinics. Successful referral was defined as the patient physically visiting the HIV clinic and registering for government HIV benefits. The TB program collected aggregate quarterly reports about PITC and HIV services provided to HIV-infected TB patients.

Results: A total of 11 537 TB patients were registered, including 245 (2%) transferred from other DTUs. Of the 11 292 patients initially diagnosed at a participating DTU, 6755 (60%) patients had smear-positive TB, 1788 (16%) smear-negative TB, and 2749 (24%) extra-pulmonary TB (EPTB). Before TB diagnosis, 1573/11 537 (14%) patients were already known to be HIV-infected. We tested 9229/9964 (93%) patients with unknown HIV status, diagnosing 715 new HIV infections. The overall prevalence of HIV was 20% (2288/11 537); in EPTB patients, it was 32% (869/2749). Successful referral was documented in 2000 (87%) HIV-infected TB patients, 471 (24%) of whom received CPT and 263 (13%) of whom received ART.

Conclusion: HIV-associated TB is a major problem in HCMC. We successfully expanded PITC and HIV

services for TB patients in HCMC, and identified new HIV cases through this program. Efforts to increase co-trimoxazole and antiretroviral therapy use in HIV-infected patients are urgently needed.

TS-81655-19 Targeted mobile digital radiography to reduce diagnostic delay for tuberculosis among hard to reach groups

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Setting: Tuberculosis remains an important public health problem in London, particularly among homeless people, problem drug users and prisoners. These hard to reach groups comprise around one fifth of the total caseload but around one third of all smear positive cases and almost half of cases lost to follow up.

Objectives and Methods: We used a case control study to test the impact of active case finding using a mobile digital chest radiography unit (MXU) on delay to diagnosis, disease severity and infectiousness in hard to reach groups. Cases detected by the MXU and controls who presented passively were derived from the same target population. Multivariable models adjusted for age, ethnicity, prison history, homelessness and problem drug use. We compared diagnostic delay using a Cox proportional hazards model and used multivariate logistic regression to compare the proportion of patients who were smear positive on diagnosis.

Results: Very high rates (per 100 000 screened) of tuberculosis were found among problem drug users (717), homeless people (338) and prisoners (200). The study included 35 cases and 240 controls from the target group. The adjusted hazard ratio was 0.35 ($P < 0.0001$). Controls, on average, had almost three times the delay observed among cases. 44% of cases were smear positive on diagnosis compared to 66% of controls (adjusted OR 0.35 $P < 0.001$).

Conclusion: Targeted mobile digital radiography significantly reduces diagnostic delay, disease severity and infectiousness in hard to reach groups and is acceptable and accessible to the populations targeted.

TS-82026-19 Connect and consolidate: the strengthening of a community-based TB and HIV/AIDS programme

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Issues: Tuberculosis is the leading cause of death for people with HIV in Namibia. Challenges and complexities associated with dealing with co-infection remain enormous especially in poor resource settings. Early and effective screening for both TB and HIV are essential. Lack of linkages between disease control efforts for these diseases impacts on outcomes. To

improve effectiveness and outcomes there is a need for a supportive national framework and policies, co-ordinated shared implementation and a holistic approach to treatment care and support.

Description: The Penduka CB-DOTS Programme operates in Katutura, a township with a population of 200 000, a HIV prevalence rate of 26.7% and a case notification rate for TB of 781/100 000 (NTCP 2007). In 2006 10% of TB patients received VCT for HIV and even fewer HIV patients were screened for TB. Co-infected patients had a daunting task of coordinating their dual medical care through a maze of separate medical departments, NGOs and support groups. In 2007 with the implementation of a holistic approach, VCT for TB patients is up to 70%, referral systems and linkages have improved, HIV+ patients diagnosed with active TB are referred to CB-DOTS and TB patients who are HIV+ are monitored and commenced on ARVs according to their CD4 results. The programme provides daily supervision with medications, health education, support groups, income generation activities and daily meals. Most patients remain on the programme for 6–9 months. During this time they learn about treatment compliance and are less likely to become defaulters as the level of support reduces.

Lessons learnt: Results from a cohort of 1000 patients over a 2 year period at 14 CB DOT sites show an impressive reduction in defaulters from 21% to 1.3% and improved treatment outcomes. This programme demonstrates that strong linkages between HIV and TB services are essential to improve treatment outcomes in populations with high co-infections.

TS-82062-19 Current progress in implementing TB-HIV integrated services in Rwanda

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Background: Rwanda is highly affected by the TB-HIV syndemic. In response, a national policy on TB-HIV collaborative activities was developed, a TB-HIV working group (TB-HIV WG) established and program guidelines revised in 2005. The policy recommends one-stop services for counseling, testing and treatment of HIV infected TB patients through the TB clinic and systematic screening of all people living with HIV/AIDS (PLHA) for active TB. The TB and HIV program led the implementation of activities, starting at 2 model centers, followed by national scale-up.

Methods: An assessment was carried out to identify

training needs of health service staff. Training was conducted at district level for 141 health facilities providing TB and HIV services, with an emphasis on cross-training between programs using the model centres as practical training sites. Intensive site support, focused on clinical mentorship, monitoring and evaluation was conducted. The national TB-HIV WG met quarterly to review progress and resolve program implementation barriers.

Results: By February 2008, 33/36 district hospitals were implementing one-stop TB services. Nationally, HIV testing and counseling of TB patients increased from 46% in 2004 to 91% by the 4th quarter of 2007. The prevalence of HIV among those tested was 37%. Of the HIV-infected TB patients, 71% had initiated cotrimoxazole preventive therapy and all eligible patients were receiving ART. By 2007, 97/175 (55%) HCT, had documented evidence of regularly screening PLHA for active TB as part of routine care. Of the HIV-infected patients, 2% were diagnosed with active TB.

Conclusion: The Rwandan experience demonstrates that it is feasible to achieve rapid and successful implementation of TB-HIV integrated services in settings with a high level of political commitment. Challenges remain in reaching full coverage of one-stop TB services, implementing routine TB screening at HCT and ensuring timely and accurate TB diagnosis in PLHA.

TS-82173-19 Fear of HIV sero-disclosure among HIV-positive women and gender inequality an impediment to ART success

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Background: ART is a life long commitment and success depends heavily on patients' adherence and a supportive environment. For married women, HIV sero-disclosure to partners is critical.

Objectives: To assess HIV serodisclosure and ART success among married women in Zambia.

Methods: Married women on ART completed standardized questionnaire including in-depth oral interviews. Among questions included were on HIV sero-disclosure to a partner and cultural observance, ART adherence, partner sexual behavior and legal protection. The study area was across five (5) districts. (Lusaka, Ndola, Kitwe, Livingstone and Mansa).

Results: Out of 740 women, who participated, 87% did not disclose the status to a partner due to fear of blame, abandonment and losing the economic support of their partner. Data cite courts of law in Zambia to be driving fear of disclosure in women, as divorce is granted to men on the grounds that a wife went for VCT and is on ART without approval. Men's cultural control of sex and matrimonial decisions suggests

women's exposure to possible reinfection. More than 21% had their regimen shared in half with a non-tested husband. The results further suggest that 76% did not adhere to ART regimen as prescribed because they are trying to hide their pills. 94% had no access to legal protection.

Conclusion: Although more men in Zambia access ART, data analysis suggests that women have superior clinical outcomes once on ART when supported. But gender-based violence, denial and fear of HIV sero-disclosure to partners, and the customary law, which has disadvantaged women for decades, undo would-be success. ART success in women depends on the legal rights and freedoms, supportive cultural behavior and an enabling health care system. Thus, legal and health-care system is a major entry point to ending this conspiracy of customary law, culture and violence against women.

TS-82225-19 TB-HIV co-management at primary care level

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Aim: The WHO TB Care with TB-HIV Co-Management guideline module and accompanying short training courses target health workers at health centres and in district outpatient clinics in high HIV prevalence settings who have already been trained with the WHO IMAI Chronic HIV Care with ART and Prevention. IMAI Acute Care prepares health workers when 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. The TB Care with TB-HIV Co-management guideline module and training course supports integrated TB and HIV care, patient education, adherence preparation and support, monitoring of TB-ART co-treatment, and TB infection control. Country adaptation experience will be presented.

Interventions: Countries has been supported in the adaptation of the WHO TB-Care with TB-HIV Co-Management guideline module. Inter-regional workshop was held to thoroughly familiarize TB and HIV programme managers from 11 countries. A network of technical experts was developed to support country adaptation, relying heavily on south-to-south assistance. So far, adaptation of this guideline module is complete in 2 countries and ongoing in 10 countries. The experience of these country adaptations and early implementation will be presented and discussed. **Lessons learnt:** Providing TB and HIV care in the same site has clear advantages to the patient (one-stop care) and the health system but requires training,

adequate human resources, coordination of the district TB and HIV program, and TB-Infection Control in health care settings.

Recommendations: Countries should be supported in the adaptation and implementation of the WHO TB care with TB-HIV co-management module, it can contribute to the acceleration of TB-HIV collaboration and expedite the diagnosis and treatment of TB among PLHIV.

TS-82281-19 Implementation of a primary health care ART model for HIV co-infected TB patients improves treatment outcome

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Objective: To evaluate the impact of the implementation of a primary health care delivery model for antiretroviral treatment (ART) on the mortality of HIV co-infected patients during TB treatment.

Methods: From January 2006 onwards, HIV co-infected TB patients (identified by provider initiated counseling and testing) at 14 primary health care clinics in Kinshasa, Democratic Republic of Congo received cotrimoxazole (CTX) prophylaxis at the TB clinic, and were referred to existing antiretroviral treatment (ART) centers for HIV care. Assessment for eligibility, and provision of primary HIV care and ART was integrated into routine management at 3 TB clinics in September 2007, and in one additional clinic in January 2008. We compared the survival of HIV co-infected patients at these 4 clinics prior to and after the implementation of the primary health care ART delivery model.

Results: Between January 2006 and April 2007, 2368 patients registered for TB treatment at the 4 clinics, 411 (17.4%) were HIV co-infected. Among the HIV co-infected patients, 403 (98.1%) initiated CTX prophylaxis and 59 (14.4%) gained access to ART. 99.4% were on still on CTX treatment at the end of TB treatment. 18.0% of patients died during TB treatment, and 5.8% were lost to follow-up. Since September 2007, 107 HIV co-infected patients were identified at the same 4 clinics. Among these, 100% initiated CTX, and all ART-eligible (44 or 41% of all HIV co-infected patients) initiated ART. At time of analysis, 7 (6.5%) of HIV co-infected patients had died, of which 3 were on ART at time of death. We thus observed a 63.6% reduction in proportion of HIV co-infected patients who died during TB treatment following initiation of the integrated ART eligibility screening and delivery model.

Conclusions: Integrating ART screening and delivery at the primary health care level TB clinic significantly improves access to ART among those in need, and improves the survival of HIV co-infected TB patients.

TS-82406-19 Home-based care workers screening for TB when visiting with people living HIV/AIDS in South Africa

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Aim: Tuberculosis (TB) is a leading cause of death among people living with HIV/AIDS (PLWHA). WHO recommends regular active case-finding to decrease the burden of TB among PLWHA. As part of comprehensive HIV care and treatment, Catholic Relief Services and the US Centers for Disease Control and Prevention are field testing a program to train home-based care workers (HBCWs) to conduct TB symptom screening among PLWHA.

Methods: HBCWs, antiretroviral adherence counselors, and nurses from one urban and one rural site attended a skills-based participatory training on TB symptom screening. TB screening during home visits included asking PLWHA about: 1) TB symptoms (i.e., cough, fever, night sweats, unexplained weight loss, fatigue, and hemoptysis), and 2) risk factors for infection such as living with or having been in contact with a person with TB disease. HBCWs were trained to screen for TB, document results, and refer PLWHAs for further evaluation for TB disease if they had two or more symptoms/risk factors. Staff knowledge and confidence to conduct TB screening were measured by pre and post-training assessments.

Results: Among the 74 staff who were trained, awareness of TB symptoms increased from 63% to 90% ($P < 0.001$) and confidence in their ability to screen for TB increased from 74% to 90% ($P < 0.001$). At the rural site, from January–February 2007, HBCWs identified 248 PLWHAs with 2 or more TB symptoms and referred them for evaluation at a TB clinic; 55 (22%) were diagnosed with TB disease.

Conclusion: We report a high prevalence of TB among PLWHA who were screened by HBCWs. The preliminary findings show that TB screening by HBCWs can contribute to TB case detection. We are currently working with staff to improve the consistency of screening, referral for evaluation, data collection and reporting. Results from the next phase of program implementation and data collection will be shared at the meeting.

TS-82295-19 TB incidence in HIV-infected patients starting antiretroviral therapy in a South African mining population

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Aim: To describe and explore risk factors for TB incidence following antiretroviral therapy (ART) initiation among miners with HIV infection in South Africa. **Design:** Retrospectively analysis.

Methods: Routine data from patients initiating ART between March 2003 and 30 September 2007. A TB episode was defined as TB treatment initiation, ascertained from a company TB database. Patients were followed from ART initiation to first TB episode, de-registration from the clinic or 30th September 2007. Cox regression was used for the analysis.

Results: 1363 miners (mean age 41.9y; 96% males, 53% WHO stage 3, 18% WHO stage 4 and median VL 110 262 copies/ml) were included. 257 patients developed TB over 2413 person years (py) (median 1.56) with an incidence 10.64 per 100 py. IPT was used in <1% of patients. TB incidence reduced with duration of time after starting ART: <45 d 26.06/100 py, 45–90 d 14.9/100 py, 91–180 d 11.2/100 py, 181–360 d 8.9/100 py, 361–540 d 5.69/100 py and 540–720 d 4.1/100 py. On univariate analysis, risk factors were CD4 count at baseline (CD4 ≤ 50 cells/μl: HR = 1; CD4 51–200: HR 0.85; CD4 201–250: HR 0.62; CD4 > 250: HR 0.42, $P < 0.001$), baseline viral load (<10 000 copies/ml HR 1, 10 000–100 000 HR 1.66, >100 000 HR 2.51, $P < 0.001$) and WHO stage baseline (WHO 1: HR 1; WHO 2: HR 0.94; WHO 3: HR 2.06; WHO 4: HR 1.77, $P < 0.001$). On the multivariate analysis, WHO stage ($P = 0.04$) and baseline viral load ($P < 0.01$) were independent risk factors. Age group, prior TB history, gender, prior IPT use and stopped ART were not significantly associated with TB incidence.

Conclusions: TB incidence in patients starting ART remains extremely high, even after 2 years of treatment. The high incidence immediately following ART could be either due to immune reconstitution syndrome or following TB screening at ART initiation. All patients should be screened for TB before starting ART. TB incidence could be further reduced by concomitant isoniazid preventive therapy.

POSTER DISCUSSION SESSIONS

TB DIAGNOSIS AND CONTROL

PC-81423-19 Surrogate markers for poor outcome treatment for tuberculosis: results from extensive multi-trial analysis

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Setting: It is now widely acknowledged that new regimens are needed for the treatment of tuberculosis and several large multi-centre clinical trials to evaluate new regimens have started in recent years. The combined final endpoint used in such trials is failure at the end of treatment or relapse (poor outcome). Surrogate markers measured early in treatment, used as substitutes for poor outcome in evaluating new treatment regimens, are urgently required to reduce costs and speed new tools for national tuberculosis programmes.

Objectives: To evaluate culture results during treatment as surrogate markers for poor outcome.

Data: The data are from twelve randomised controlled trials conducted by the British Medical Research Council in the 1970s and 80s in East Africa and East Asia, consisting of 6974 participants across 49 treatment regimens. Data are also included from two recent international multi-centre trials.

Methods: The receiver operating characteristic (ROC) curve, displaying sensitivity and specificity was used to evaluate monthly culture results as prognostic markers for poor outcome. To evaluate cultures as surrogate markers, the treatment effect on the culture result was plotted against the treatment effect on poor outcome and a mixed effects model fitted.

Results: No marker was a good individual-level predictor. Sensitivity was too low at month 2 and specificity too low at month 1. The area under the ROC curve (AUC) is greater at month 3 than at month 2 (see table), indicating marginal superiority. Surprisingly, the month 2 culture result was shown to be a poor surrogate marker (based on R^2 [trial]). The month 3 culture result, on the other hand, was shown to be a moderate surrogate marker.

Marker:

Culture result at	Sensitivity	Specificity	AUC (95%CI)	R^2 (trial)
Month 1	80%	44%	0.68 (0.66, 0.70)	0.23
Month 2	40%	85%	0.70 (0.67, 0.74)	0.37
Month 3	19%	96%	0.74 (0.67, 0.81)	0.67
Month 4	15%	98%	0.66 (0.55, 0.78)	0.39

Conclusion: Culture positivity at 3 months outperforms that at 2 months as a surrogate marker but, on

this evidence, is less than perfect. Further work on these data, and better surrogates are needed.

PC-81701-19 Risk of reinfection with different *M. tuberculosis* strains among retreatment cases in Latvia

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Aim: To find out and reduce the risk factors for tuberculosis (TB) reinfection.

Design: Retrospective case control study. Non-probability convenience sampling of retreatment cases (RC) according to WHO definitions of 31 available *M. tuberculosis* cultures for current and previous TB episodes from years 2001 to 2005.

Methods: Drug resistance was determined by absolute concentration and/or BACTEC cultivation methods. Molecular typing of *M. tuberculosis* isolates was performed by analysis of PVU II restriction patterns and spoligotyping, compared in program Gel Compar.

Characteristics of previous cases #31	Reinfection cases #24	Reactivation controls #7	OR, P value
New	15	5	0.67, P = 0.77
Relapses	8	0	0
Retreatments after failure	1	1	0.26, P = 0.47
Sputum smear positive, culture positive	19	5	1.52, P = 0.81
Sputum smear negative, culture positive	5	2	0.66, P = 0.81
<i>M. tuberculosis</i> sensitive (#ST1 and #ST42 among them)	18 (1 ST1 and 0 ST42)	1 (0 ST1 and 0 ST42)	18.00, P < 0.05
<i>M. tuberculosis</i> resistant (#ST1 and #ST42 among them)	4 (2 ST1 and 0 ST42)	3 (2 ST1 and 0 ST42)	0.27, P = 0.09
<i>M. tuberculosis</i> MDR (#ST1 and #ST42 among them)	2 (2 ST1)	3 (3 ST1)	0.12, P < 0.05
HIV infection	2	0	0
Diabetes mellitus	2	0	0
Sputum smear negative after 2 or 3 months of treatment	9	1	4.5, P = 0.15

Results: Cases—24 TB RC with genotypically different *M. tuberculosis* in both episodes, suggesting reinfection with different strain. Controls—7 TB RC with genotypically identical *M. tuberculosis* in both episodes, suggesting endogenous reactivation of existing strain. Characteristics of previous TB episode see in table. Median time of sputum smear (ss) conversion in previous episode for non-MDR cases was 72 days, but for controls 148 days. Median hospitalization time for cases was 208 days and controls 181 days. Me-

dian duration of ambulatory treatment for cases was 32 days and for controls 93 days. Reinfection cases were developed in median 19 months after previous case registration, reactivation controls after 22 months. 7 cases were reinfected with different strains, but 17 with *M. tuberculosis* of 12 Beijing (ST1) and 4 LAM (ST42) genotypes. 16 of these 17 strains were multi-drug-resistant (MDR), including 1 extreme drug resistant (XDR). 13 (81%) from these MDR and XDR strains were in clusters.

Conclusion: The highest risk for reinfection is long hospitalization for patients with early sputum smear conversion, HIV infection and diabetes. Reactivation was found among patients with severe TB forms. To decrease risk of TB transmission in hospitals, strong infection control measures and ambulatory treatment should be enforced.

PC-81774-19 Study of relapse and failure cases of cat I registered from 1994 to 2005 and retreated with Cat II under DOTS

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Aim: To analyse the treatment outcome of Cat I smear positive Relapse and Failure cases of TB when treated with Cat II under India's DOTS Program for period of 12 years.

Design:

–Cat I regimen is given to new smear positive cases and seriously ill smear-negative and extra-pulmonary cases. It consists of 2 months of HRZE thrice weekly in intensive phase and 4 months of HR thrice weekly in continuation phase.

–Cat II regimen is given to relapse and failure cases.

–Relapse: Smear-positive case once cured reports back as smear-positive again after a gap.

–Failure: Smear-positive case remains positive at the end of 5 months of short course chemotherapy.

Methods: All Cat I smear-positive cases registered from 1994 to 2005 in Chest Clinic Gulabi Bagh (CCGB), Delhi covering a population of 100 000 were meticulously followed up. Relapse and failure cases arising out of these cases were put on Cat II regimen. The retreatment outcome data in each group was reviewed and analysed.

Results: The study population included 5576 Cat I positive cases in CCGB, Delhi from 1994 to 2005. The average cure rate was 88% (84.8% to 93.7%). The average failure rate was 3.4%. Out of total 4905 cured cases, 9% relapsed. The success rates of relapse and failure cases when put on Cat II regimen were 76% and 49% respectively.

Conclusion: The significant success rate of Cat I relapse cases when put on Cat II shows efficacy of Cat II regimen for treatment of relapse cases. The failure cases of Cat I when treated with Cat II showed significantly

lower success rates ($P < 0.05$) as compared to Relapse cases. In view of low success rate and high failure rate in Failure cases of Cat I when put on Cat II, the authors recommend reappraisal of Cat II regimen for such cases or at least initial drug susceptibility testing before initiating Cat II regimen.

PC-81882-19 Performance of TB screening prior to community-wide IPT among gold miners in South Africa

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Setting: 'Thibela TB' is a cluster-randomised trial evaluating community-wide isoniazid preventive therapy (IPT) in three gold mining companies in South Africa. Prior to IPT, participants are screened by trained nurses for active TB using symptoms (cough >2 w, night sweats, weight loss) and chest radiograph.

Objectives: To describe TB cases missed at screening and to explore risk factors for screening failure.

Methods: We included study participants enrolling between July 06 and July 07 who started IPT within 7 days of enrollment. Screening failure was defined as starting TB treatment (documented or self-reported) or discontinuation of IPT based on positive smear or culture within 3 months of IPT start. HIV status was not determined as part of the study.

Results: Among 8116 participants (median age 39 [IQR 31–45] years, 98% male, 8% past history TB, 0.8% prior history of IPT, 2.2% on ART), 26 (0.3%) were classified as screening failures. None had TB symptoms at enrollment. Previous IPT was associated with screening failure (OR 16.6, 95%CI 4.9–56.8); there was also a trend to association with screening failure and age over 40y (OR 3.8, 95%CI 0.9–16.4 vs. age <29 y), current ART use (OR 3.8, 95%CI 0.9–16.1) and history of TB (OR 2.6, 95%CI 1.0–7.0).

Conclusion: Previous IPT, current ART and prior history of TB are all likely to be markers for positive HIV status, which may predispose to screening failure. Overall, however, this screening strategy has missed very few cases of active TB.

PC-81949-19 Risk factors associated with death in tuberculosis patients in Ouagadougou, Burkina Faso

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Setting: Burkina Faso is a West African Country. It is estimated that 233 new cases of TB all forms/100 000

habitants occur every year. A National Tuberculosis Programme that implements the DOTS strategy was introduced in Burkina Faso in 1995. Mortality rate was 12.5% in 2006.

Objective: To identify risk factors associated with TB mortality among tuberculosis cases in Ouagadougou, the capital city of Burkina Faso.

Design: Case control analysis of new TB patients registered in 5 treatment centres during 2006. Case is defined as a new all form TB case death during TB treatment. Control case is defined as a new all form TB case declared success of treatment. The TB register of each TB center was reviewed to obtain information about sex, age, grade of smear, TB form, baseline weight in Kg, HIV status and antiretroviral treatment (HAART) in all death outcome and in control cases (2 control cases for each case). The anti-tuberculosis regimens used for Category I was 2 (RHZE)/6 (EH). Analysis was performed using Epi Info 2000 and SPSS, Version 12.0 to identify the independent risk factors for death. *P* values of less than 0.05 were considered significant.

Results: 123 cases and 246 control cases were analysed. Sixty nine (56%) of cases were HIV positive. Median number of days between treatment initiation and death was 46. In multivariate analysis, factors independently associated with death were age >39 years (OR = 1.69, 95%CI 1.07–2.69); baseline weight <50 Kg (OR = 1.92, 95%CI 1.18–3.11); HIV infection (OR = 5.03, 95%CI 2.60–9.87) and being off HAART (OR = 4.03, 95%CI 1.65–8.86).

Conclusions: In our study, HIV infection and being off HAART are associated with death. Availability of rapid diagnostics, application of new diagnostic algorithm for smear negative pulmonary tuberculosis in HIV patients, availability of chest x-ray, and early antiretroviral treatment in HIV patients are possible approaches in attempting to improve treatment outcomes.

PC-82005-19 Rifampicin plasma concentrations in children hospitalised for the management of severe tuberculosis

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Objective: This study evaluated the pharmacokinetics of rifampicin (RMP) in children.

Patients and methods: Fifty-four children, 21 HIV-infected and 33 uninfected, mean ages 3.73 and 4.05 years ($P = 0.68$) respectively, admitted to a Cape

Town, South Africa, tuberculosis hospital with severe tuberculosis were studied 1-month and 4-months after commencing antituberculosis treatment. Blood specimens for analysis were drawn 0.75, 1.5, 3.0, 4.0 and 6.0 h after dosing. RMP was determined by mass spectrometry supported by high pressure liquid chromatography.

Results: The children received a mean RMP dosage of 9.60 (6.5–15.6) mg/kg bodyweight at 1-month and 9.63 (4.63–17.8) mg/kg at 4-months after commencing treatment. The mean RMP area under the curve 0–6 h after dosing was 14.9 and 18.1 $\mu\text{g}\cdot\text{h}/\text{ml}$ ($P = 0.25$) 1-month after starting treatment in HIV-infected and uninfected children respectively and 16.52 and 17.94 $\mu\text{g}\cdot\text{h}/\text{ml}$ ($P = 0.59$) after 4-months treatment. The mean calculated 2 h RMP concentrations in HIV-infected and uninfected children were 3.9 and 4.8 $\mu\text{g}/\text{ml}$ ($P = 0.20$) at 1 month after treatment start and 4.0 and 4.6 $\mu\text{g}/\text{ml}$ ($P = 0.33$) after 4-months treatment. At 1-month after starting treatment 24 children (44%) had calculated 2 h plasma concentrations $<4 \mu\text{g}/\text{ml}$ (57% and 41% ($P = 0.37$) amongst HIV-infected and uninfected children respectively) and 25 (46%) at 4-months (39% and 43% ($P = 0.83$) amongst HIV-infected and uninfected children respectively).

Conclusion: HIV-infected and uninfected children with tuberculosis have similar low RMP serum concentrations after receiving standard RMP dosages similar to those used in adults. Pharmacokinetic studies of higher doses of RMP in children are urgently needed.

PC-82069-19 Role of cough monitors to ensure completion of TB evaluations in mobile populations

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Background: Evaluation of TB suspects through the evaluation of 3 sputum specimens presents logistical challenges. In the outpatient (OP) setting return the 2nd day is difficult for patients; inpatient (IP) evaluations may require patients to remain hospitalized to complete collections. Use of cough monitors (CM) coupled with cell phone technology may overcome this barrier.

Methods: 4 CMs working at Moi Teaching and Referral Hospital (MTRH) were given a phone directory of 173 CMs distributed at peripheral health units in western Kenya. MTRH CMs redesigned their log books to include all necessary patient and clinician tracking information. When OP could not return or IP were discharged early, MTRH CM contacted local CM with request to complete evaluations. MTRH

CM tracked both OP and IP to verify receipt of delayed lab results and to ascertain follow-up. Laboratory register and cough monitor patient logs were retrospectively analyzed to note the number of AFB smear results per case and successful return of results with follow-up for 200 consecutive new TB suspects.

Results: Prior to the new protocol, 13.0% ($n = 13$ of 100) of cases reported less than three sputum smear results (incomplete evaluation). The rate of incomplete evaluation fell to 4.0% ($n = 4$ of 100, $P = 0.0375$) under the CM protocol. Prior to the new protocol, proper communication of results and follow-up care was not documented. The new CM protocol permitted documentation of all patients' receipt of available results and follow-up care.

Conclusion: Cough monitors in our setting were initially utilized to perform active case finding. However, CM may be utilized both in the outpatient and inpatient settings to ensure completion of evaluation and documentation of follow-up, even in highly mobile patient populations.

PC-82079-19 Application of a process-based performance review tool to improve diagnosis of pulmonary tuberculosis

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Setting: Previous data on 350 South African miners showed 65% of pulmonary tuberculosis (PTB) detected at autopsy was not diagnosed in life. This led to the development of a Process-Based Performance Review (PBPR) tool to identify 'missed opportunities' in TB diagnosis.

Objectives: (1) To perform a clinical-pathological comparison for PTB in a group of patients who had undergone autopsy; and (2) to evaluate the PBPR tool in a range of health care settings (a South African teaching hospital, two mine hospitals and a UK teaching hospital).

Methods: The PBPR tool was used to evaluate the medical and autopsy (where performed) records of deceased patients. The tool is a single flow sheet used to collect demographic and diagnostic details, important clinical actions and an assessment of the process of care and response to therapy. The tool identifies 15 actions, which if carried out, should minimise missed diagnoses.

Results: Preliminary data on 159 cases have been analysed. In the 133 with both clinical and autopsy data, 44 patients had PTB at autopsy, 23 (52%) of whom

were not diagnosed in life. The sensitivity of clinical diagnosis was 48% (21/44) and specificity was 80% (71/89). The PBPR tool was used to review 56 of the 62 cases with a clinical and/or pathological diagnosis of TB, and a further 26 cases without autopsy data but with a clinical cause of death of TB and/or HIV. The tool identified inadequate clinical history in 55% (45/82), the absence of chest radiography in 36% (30/82), and failure to send any TB sputum smears in 46% (38/82) of these cases. On average, there were 9.4 missed opportunities per case.

Conclusion: The PBPR tool identified omission of simple clinical processes in the context of the significant proportion of missed diagnoses. Used in conjunction with a manual that describes best practice, the tool is a reliable, widely applicable and educational method for diagnosing PTB and, ultimately, improving clinical performance.

PC-82260-19 Utility of a T-cell interferon- γ release assay for diagnosis of active tuberculosis in a low prevalence area

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Background: T cell interferon- γ release assays (IGRA) have high specificity for TB infection, but their use for diagnosing active TB is restricted in regions with high endemicity due to a high background prevalence of latent TB.

Setting: Departments of infectious and pulmonary diseases in the university hospitals in Malmö and Lund, Sweden.

Objectives: To evaluate the utility of an IGRA (QuantiFERON®-TB Gold; QFT) in investigation of suspected active TB in a low-prevalence area (Sweden; annual TB incidence 5/100 000), and to identify factors associated with IGRA results in patients with confirmed active TB.

Methods: Adult patients investigated for suspected active TB underwent QFT testing, in addition to routine TB investigations. Newly arrived immigrants from countries with high TB incidence were recruited as control subjects. Positive (PPV) and negative (NPV) predictive values of IGRA for identifying active TB among patients were calculated.

Results: Among 141 patients, 70 were diagnosed with TB. QFT was positive in 41 TB patients and in 16 patients in whom TB was not the final diagnosis. For pulmonary TB, PPV and NPV was 61% and 68%, respectively; for isolated extrapulmonary TB, PPV was 90% and NPV 67%. Among 96 healthy immigrants, 10 had a positive QFT result. PPV was 77% and NPV 82% in TB patients from high incidence countries. TB patients with positive IGRA test had lower median total leukocyte count ($P = 0.001$) and

higher body mass index ($P = 0.020$) than IGRA-negative TB patients.

Conclusion: IGRA has a low PPV for pulmonary TB, but is satisfactory for extrapulmonary TB. Positive results were significantly more frequent in patients with TB than in healthy immigrants from high-prevalence areas. Although lacking in sensitivity, IGRA may be useful in assessing patients with suspected active TB in low-prevalence areas.

PC-82438-19 Reproducibility of two commercial interferon-gamma release assays

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Introduction: Interferon-gamma Release Assays (IGRAs) are promising tools for the diagnosis of tuberculosis infection and are increasingly used in research and routine screening. However, there are limited data on the variability and reproducibility of IGRAs. **Aims:** We assessed test-retest reproducibility, intra-, inter-operator and intra-individual variability and the agreement between different tests for 2 commercially available IGRAs.

Methods: QuantiFERON-TB Gold In-Tube (QFT-IT) and T-SPOT.TB (T-SPOT) were performed in 27 health care workers. Two sets of each assay were performed by different operators on day 1. On day 3, QFT-IT was repeated by one operator and two T-SPOTs were assessed, each by a different operator. The agreement between the proportions of positive tests was calculated using the kappa coefficient.

Results: Due to errors in the standard curve 72/216 (33.4%) QFT-IT results were invalid. 12/27 subjects (44.4%) had ≥ 1 positive QFT-IT; there were no indeterminate QFT-IT. Agreement between duplicate QFT-IT was excellent (kappa 0.95). All T-SPOTs were valid, 19/27 subjects (70.4%) had ≥ 1 positive result, 3.2% (7/216) were indeterminate. Agreement between duplicate T-SPOTs was good (kappa 0.72). Intra-person reproducibility was excellent for QFT-IT (kappa 1) and good to excellent for T-SPOT (kappa 0.7–0.85). Inter-operator agreement for QFT-IT was excellent (kappa 1) and moderate to good for T-SPOT (0.59–0.71). Inter-operator reproducibility for T-SPOT interpretation was moderate to good (kappa 0.59–0.77). Overall agreement between the 2 IGRAs was good (kappa 0.71). We also compared continuous

antigen responses, which showed a higher degree of variability.

Conclusions: The reproducibility of both IGRAs was moderate to excellent. QFT-IT performed slightly better, but the reason for the high number of invalid results requires further investigation. Our data indicate that both IGRAs are robust tests if performed in an experienced laboratory.

EDUCATION AND TRAINING OF HEALTH CARE WORKERS

PC-81778-19 Adherence to latest GINA guidelines among internal medicine residents in a tertiary hospital

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Aim: Medical Residents are among the primary care physicians. We undertook the current study to test their understanding of the guidelines because understanding the guidelines is the first step in applying their principles to patient care.

Design: This is a descriptive qualitative study involving Internal Medicine Residents.

Methods: A 15-question multiple choice of asthma knowledge using the latest GINA guidelines were distributed among second and third year medical residents who are expected to have read the latest GINA guidelines.

Results: Thirty one respondents were included in the study. 71% had shown that the clinical diagnosis of asthma consisted of episodic breathlessness, cough and wheezing. Spirometry was not part of diagnosis in asthma in 68% of the respondents. In this study, initial treatment plan was noted to be based on severity in 55% of the medical residents and 45% answered level of asthma control. 84% of respondents follow up stable asthmatics quarterly and 65% of them quarterly adjust their medications in stable patients. 65% do not do routine peak flow monitoring. Only 65% of them know the proper inhaler technique and sixty eight of them teach inhaler technique to their patients. Only sixty five percent have asthma control plans. 74% of them had read the latest GINA guidelines but only 42% percent were confident to say that they are adherent to the guideline.

Conclusion: There are observed deficits in physician understanding of the GINA guideline hence better educational programs be directed towards them.

PC-81805-19 Community-based approach in TB control by strengthening the health system

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Introduction: BRAC initiated community based TB programme since 1984. Currently BRAC-NTP jointly expanded TB control activities in two third of Bangladesh covering 86 millions of population. Community participation especially in case detection, home-based treatment and referral added additional strength to health system.

Objectives: To strengthen the health system by involving community in TB control programme.

Methods: BRAC works closely with Government and other NGOs in TB control and contributes substantial role to strengthening the health system. BRAC addresses the gaps in human resources at health facilities and community levels. Community health volunteers (known as Shasthya Shebika) are involved to increase awareness on TB, referral and treatment adherence. BRAC established additional laboratories at local government facilities to increase their utilization. Routine outreach sputum collection centers are organized below sub district at community settings. Different local level stakeholders are engaged through coordinated advocacy, communication and social mobilization activities.

Results: Currently 900 staffs and 68 000 community health volunteers are working for BRAC TB control programme. Beside Government laboratories, 276 additional laboratories established in BRAC supported areas. 350 lab technicians were trained till 2007. 4719 local opinion and religious leaders; and through 620 DOTS committee meetings, representatives of different sectors were oriented in 2007. In 2007, the BRAC areas' case detection rate of new smear positive cases was 79%. Treatment success rate of patients treated in 2006 was 94%.

Conclusion: Community based TB control approach provided additional capacity to achieve targeted results timely.

PC-81993-19 General practitioners' knowledge and practice regarding chronic obstructive pulmonary disease

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Objective: To assess COPD related knowledge and practice patterns among general practitioners' (GPs).

Methods: An anonymous self-administered, multiple-choice-questionnaire, based on local and international COPD guidelines, was developed. GPs attending respiratory CME's at different dates and venues participated.

Results: Since 2004, 363 senior and mid-level TB programme managers were trained from 30 countries and 352 tobacco control managers were trained from 9 countries. Main learning's identified by participants included creating successors, evaluating the need of subordinator, prioritizing activities and allocating appropriate time. They also stated that the programme improved their skills in changing attitudes, behaviors and listening quality. Other frequent learning's included enhancement of knowledge and skills in strategic management, planning, and leadership. The mean score of all the reactions from participants was 31.82 (SD, 2.62, max, 36, min, 26). Other significant benefits included: new knowledge that is pertinent (55%), specific approaches and skills (75%), changed attitude that will help in the job (71%). More than 50% of the participants evaluated the courses as excellent.

Conclusion: The Union's action oriented MEP addresses critical leadership and management challenges in implementing the WHO Stop TB Strategy and reducing tobacco use in high-burden low-resource settings.

PC-82110-19 Influence of stigma and discrimination on health care workers: access to post exposure prophylaxis

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Aim:

- 1 Investigate factors influencing utilisation and under-utilisation of PEP by HCWs in Malawi.
- 2 Determine the extent to which HCWs practice universal precaution guidelines.

Methods: The study used both qualitative and quantitative methods to collect data. In-depth interviews were conducted with 45 HCWs in 2 districts. Qualitative findings informed a survey conducted among 906 HCWs in 8 districts across Malawi.

Results: Only 12.3% (N = 349) had accessed PEP after an occupational exposure although 39.8% HCWs (N = 887) had experienced an exposure in the past 12 months. Most injuries 75.9% (N = 348) were due to needle sticks. Fear of stigma and discrimination, unavailability, lack of knowledge about PEP, and fear of testing for HIV were some of the major challenges to accessing PEP. Lack of materials and heavy work load were the major challenges to practicing of universal precautions. Qualitative data showed that lack of knowledge about PEP contributed to stigma where most respondents indicated that some health care workers mistake PEP drugs with ART thinking that if one is on PEP then they are HIV positive. Others indicated that access to PEP lacks confidentiality as a

PC-82066-19 Developing future leaders for TB and tobacco control programme: The Union Management Education Programme

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Background: The Union's Management Education Programme (MEP) provides TB and Tobacco control managers with skills in leadership, strategic planning, innovative thinking and problem solving. The MEP includes a package of four courses addressing management, finance, logistics, budget planning, project cycle management, human resource development and leading management teams.

Objective: To explore the reactions of participants attending the action oriented learning programme of the Union.

Methods: All course participants are required to carry out an end of course overall course reaction-evaluation using a self administered semi-structured questionnaire. Qualitative and quantitative methodologies were employed in the analysis.

number of people have access to the PEP register in most facilities therefore a HCWs HIV status cannot be confidential.

Conclusion: HCWs face many of challenges to access PEP. PEP services and protective material should be available in all health facilities. There is need devise ways in which HCWs can access HIV/AIDS related services in an environment free from stigma and discrimination.

PC-82233-19 Managing information for action, training for strengthening skills of Indian TB Programme officers

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Background: External reviews of India's Revised National TB Control Programme (RNTCP) have noted that the recording and reporting of programme monitoring data is well organized, timely, and complete. However, reviewers have concluded that valuable routine programme monitoring data is inadequately utilized for evaluation and programme improvement at the state, district, and sub-district levels. Rather, the information is primarily used to assess progress towards set programme targets. To address this weakness, we developed and pilot tested a basic data analysis and interpretation training workshop (MIFA) for State and District TB programme managers in the states of Andhra Pradesh and Rajasthan.

Approach: The one-week MIFA course focused on transforming routine programme monitoring data into information that is relevant for decision making in TB control by district level officers. Pre and post-course assessments were conducted to evaluate the knowledge, data analysis capacity, attitude, and interest of the local TB programme officers in using their own data to understand and address weaknesses in local TB programme management and implementation.

Results: After implementation of the MIFA course, assessments found improvements in knowledge scores, data analysis capacity, and in self-reported measures of attitude and interest relative to pre-course testing. Interim analyses indicates that the case finding and case holding performance at the district level improved in both states during the quarter subsequent to the training.

Implications for Programme: The MIFA course appears to be effective at providing knowledge and tools for local programme officers to make evidence-based decisions for programme improvement. More broadly, this initiative may be a modest but important part of the efforts of RNTCP to improve the long-term sustainability and quality of programme implementation.

PC-82248-19 People living with HIV: expert patients as trainers and clinical team members for TB-HIV care

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Aim: Integrated Management of Adolescent and Adult Illness (IMAI) uses people Living with HIV as standardized patients known as Expert Patient Trainers (EPTs). Besides being involved in the training of health care workers, expert patients can be prepared to join the clinical care team. This strategy enables scaling up and decentralisation of HIV services in many resource-poor countries where the TB-HIV epidemic poses serious challenges to already stressed health systems.

Methods: More than 30 countries use EPTs in IMAI trainings. They are usually recruited from groups of people living with HIV, and undergo a three-day preparation on case presentation and use of checklist for health care worker performance assessment. EPTs give feedback to health care worker in a skill station. After the training, the EPT can be incorporated into the clinical team for supporting patients and giving adherence counselling.

Findings: This experience has shown that EPTs improve the quality of training on HIV for health care workers through fostering mutual respect and reducing stigma. Based on the successful experience in using EPTs in HIV/ART trainings, EPT cases were developed and are now being used in TB-HIV co-management training. Results will be presented from several countries. Both EPTs and health care workers grew to respect each other, a lesson that hopefully is retained during clinical practice with real patients. EPT's sense of partnership with the health care workers in managing their illness improved due to their role as trainers and the acquisition of more knowledge and skills about HIV management.

Conclusion: Involvement of the expert patient is an untapped resource that should be incorporated in the health service delivery both to help address the human resource crisis and to improve quality of care. Systematic use of EPTs in scaling up TB-HIV interventions should be expanded to improve in-service training and be incorporated into pre-service training.

PC-82479-19 Health care workers' knowledge, attitude and practices regarding prevention of smoking in gold mine workers

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Aim: The objectives of this study were to determine the knowledge, attitudes and practices (KAP) of HCWs

regarding prevention of smoking in gold mine workers and to use this information to propose a framework for a smoking intervention programme for the mines.

Methods: This was a cross-sectional descriptive KAP study. Data were obtained from 69 HCWs using self-administered questionnaires from 161 occupational lung disease (OLD) and 30 medical ward admission record reviews and from 4 informal discussions.

Results: While knowledge and attitudes about smoking was good and 84% of HCWs reported that they would routinely ask smoking status and document it, this was not done in practice. An overwhelming majority of HCWs are aware that smoking is harmful to one's health (98%); is harmful to workers' health (97.1%), and predisposes them to acquiring lung diseases (95.7%). Half (56.7%) of the nurses, but no doctors documented smoking history on admission and poor follow-up of this advice (38.5%) is alarming. HCWs identified a need for support structures such as workplace and community programmes that include education, training and awareness campaigns.

Conclusion: HCWs are responsive to workplace smoking interventions: they are knowledgeable, show insight and have positive attitudes towards smoking interventions. A more enabling environment is required to establish good workplaces practices. A framework for smoking interventions on the mines, incorporating the HCW programme has been proposed. Awareness of this study and its preliminary findings has already demonstrated a paradigm shift in thinking about tobacco on the gold mines.

Methods: A questionnaire addressing NTP surveillance infrastructure and characteristics was completed by all 19 industrialized countries, where the population is greater than 3 million and annual tuberculosis incidence was lower than 16 cases per 100 000 population for 2003.

Results: All European countries surveyed adopted Euro-TB definitions and, in most countries, data flow electronically to the central level. Surveillance information, which usually includes names, is transferred electronically to the national level in most countries. Surveillance systems in the majority of countries surveyed capture both process and social determinants. Case notification to the central level occurred within a median period of seven days, independent of mandatory notification requirements ($P = 0.23$). Average completeness of reporting was estimated as 93.5% (range 65%–100%). The correlation between estimated completeness and the existence of penalties or incentives to reporting was moderate ($P = 0.048$). Integration between HIV and tuberculosis registries was performed in two countries, and in eight others, both databases were cross-matched periodically.

Conclusion: NTP function in industrialized, low-incidence countries utilizes well-established infrastructure and relies on central operations. Approaches are consistent with the current WHO surveillance recommendations. Improved global harmonization in outcome determinants may enhance global TB surveillance. Analysis of these surveillance systems may assist policy makers in countries moving from low- to middle-income status.

CONTROL OF INFECTION AND DOTS

PC-81392-19 Tuberculosis surveillance systems among low-incidence industrialised countries: an international comparison

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Introduction: Comparative analysis of national tuberculosis control programmes (NTP) in industrialized, low-tuberculosis-incidence countries is limited.

Objectives: To analyze the applied methods, function, and accumulated experience of the different NTP in order to provide a better understanding of the standard methods used that could contribute to improving global tuberculosis control.

PC-81426-19 Contact slips project in Ndwedwe, KwaZulu-Natal: an innovative approach for screening TB contacts

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Background: Close contacts that spend time with someone who has infectious tuberculosis, are at high risk of being infected with *Mycobacterium tuberculosis*. Close contacts include family members, sexual partners, coworkers and friends. One of the goals of MCDI's Ndwedwe Integrated TB, HIV/AIDS is to screen as many TB contacts as possible. The main objective of this project is to increase number of TB contacts screened for this disease.

Method: This strategy is based on issuing Contact Tracing Slips/card to all confirmed TB patient to be given to their close contacts to attend the nearest health facility for TB screening. This program is being piloted in 4 health facilities of Ndwedwe subdistrict (Montebello Hospital, Ndwedwe Community Health

Centre, Chibinin Clinic and Esidumbini Clinic) in Ilembe District, KwaZulu-Natal and results are monitored on a monthly basis. The number of contact slips/cards issued per TB patient depends on the number of close contacts that a patient identifies. The contact cards are an invitation for the close contacts to attend a health facility in one's earliest convenience for TB screening. The following indicators are calculated using a simple tally sheet: number of TB contacts screened and TB Contact Tracing Rate (TCTR). **Results:** This methodology proved to increase significantly number of TB contacts who were tested during past 3 months (September–November 2007). During this period 89 new TB patients attended the piloted health facilities. 244 TB contacts were identified and were issued with contact slips. 40 TB contacts responded and attended TB clinics. The contact tracing rate for this period was 16.5%.

Conclusion: This is a simple and relatively cheap method for screening TB contacts. This strategy should be accompanied by well-planned IEC campaigns targeting TB patients and their communities. The feasibility of HIV testing for the contacts should also be investigated.

PC-81546-19 A decade of change: tuberculosis incidence in England and Wales, 1998 to 2007

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Background/Aim: The UK is one of the few countries in Western Europe with an increasing trend of tuberculosis in recent years (EuroTB). Using national surveillance data, this study examines the trends in tuberculosis epidemiology in the last decade, including clinical and demographic characteristics of cases. **Methods:** The Enhanced Tuberculosis Surveillance (ETS) system collects information on tuberculosis cases, including demographic, clinical and microbiological data. Detailed information on tuberculosis cases occurring in England and Wales have been reported since 1998. Mid year population estimates from the Office for National Statistics were used to calculate rates.

Results: The number of tuberculosis cases has increased over the last decade reaching a peak in 2005. Provisional ETS data show that 8030 tuberculosis cases were reported in 2007 in England and Wales, a rate of 14.9 per 100 000. The 2007 provisional figure is similar to the number of cases reported in 2005 and 2006 but represents a 42% increase since 1998 when 5658 cases were reported.

The rise in case numbers is mainly seen in those aged 15–44 (76% increase), those not born in the UK (77% increase) and in extra-pulmonary cases (73% increase). The trend is observed in most regions. Data from London, however, suggests a slowing down in

the last two years (6% decline). In contrast, numbers in the rest of the country have continued to increase. The rate of disease in the UK born population group has remained stable over the study period at around 4 per 100 000 with a small decline in absolute numbers (16%).

Discussion: Surveillance data indicate that the incidence of tuberculosis in England and Wales has increased considerably over the last decade, with a potential stabilisation of this trend since 2006. Most of this increase has occurred in the foreign-born, but the rate of disease the UK born population is not declining.

PC-81583-19 Exit control of tuberculosis patients by air travel: Taiwan experience

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Objective: Risk of transmission and exposure to infectious TB on commercial aircraft are growing concern issues in the public and international society. The study aimed to demonstrate tuberculosis air travel control and implementation of the public policy in Taiwan.

Background: TB has been a major communicable disease in Taiwan for decades, and registers the highest death toll among all infectious diseases. Right after the WHO issued its guidelines on the necessity for infectious TB patients to postpone air travel in 2006, Taiwan began devising complementary measures to facilitate the implementation of these recommendations.

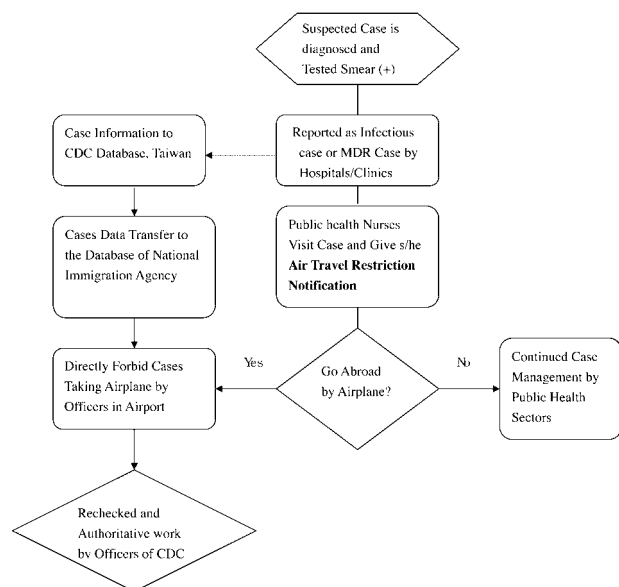


Figure Forbidding infectious TB cases to air travel, Taiwan.

Methods: Starting from 1 September 2007, patients with infectious tuberculosis are required by law to postpone air travel on flights exceeding eight hours in duration, while people with MDR tuberculosis must

postpone any air travel regardless of duration. Taiwan CDC has used a centralized real-time and web-based surveillance system to maintain a dynamic list that should be controlled. The list is then uptaken daily by immigration system in international airports to stop any restricted patient who tends to exit by air travel.

Results: Each patient who meets non-fly regulation will receive a formal notification. On a given day, an average of 707 TB patients are in the list, who should postpone their air travel. Of them, 581 are infectious TB and 126 are MDR-TB. By utilizing appropriate control measures and public health promotion, this can raise the management efficacy and avoid possible risks during flight.

PC-81696-19 Setting up DOTS Plus in Timor-Leste: a model for resource-constrained settings

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Aim: To depict the political commitment and major steps in setting up DOTS Plus.

Introduction: Timor-Leste (independence in 2002) is one among the least developed countries and has the highest incidence of TB in the south East Asia region. An NGO established National TB Programme (NTP) in 2000 and handed over to Ministry of Health (MOH) in 2006. Frequent civil strife had led to disruptions in TB control activities. Political, climatic and geographical challenges had affected the TB control leading to treatment interruptions by patients. Directly observed treatment and defaulter retrieval were affected and consequently MDR-TB cases emerged. In the absence of quality assured laboratory for sputum culture and drug sensitivity testing (DST) and sufficient resources to procure second line anti-TB drugs, the MoH demonstrated political commitment to collaborate with multiple agencies to pool resources to set up DOTS Plus. **Methods:** Review of records, registers and communications.

Results: Country obtained approval from Green Light Committee. Doctors were trained in India/Philippines in MDR-TB. MoH signed agreement with supra-national reference laboratory in Adelaide for culture/DST. Laboratory technicians were trained in Darwin on IATA-certified air transportation of sputum. DOTS Plus committee was formed and DOTS Plus guidelines were drafted. Second-line anti-TB drugs were received from Global Drug Facility. An NGO offered infrastructure for inpatient care. WHO provided technical assistance and facilitated preparatory activities and funds mobilization.

Conclusion: Strong political commitment and collaboration between national and international agencies could facilitate setting up of DOTS Plus even in a resource-limited setting like Timor-Leste.

PC-81769-19 Awareness analysis of the public on TB symptom and government free policy

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Setting: In order to increase TB detection rate, National TB control Programme proposes awareness rate of the public on TB will achieve 80% by 2010. National TB control institute organized a survey on knowledge, attitude and practice about TB in the public of some counties in 2006.

Aim: Understand active consulting and information source of TB patients through awareness investigation of the public on TB suspicious symptom and government free policy.

Methods: Selected 8 counties did face-to-face survey by unified questionnaire including 8 core information to obtain the tuberculosis related information, applied additional questionnaire to TB patients of the public investigation for supplementary investigation, used questionnaire to village doctors of rural areas.

Results: The results of investigation of 69 253 cases shows the awareness rate of 8 core information is from 16.0% to 79.1%. The awareness rate of 'cough and expectoration more than three weeks should consider tuberculosis' is 16.0%; knowledge rate of free examination policy and free treatment policy is 46.4% and 47% respectively; once heard 'TB' is 74.7%; obtain TB knowledge by TV is 47%.

Conclusion: 1) Awareness rate of the public on symptom of TB is lower which restricts early detection and treatment. 2) Higher awareness of the public on government free policy reflects that the publicity is certain strong, especially low-income TB patients. 3) Village doctors is good media on disseminating TB knowledge of prevention and control, for whom can direct contact the masses. Have same language and environment with target population, therefore not only it's convenient to develop interpersonal communication activities, also obtain good results. 4) TV is best mass media on disseminating TB knowledge of prevention and control. So far, health department and radio-television department have set up good cooperation relationship, obtained good effect.

PC-82013-19 Organisation of infection control activities in Orel Oblast

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Goal: To demonstrate the types and measures of infection control (IC) in TB health care facilities using the example of Orel Oblast.

Administrative measures: 1995–2002—Reorganization of bed capacity, creation of separate departments: for newly detected pulmonary TB (PTB) patients, PTB relapses, and chronic PTB cases. Meals were provided inside each department. Rooms for sputum collection were created in each department. 2002–2006—Trainings for staff and patients on IC principles. In-treatment departments were divided into working zones; patients were placed in rooms based on smear status. Special rooms were created for patients with high MDR risk. A 'closed doors' regimen was introduced in the dispensary. Patients' visits to the paraclinical departments were scheduled according to their smear status. Smear positive patients were ordered to wear masks.

Engineering-technical measures: 1995–2000—Bacteriological lab was reconstructed and equipped with supply-exhaust local ventilation. Lab was equipped with biosafety cabinets: 1st class, 3 units; 2nd class, 2 units. Disposable sputum containers were purchased. 2001–2005—Sputum collection booths were installed in polyclinics and dispensary in-treatment departments. UV radiators and air recirculators were installed in MDR-TB departments. 2006–2007—Air cleaners were installed in the lab. Assembly of the supply-exhaust ventilation in the building for bacteriological positive patients was started.

Respiratory protection: Medical workers were trained on use of individual respirators. Respirators were fitted individually.

Results: The TB notification rate in Orel Oblast decreased 13% from 2002 to 2007, and was 58.2/100 000 in 2007. Primary drug resistance in 2007 was 6.5%. TB incidence in medical staff in 2002–2007 was 33% lower than 1996–2001.

Conclusion: A set of IC measures significantly decreased TB transmission in the dispensary, and lowered the risk of nosocomial TB infection among patients and staff.

PC-82250-19 World atlas of BCG policies and practices

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Aim: BCG policies and practices vary widely across different countries and often change over time even within a country. The previous history of BCG vaccination in an individual can affect the interpretation of tuberculin skin testing results and is likely to be valuable in comparing the relative utility of TST vs. interferon-gamma release assays for the diagnosis of tuberculous infection. Therefore, health professionals and epidemiologists need detailed information about BCG vaccination, its timing, number of doses, strain type, etc. The objective of this project was to compile a searchable online database (Atlas) that contains detailed information on countries' current and past BCG policies and practices.

Methods: Data were collected from published sources and respondent completed questionnaires. Questionnaires ascertained detailed information on both past and current practices and policies; as well as changes over time, including: booster shots, TST testing, impact of HIV and vaccine strain changes.

Results: Data were identified for 144/207 countries. Countries were divided into 3 main categories: 137 countries that currently recommend BCG vaccination (Category A), 5 countries that recommended BCG previously but no longer (Category B), and 2 countries that never gave BCG, except to high-risk groups (Category C). Sixteen category A countries (12%) give at least one BCG, generally in infancy, 8 (6%) give 3 BCG shots at different ages of development (ie: booster shots), while 2 countries (1.5%) regularly give 4 BCG boosters. Since 1990, 12 category A countries have stopped giving booster vaccinations.

Conclusion: Many countries have changed their BCG policies and practices, over the last 20 years, particularly with regard to the practice of giving booster shots. Knowledge of past policy as well as current practice is beneficial to clinicians and researchers interpreting TST results.

PC-82288-19 The contribution of immigration medical examinations to tuberculosis control in the USA and Canada

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Background: Foreign-born persons applying for permanent residence in USA/Canada are required to undergo overseas screening (OS) or in-country screening (IS) for active TB. Persons with chest xrays consistent with active TB are referred for health follow-up; persons with OS referrals must enter the USA/Canada ≤ 6 months of exam. Screening is not required for most persons seeking temporary visas.

Aim: To determine if immigration medical examinations prevent/control active TB.

Design: Cross-sectional study.

Methods: Foreign-born adults (≥ 18 years) reported with active TB in 2005–2006 were sampled at 22 USA/Canadian TB Epidemiologic Studies sites for interview about visa status, care-seeking during TB diagnosis, and immigration screening.

Results: Of 1509 participants, 1319 (87%) provided visa status at interview. These included 164 (12%) temporary, 308 (23%) undocumented, and 847 (64%) permanent residents. Though required, OS or IS was recalled by only 626 (73%) permanent residents; 125/626 (20%) recalled health department referral and 122/125 (98%) received follow-up. Among IS referrals, the median time from exam to TB diagnosis was 1.6 months (Range 0–252). For OS referrals, the median time from exam to diagnosis was 9.6 months (Range 0–408) with a median time from entry to diagnosis of 5.3 months. Overall, 68 (8%) of 847 permanent visa holders said their TB diagnosis resulted from immigration screening, primarily OS. Most of the 68 were immigrants (10%; 47/492) and refugees/asylum seekers (20%; 14/71).

Conclusions: Immigration screening resulted in diagnosis for only 1 in 12 permanent visa applicants who became TB cases. Among OS referrals diagnosed < 6 months after entry, long delays between screening and diagnosis require evaluation. Screening was not required for more than 1/3 of foreign-born TB cases. Along with reducing TB globally, the USA/Canada can only achieve TB prevention and control with more effective diagnosis and treatment of latent TB infection.

PC-82362-19 Alignment of Global Fund Round 6 and 7 TB proposals to the Stop TB Strategy and the Global Plan to Stop TB

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Setting: The Global Fund to Fight AIDS, TB and Malaria is the most important source of external funding for TB control.

Objective: To assess alignment of Global Fund TB proposals to the Stop TB Strategy and of the Global Plan to Stop TB 2006–2015. To describe budget distribution of TB proposals approved in rounds 6 and 7. To describe Stop TB tools and related technical assistance designed to help TB proposals align planning for all components of the Stop TB Strategy in line with the Global Plan to Stop TB 2006–2015.

Method: The Stop TB Strategy has 6 components with 17 Service Delivery Areas (SDAs) and 82 main activities. An analysis of the budgets according to Stop TB Strategy SDAs was conducted for TB proposals from rounds 6 and 7. The WHO Stop TB Department developed 2 tools for planning and budgeting all components of the Stop TB Strategy in line with the Global Plan to Stop TB 2006–2015: Stop TB Planning Matrix and Tool and Stop TB Budgeting Tool. TBTEAM (TEchnical Assistance Mechanism of the Stop TB Partnership) facilitates TA to countries for proposal preparation and implementation.

Results: The budget distribution by Stop TB component was 1) DOTS (R6 = 52%, R7 = 47%); 2) TB-HIV, MDR-TB and other (R6 = 22%, R7 = 33%); 3) HSS (R6 = 3%, R7 = 4%); 4) All care providers (R6 = 3%, R7 = 2%); 5) Empower people/communities (R6 = 18%, R7 = 7%); 6) Operational Research: R6 = 2%, R7 = 1%) TBTEAM TA for proposal preparation and the alignment of Stop TB planning and budgeting tools with Global Fund M&E Toolkit, Performance Framework and Enhanced Financial Reporting, helped to ensure success of TB proposals (62%/Round 6; 51%/Round 7).

Conclusion: To ensure that TB proposals continue to be aligned to the Stop TB Strategy and Global Plan to Stop TB, the use of the WHO Stop TB Planning Matrix and Frameworks and Budgeting Tool is encouraged accompanied by TA facilitated through TBTEAM.

DRUG-RESISTANT TB EPIDEMIOLOGY AND TREATMENT

PC-81263-19 Pulmonary tuberculosis and drug resistance in five prisons in Vietnam

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Aim: To define TB drug resistance in five prisons.

Design: Cross sectional study in 2006 in 7501 prisoners in five prisons in Vietnam.

Methods: (i) Questionnaires for interviews, chest X-ray, direct microscopy; (ii) cases with positive smear microscopy or lung trauma on X-ray result are referred for culture and DST.

Results: 38.4% people were reported with coughing with duration of ≥ 3 weeks. 8.7% of study population had TB treatment before. 6.0% were considered suggestive of TB by chest X-ray. 80 cases (4.3%) were defined as smear-positive pulmonary TB patients, of whom 40 were being treated for TB in intensive phase. 339 sputum samples were positive for culture. DST was done in 181 samples (53.4%). Resistance to any drug was seen in 64%, MDR-TB in 17.4% (MDR-TB among re-treatment group was 31.5% and among new patient group was 6.8%).

Conclusion: Resistance to any drug was seen in 64%, MDR-TB in 17.4%. These findings show that it is important to diagnosis TB early in overcrowded and endemic settings.

PC-81355-19 Treatment of isoniazid-resistant pulmonary TB with HERZ for 9 months at National Mokpo Hospital, Korea

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Objectives: The purpose of this study is to evaluate the treatment results and the relapse rate of INH resistant pulmonary tuberculosis after treating with first line drugs for at least 9 months.

Methods: From January 1995 to December 2001, sputum culture-proven pulmonary tuberculosis patients with confirmed INH resistance, excluding MDR-TB, were enrolled. Relapsed cases were also enrolled but treatment failures including chronic excretors at the start of this study were excluded. At least 9 months treatment with 2HREZ/7HRE was given to enrolled patients, with their medical records retrospectively analyzed.

Results: Among 133 patients registered for the study, 109 (82.0%) were male, and the median age was 48 (range 18 to 86). The median period of follow-up was 81 months. Twenty patients (15.0%) were sputum smear negative at the start of the study. Fifty-nine patients (44.4%) had a history of previous treatment, and 38 of them had an irregular treatment course. The cure rate of first line drugs was 88.0% (117/133), with the total cure rate of 91.7% (122/133) when cases with change of drugs to second line due to adverse effects (5 cases) or treatment failure (11 cases) were included. The median time for negative conversion of sputum smear and culture for 117 cases successfully treated with first line drugs was 1 month (range 1 to

8 and 1 to 6, respectively), and the median treatment duration was 9 months (range 9 to 24). Eleven (9.4%) of the 117 cases relapsed. The risk factors for treatment failure with first line drugs were presence of previous treatment history within the last 2 years ($P = 0.001$) and history of an irregular treatment course ($P = 0.013$), while risk factor for relapse was longer time until negative sputum smear conversion ($P = 0.042$).

Conclusion: The cure and relapse rates of INH resistant pulmonary tuberculosis with 9 months treatment using first line drugs (2HREZ/7HRE) were similar to previously reported results utilizing various treatment regimens.

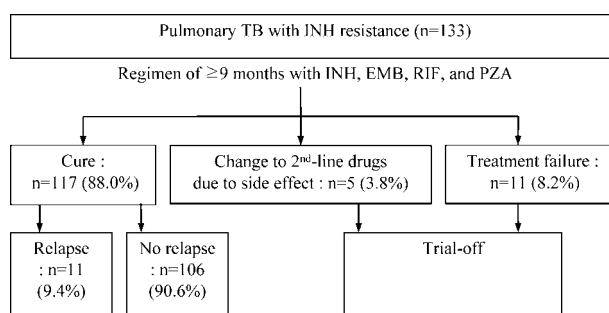


Figure Treatment scheme and results. TB, tuberculosis; INH, isoniazid; EMB, ethambutol; RIF, rifampin; PZA, pyrazinamide.

PC-81397-19 Résultats de traitement de la première cohorte de cas TB-MDR au Rwanda

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Objectif : Présenter les résultats de traitement des 52 premiers malades multirésistants mis en traitement de 2ème ligne entre le 30 juin 2005 et le 29 avril 2006.

Contexte : Depuis Juillet 2005 jusqu'au 31 décembre 2007, 172 patients ont été mis sous traitement, parmi lesquels 52 malades ont fini le traitement.

Méthode : Les malades sont mis sous traitement sous certains critères : la confirmation de la multi résistance par le test de sensibilité, la chronicité ou le contact avec un patient multi résistant connu. Le schéma de traitement comprend deux phases. La phase injectable 4K6 (PtoCsOfxZ)/7/4K3 (PtoCsOfxZ)/7 et la phase orale 12 (PtoCsOfxZ)/7, soit une durée totale de 20 mois. Le traitement est administré sous TDO strict en hospitalisation jusqu'à la conversion des frottis et cultures, ensuite les malades continuent le traitement en ambulatoire dans les centres de santé les plus proches de leur domicile.

Résultats : Parmi les 52 cas évalués, 43 étaient confirmés par le test de sensibilité et 9 étaient des cas chroniques pour qui le traitement a été initié de façon empirique. 24 étaient VIH+ (46%). 42 malades ont été guéris selon la définition de l'OMS, 1 a terminé le traitement et 9 sont décédés. Le taux de guérison est de 83% et le taux de décès de 17%. Le taux de guérison

parmi les patients VIH+ est de 88% (21/24) contre 75% (21/28) parmi les VIH-. 3 patients sont décédés parmi les VIH+ alors que 6 malades sont décédés parmi les VIH-. Ces 6 décès sont en relation avec des lésions pulmonaires étendues suite au retard de traitement. Les causes de décès sont l'insuffisance respiratoire (3 cas), une hémoptysie massive (2 cas), une insuffisance rénale, une allergie sévère, un pneumothorax et une dépression.

Conclusion : Le taux de succès thérapeutique (83%) est très satisfaisant pour cette première cohorte et met en évidence le suivi consciencieux effectué par le personnel qui assure leur prise en charge.

PC-81473-19 Early mortality among MDR- and XDR-TB patients in KwaZulu-Natal Province, South Africa

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Background: King George V Hospital is the primary referral center for initiation of treatment for drug-resistant tuberculosis in KwaZulu-Natal Province, South Africa. From February to August 2006, 181 new MDR-TB cases began their first course of therapy for MDR-TB with a positive culture on admission.

Methods: Out-patient sputum samples throughout the province are cultured at the National Health Laboratory Services (NHLS). First- and second-line drug-sensitivity testing (DST) is performed simultaneously as requested by health care providers. Clinical and laboratory data has been collected as part of PETTS, Preserving Effective TB Treatment Study. Patients gave duplicate sputa to be cultured at the MRC and sent to the US CDC for DST and genotypic analysis.

Results: 12 patients (6.6%) had XDR-TB prior to receiving any second-line treatment. During the first 6 months of treatment 4/12 patients with XDR-TB died (33.3%) while 12 of the 169 patients with MDR-TB died (7.1%). The 4 patients with XDR-TB who died did so an average of 86.5 days (range 71–100) after initial sputum collection for diagnosis and 26.5 days (range 18–42) after hospitalization. Patients with MDR-TB died an average of 185.5 days after initial sputum collection for diagnosis (range 90–251) and 86.5 days (range 18–141) after hospitalization.

Spoligotype analysis was available on 86 patients (5 XDR-TB and 81 MDR-TB). Of this subset, 8 patients died within 6 months of hospital admission (1 XDR-TB and 7 MDR-TB). All patients who died were infected with Euro-American strains (XDR-TB: 1 LAM family; MDR-TB: 2 LAM family, 2 S family,

1 X family, 1 Haarlem family, 1 unknown). Of those continuing treatment at 6 months, 75% of the XDR-TB patients and 79.7% of the MDR-TB patients were infected with Euro-American strains.

Conclusions: Both MDR- and XDR-TB have high early mortality. Euro-American strains, especially the LAM family, are indicated in drug-resistant tuberculosis.

PC-81626-19 Treatment success and analysis of a subgroup of defaulting patients subgroup in controlled MDR-TB treatment programmes

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Introduction: The Green Light Committee Initiative (GLC Initiative) has expanded from a few to more than 60 projects in 52 countries between 2000–2008. These projects run in countries most affected by the MDR-TB, following WHO guidelines. The experience and data collected in the GLC approved projects is expanding existing evidence on the best practices for MDR-TB management. In 2007, 21 countries reported outcomes from GLC approved projects.

Methods: Aggregated notification data and treatment outcomes of 5705 MDR-TB patients enrolled in country projects approved by the GLC from 2000 to 2005 were analysed in line with WHO definitions.

Results: Treatment success rates averaged to 63% in 2000–2005 cohort outcomes (excluding patients still on treatment). Major part of enrolment were re-treatment cases—38% and new cases—only 17%.

During the same period proportion of outcome 'defaulted' grew from 8 to 18%. Analysis of combined data over the period for this group shows that major part (43%) is attributable to a category composed of mostly chronic patients that received multiple unsuccessful treatments previously ('others' enrolment category).

Conclusion: Treatment success rates in GLC approved projects enrolling big proportions of re-treatment and chronic patients stabilized around 63% and may improve with cleared up backlog of these kind of cases. Actions to reduce defaulting among subgroup of 'others' should be strongly pursued in new programmes in order to further improve treatment success.

PC-82033-19 Dynamics of reducing reservoir of MDR-TB in civilian sector of Tomsk Oblast, 2002–2007

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By the end of 1990s high prevalence of MDR-TB became the main cause of poor effectiveness of anti-tuberculosis activities in Tomsk, resulted in creation of huge MDR-TB reservoir and reached its highest numbers by 2002 (831). As of 2003 rates of primary drug resistance was 11.2% and secondary 45.3%. By 2001, proportion of MDR-TB patients cured with standardized regimens, those who died and transferred out had not significantly impacted the MDR-TB reservoir. Moreover, lack of adequate strategies and approaches to manage MDR-TB, absence of second-line TB medicines, contributed to accumulation and enlargement of MDR-TB reservoir, and its further dissemination to general population. According to 2002, standardized chemotherapy of smear+ patients under strict DOT was effective only in 73.9% of newly detected cases, in 44.4% of relapses, and in 40.0% defaulters and Category I treatment failures. In 61.2% MDR-TB was the main cause of TB deaths in previously treated cases. Decrease in treatment effectiveness, as a number of previous courses increases, was leading to amplification of drug resistance, increase of reservoir, and was in direct relation with the level of MDR in certain categories of patients. Implementation of comprehensive DOTS-Plus program aimed at establishment of adequate drug resistance surveillance system and focused on reaching favorable treatment outcomes, resulted in decrease of MDR-TB reservoir in 1.36 times over 2002–2007 (9 months). Starting from 2004 stable tendency of reservoir decrease is seen primarily due to the increase in absolute numbers of cured vs. died patients. Simultaneously, strengthening early TB detection and treatment with standardized regimens under strict DOT allowed Tomsk TB Services to decrease TB mortality from 19.5 to 10.4 over 2002–2006.

	1999	2000	2001	2002	2003	2004	2005	2006	2007 (9 months)
Detected (absolute)	422	353	270	286	217	263	242	251	170
Detected (cumulative)	729	1082	1352	1638	1855	2118	2360	2611	2781
Cured (absolute)	1	8	10	39	91	119	141	163	170
Died of any reason (absolute)	133	148	115	160	154	132	128	114	105
Transferred out	39	36	34	27	32	32	45	48	42
Decrease (cumulative) MDR-TB reservoir	230	422	581	807	1084	1367	1681	2006	2323
	499	660	771	831	771	751	679	605	458

PC-82138-19 Expert consultation for the management of multidrug-resistant tuberculosis

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Background: Multidrug-resistant tuberculosis (MDR-TB) threatens communities across the globe. In the United States, 1–2% of incident cases are MDR-TB. Expert consultation for MDR-TB management is recommended in the United States and MDR-TB program providers and national experts expressed the need for structured expert consultation.

Methods: In January 2005, we formed a network of MDR-TB experts from the four CDC-funded Regional Training and Medical Consultation Centers, The National Jewish Medical Center and several state/local TB programs and started a bimonthly forum for case review. Specialists in thoracic surgery and radiology were included. The network objective was to provide expert consultation for challenging clinical and case management questions and create a forum for education, collaboration, mentoring and capacity building. We recorded case characteristics, participants and questions for each network conference.

Results: Through March 2008, 18 case conferences addressed 78 cases: 71 (91%) MDR; 1 (1%) mono-rifampin resistant; 6 (8%) pan-sensitive. Eleven cases were pediatric. Types of questions included diagnosis 23 (29%), treatment regimen and length 78 (100%), drug toxicity 29 (37%), thoracic surgery 32 (41%), treatment adherence 14 (18%), treatment of contacts 27 (35%), laboratory methods 29 (37%), and infection control 20 (26%). Cases were from Washington 1 (1%), Colorado 2 (3%), Florida 1 (1%), California 57 (73%) and Baja California 17 (22%). Limitations included insufficient time for case volume and lack of evidence basis for decisions.

Conclusion: The MDR-TB expert consultation network facilitates management of complicated, drug-resistant cases. Our experience underscores the need for further evidence basis in management of MDR-TB. Adherence to network recommendations and patient outcomes deserve further investigation. Next steps include an end-user survey, expanding the network, and systematic data collection to guide decision making.

PC-82309-19 Prevalence of second-line drug resistance among MDR-TB patients in 7 countries in the PETTS Study

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Setting: The Preserving Effective TB Treatment Study (PETTS) is a prospective, observational study of consecutive MDR-TB patients enrolled in 8 countries, 2005–2008: Estonia, Latvia, Peru, Philippines, Russia, South Africa, South Korea, and Thailand.

Objectives: The overall objectives of PETTS are to determine the rate of, risk factors for, and consequences of acquired resistance to 2nd-line drugs (SLDs) in MDR-TB patients. The objective of this analysis is to determine the prevalence of baseline resistance to SLDs. **Methods:** Sputum specimens are cultured for mycobacteria at the start of treatment and monthly. *M. tuberculosis* isolates are shipped to CDC for drug susceptibility testing (DST) by the proportion method on Middlebrook 7H10 agar.

Results: As of March, 2008, complete DST results are available for 577 baseline isolates from seven countries. Of 552 (95.7%) confirmed MDR isolates, 229 (41.5%) had resistance to at least one SLD (range across sites 33.0%–64.7%); 109 (19.7%) had resistance to either a fluoroquinolone or an injectable SLD (range 11.1%–45.6%). XDR-TB was present in 30 (5.4%) isolates and was found in all 7 countries (range 0.8%–23.5%). In addition, 285 (51.6%) baseline MDR-TB isolates had resistance to 4 first-line drugs (excluding pyrazinamide) (range, 37.7%–88.6%).

Conclusions: When starting treatment, ~20% of MDR-TB patients have resistance to one or more of the most important SLDs, and >5% have XDR-TB. To prevent worsening resistance, MDR-TB patients should be treated with ≥4 effective drugs based on DST and treatment history.

PC-82356-19 Programme performance indicators in MDR-TB management in the Philippines

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Background and setting: Manila, Philippines, an MDR-TB-priority country with a Green Light Committee-approved MDR-TB Management program since 2000.

Objectives: Using data in the Electronic Medical Record, this review describes the baseline bacteriologic status of enrolled MDR-TB patients, and observes trends in program performance indicators, e.g., a) time to culture conversion among those successfully treated, b) interim outcome among those bacteriologically positive, and c) final treatment outcome.

Culture conversion means negative culture sustained till end of treatment with allowance of 1 culture positive in the last 12 months as long as followed by at least three negative cultures.

Six-month bacteriologic status serves as the basis for the interim outcome.

Results: Of 922 patients enrolled from April 1999–December 2007, baseline culture positivity was 92% (851). Among 306 treatment success patients from 1999–2005, mean time to culture conversion was 2.36 months and was noted to decrease yearly from 3.31 months in the 1999–2000 cohort to 1.97 months in 2005. Conversion occurred in month 1 in 31%, month 2 in 34%, month 3 in 19%, month 4 in 10%, month 5 in 2%, and in months 5–10 in 3.5%.

The average rate of culture negativity at month 6 of treatment from 1999–2005 was 77% among culture-positive patients at baseline. However, there was an increasing trend of 6-month culture negativity from 62% in 1999 to 87% in 2006.

Success rate showed improvement from 64% in 1999 to 74% in 2005 and a decrease in the failure rate from 18% to 1%; default has fluctuated from 9% to 23% to 13%; so has death from 9% to 15% to 12%.

Performance Indicator	1999–2000	2001	2002	2003	2004	2005	Total
1 Mean time to culture conversion among Tx success patients							
No. of patients successfully treated	13	45	32	13	17	132	306
Mean no. of months to culture conversion	3.31	2.84	2.53	2.31	2.55	1.97	Mean 2.36
2 Six-month interim outcome among bacteriologically positive							
No. of bacteriologically positive patients at baseline	13	61	39	15	79	156	363
% culture negative at month 6 of treatment	62%	79%	76%	71%	85%	87%	Ave. 77%
3 Final treatment outcome							
No. enrolled with outcome	22	86	56	22	99	133	418
Success	64%	56%	59%	73%	73%	74%	
Failed	18%	14%	7%	0	4%	1%	
Died	9%	15%	11%	42%	8%	12%	
Defaulted	9%	14%	23%	23%	15%	13%	

Conclusion: As the TDF PMDT program has matured since 1999 and progressed from a pilot project to regionwide expansion in Metro Manila in the Philippines, there has been progressive improvement in its programmatic performance. This can be a good indicator that the program is ready for scaleup.

PC-82415-19 Peru—Study C: primary resistance to first-line drugs

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Background: Study C is designed to test the efficacy of Fixed dosed combined Drugs under the infrastructure of National Tuberculosis Programs (NTP) when given in the initial intensive phase of treatment of patients with newly diagnosed smear positive pulmonary TB.

Methods: Newly diagnosed smear positive TB patients from eleven sites in Asia, Africa and South America were randomised to receive either an FDC or separate formulations of H, R, E, Z in the initial intensive phase for eight weeks. In this abstract we describe the drug susceptibility findings to first line drugs in one of the sites of study C. All positive cultures at diagnosis had susceptibility testing done by the Tuberculosis National Reference Laboratory, using the proportions method.

Results: Between July 2005 and September 2006, 250 (15.75% of the Study C) patients were randomized in 10 Health Centers in Lima City, Peru. A total of 69 (27.6%) had primary resistance to at least one anti-tuberculosis drug. Of those, 39 (15.6%) patients had primary resistance to isoniazid and 20 (8%) patients had primary MDR-TB at diagnosis. All twenty patients with MDR-TB were referred for evaluations for individualized treatment under the auspices of the NTP of Peru. Sixteen cases began individualized treatment, two cases died before treatment was initiated and two cases were continued on first line drugs because of good initial clinical evolution.

Conclusion: These results of study C in Peru show high rates of primary resistance to isoniazid and MDR strains, in Lima Ciudad Region. Because the level of anti-tuberculosis drug resistance in a population is an indicator of the effectiveness of an NTP, the persistence of high rates of primary drug resistance despite 15 years of implementation of the DOTS strategy in Peru and more than 90% cure rates is puzzling. Potential explanations will be discussed.

Aim: To compare sputum smear microscopy results of fluorescence microscopy with Ziehl-Neelsen technique for acid-fast bacilli using bleach centrifugation method.

Setting: Mbagathi District Hospital and the Tuberculosis laboratory at the Center for Respiratory Diseases Research—Kenya Medical Research Institute.

Methods: Three hundred and seventy sputum specimens were collected from new TB suspects attending Mbagathi District Hospital and processed for direct microscopy using both Ziehl-Neelsen and fluorescent microscopy. Culture was also done using Löwenstein-Jensen egg media. Smear negative specimens were treated with 3.5% bleach and left to stand for 30 minutes before centrifugation. Two smears were prepared from each bleach treated specimen, processed and examined using ZN and FM staining methods.

Results: Of the 370 specimens, 200 (54%) were culture positive. The number of smear positive by direct ZN was 138 (37.2%) which increased to 171 (46.2%) and direct FM positive was 165 (44.6%) which increased to 180 (48.6%), after treatment of direct ZN smear negative specimens with 3.5% bleach, respectively. There was a significant increase in sensitivity from 66% to 81.1% ($P < 0.05$) using ZN technique. There was a significant increase in sensitivity from 75.5% to 83% ($P < 0.05$) using FM technique. There was no statistically significant difference between results obtained by FM and those of ZN technique when bleach and centrifugation were used ($P > 0.05$).

Conclusions: The high concordance between FM and ZN technique when bleach with centrifugation were used indicates that this approach significantly increases ZN sensitivity and could be recommended in settings where high rates of direct ZN sputum smear negative TB are reported.

PS-81955-19 Première enquête nationale sur la résistance primaire aux antituberculeux à Madagascar, 2005–2006

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Objet : A Madagascar, près de 15 000 nouveaux cas de tuberculose pulmonaire à microscopie positive (TPM+) sont dépistés par an. La dernière enquête sur la résistance, effectuée seulement à Antananarivo la capitale en 1999–2000, a montré un taux de multi-résistance primaire de 0,1%. Aucune donnée sur le niveau national n'est disponible.

Schéma : L'enquête a été effectuée à un niveau national pour connaître la situation réelle de la résistance aux antituberculeux dans le pays.

Méthode : L'échantillonnage s'est fait sur 205 centres de diagnostic et de traitement, sur le modèle d'un

POSTER DISPLAY SESSIONS**CLINICAL TRIALS AND TUBERCULOSIS BASIC SCIENCE: BACTERIOLOGY—II****PS-81912-19 Bleach with centrifugation in sputum smears: a comparison between fluorescent and Ziehl-Neelsen microscopy**

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sondage en grappe de type PEV : 35 grappes de 30 patients ont été retenus, soit 1050 nouveaux cas TPM+ à inclure de manière consécutive, pour l'étude de la résistance primaire. La résistance secondaire a été évaluée sur les patients TPM+ déjà traités, inclus au cours de la même période. Les tests de résistance à la streptomycine 4 µg/ml, la rifampicine 40 µg/ml, l'isoniazide 0.2 µg/ml, et l'éthambutol 2 µg/ml, sont réalisés sur milieu LJ, suivant la méthode des proportions.

Résultats : En février 2008, sur le total des malades inclus, 973 malades ont eu des résultats interprétables, dont 909 nouveaux cas et 59 récurrents. Parmi les nouveaux cas, la résistance primaire globale a été de 6,4%, la résistance acquise de 10,1%. La MDR primaire a été de 0,4% et la MDR secondaire de 3%. La résistance la plus élevée à un antituberculeux a été observée avec l'isoniazide : 4,1%.

Conclusion : Les taux de résistance primaire et secondaire aux antituberculeux restent encore faibles à Madagascar.

PS-81995-19 Extensively drug-resistant (XDR) tuberculosis in Thailand, 2007

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Setting: MDR isolated from specimens bank at Supra-National TB Reference Laboratory, Bangkok, Thailand, was tested for XDR.

Objective: To determine the percentage of XDR-TB among MDR isolated strains in Thailand.

Background: Little is known about extensively drug-resistant tuberculosis in Thailand. The XDR-TB surveillance based on laboratory diagnosis would lead to better understanding the magnitude and trends of drug-resistance.

Methodology: After the confirmation of the examined microscopically for acid-fast bacilli and inoculated into Löwenstein-Jensen media slant by standard procedures. Testing of susceptibility to first line drugs was performed. Subsequently, the 401 strains that were identified as multidrug-resistant *M. tuberculosis* were subjected to susceptibility testing for six second line drugs; kanamycin, ofloxacin, PAS, ethionamide, capreomycin and cycloserine.

Results: A total of 22 of 401 (5.5%) multidrug-resistant strains were XDR-TB.

Conclusion: The finding in this study show the existence of XDR-TB in Thai tuberculosis patients. This might pose a serious threat to the control of tuberculosis in Thailand. Activities that facilitates detection drug-resistant TB accurately and rapidly is benefit to the clinician's judgement in managing the case properly. Continue surveillance of MDR and XDR is needed to address the magnitude of the problem and would lead to appropriate and timely interventions.

PS-82024-19 Predicting risk factors for culture cross-contamination in a mycobacteriology laboratory

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For many years, it has been thought that a positive culture of *M. tuberculosis* is a definitive diagnostic evidence of tuberculosis (TB). However, the recent use of molecular tools have resulted in increased recognition of cross-contamination events linked, most of the times, to laboratory procedures. Features of cross-contamination include: culture results not consistent with the clinical course of the patient, isolates with unexpected drug resistance, single culture-positive specimen and low colony count on solid medium. Nonetheless, true-positive cultures of specimens from some groups of patients (with preliminary active pulmonary tuberculosis, HIV infection, or under treatment) can also have some of the characteristics outlined above. The evaluation of low-yield growth cultures as a microbiological marker of cross-contamination would be very helpful in confirming or excluding TB cases. In the present study, we assessed whether or not low-yield growth cultures could be considered a cross-contamination marker, using molecular typing methods (RAPET and RFLP). We evaluated 109 low-yield growth cultures (less than 20 colonies) from 97 patients that were processed in 94 different days in a two years period. The false-positive rate found in this study was of 1.8% and 2.0% per samples and patients, respectively. These results suggest that low-yield growth cultures do not seem to be a considerable marker for cross-contamination, especially in a clinical trial mycobacteriology laboratory or in laboratories working under the good laboratory and clinical practices. It has also been shown that the modified RAPET method is rapid (1 to 2 days), reproducible, and valuable in identifying episodes of possible laboratory cross-contamination.

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PS-82081-19 Genetic characterisation of drug resistance in MDR- and XDR-TB strains from a Cape Town hospital in 2006

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Introduction: Multidrug-resistant *M. tuberculosis* (MDR-TB) strains are resistant to both rifampicin (RIF), due to *rpoB* mutations, and isoniazid (INH), usually due to either *katG* S315T or *inhA* C-15T mutations. The treatment of these MDR-TB isolates has recently been compromised by emergence of XDR-TB strains, which are additionally resistant to a fluoro-

quinolone (FQ) and at least one of three injectable second-line drugs (SLDs), such as amikacin (AK), kanamycin (KM) or capreomycin. A recent fatal outbreak of XDR-TB in South Africa highlights the importance of elucidating mechanisms of resistance in MDR-TB, to facilitate design of molecular methods for the rapid detection of resistance.

Aim: To characterise RIF, INH and SLD resistance determinants in MDR-TB from Groote Schuur Hospital in 2006.

Methods: Multiplex allele specific (MAS)-PCR assays were designed to detect mutations resulting in resistance to INH, FQs, AK and KM. Primers were designed to detect *katG* S315T and *inhA* C-15T, mutations at codon 94 of *gyrA*, a marker of FQ resistance, and A1400G in *rrs* resulting in high-level resistance to AK and KM.

The GenoType® MTBDRplus assay was evaluated for detection of RIF and INH resistance determinants. Strains were genotyped using spoligotyping and MIRU-VNTR.

Results and Discussion: The GenoType® MTBDRplus assay correctly identified RIF resistance in 53/58 strains. However, 8% of MDR strains and 41% of INH mono-resistant strains were scored INH susceptible using this assay. MAS-PCR assays confirmed the presence of the INH resistance determinants in all of the MDR isolates and in all but 3 of the INH mono-resistant strains.

Spoligotyping confirmed an association between the W-Beijing lineage and MDR-TB strains. Eight of 11 RIF mono-resistant strains were of the LAM3/F11 lineage. No association was observed between genotype and SLD resistance determinant.

PS-82161-19 New rapid method (NITRATASA) for the determination of bacteriological resistance to anti-tuberculosis medicine

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Introduction: In the last 10–15 years publications have been made of diverse technical ways, for the determination of resistance levels in patients, in whose is required to know the drug resistance. Yet in practice not all of them are possible of being executed in laboratories that make the routine diagnosis of the TB of the countries with scarce human economic resources. Causing this situation technical limitations regarding the execution of tests of sensibility and resistance. For this reason in the National Laboratory of Tuberculosis of Bolivia the study of the method of the nitrataasa has been made to facilitate the report of results in opportune form with the same sensibility that the method of the proportions of Canetti rist.

Material and methods: 100 cultures of *M. tuberculosis* were processed in Löwenstein-Jensen (LJ) medium

tubes with drug following the method of the proportions of Canetti rist, sowing three dilutions. In parallel form the sowing is made in tubes of LJ with drugs plus NO4K in a proportion of 1%, to facilitate the colorimetric reaction of diazotation, the groundwork of the test. The interpretation is made 45 days later, in the means of cultivation of LJ without NO4K and 25 days later in the means of LJ with NO4K to 1%.

Results: The comparative results of the tubes of LJ with drug and the tubes of Löwenstein-Jensen with added drug of NO4K in the processed 100 sample, presents a sensitivity of 66% and a specificity of 96.8%.

Conclusions: The method of the nitrataasa is useful and it can be applied like an alternative to determine the resistance to anti-tuberculosis treatments for its presentation of high specificity.

PS-82226-19 Capilia TB assay for identification of *M. tuberculosis* complex in cultures of multidrug-resistant mycobacteria

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Aim: To compare Capilia TB (TAUNS, Numazu, Japan) with Accu Probe (Accu-Probe, Gen Probe, Inc. San Diego, Calif.) in identifying *Mycobacterium tuberculosis* complex in multi-drug-resistant mycobacteria.

Design: HIV co-infection has led to an increase in the frequency of isolation of non-tuberculous mycobacteria (NTM), many of them naturally resistant to multiple drugs. In developing countries with high rates of detection of resistant *M. tuberculosis*, it is important to have a rapid, accurate and inexpensive assay to distinguish between highly resistant NTM and drug-resistant *M. tuberculosis*.

Methods: Between December 2007 and January 2008, 124 cultures of multidrug-resistant mycobacteria were evaluated by Accu Probe and Capilia TB according to manufacturers' instructions. Operators were blinded to the other assay results. The sensitivity, specificity, positive and negative predictive values, agreement and kappa index were calculated. Accu Probe was considered the gold standard.

Results: Of 124 strains, 112 belonged to *M. tuberculosis* complex and 12 were NTM. The sensitivity, specificity, PPV, NPV of Capilia TB were 100, 100, 100 and 100% respectively. The agreement was 100% and the kappa index was 1.0 (very high agreement). The process time for Capilia TB and Accu Probe was 30 minutes and 1 hour by sample on average, respectively.

Conclusion: Capilia TB demonstrates excellent sensitivity and specificity and is well suited for rapid strain identification for *M. tuberculosis* complex; it could thus contribute importantly to public health intervention measures undertaken for tuberculosis control in Peru.

PS-82246-19 Rapid detection of *Mycobacterium tuberculosis* using the MTBDRplus assay on contaminated MGIT cultures

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Introduction: Contamination of MGIT (Becton Dickinson) cultures for *M. tuberculosis* occurs frequently. Repeat decontamination and re-incubation impact negatively on turn-around times for species identification and drug susceptibility testing (DST), and on TB control facing an escalating burden of extensively drug-resistant TB. This study assesses the ability of Geno-type® MTBDRplus (Hain Lifescience) assay to detect *M. tuberculosis* and screen for drug resistance in contaminated MGIT cultures.

Materials and Methods: Sputum specimens for culture of *M. tuberculosis* and DST were decontaminated by NALC-NaOH method. Pure growth in MGIT culture tubes was confirmed by appearance of acid-fast bacilli (AFB) on microscopy of Ziehl-Neelsen-stained smears, and when contamination occurred, re-decontamination was performed. MTBDRplus assay is designed to detect *M. tuberculosis*, as well as mutations in *rpoB*, *katG* and *inhA* genes for rifampicin (RMP) and high- and low-level isoniazid (INH) resistance and was performed on pure and contaminated MGIT culture-positive tubes. MTBDRplus testing was applied to 1901 contaminated MGIT cultures encountered from October 2007 to January 2008.

Results: Performance of MTBDRplus on 1901 contaminated MGIT culture tubes is summarized in table.

Table Results of MTBDRplus testing on contaminated MGIT cultures. Number of cultures identified as *M. tuberculosis* (n = 1252)

Susceptible	Mono-resistant	Mono-resistant	MDR-TB	NTM*	Total
	INH	RMP	TB		
964 (77%)	62 (4.5%)	35 (2.8%)	191 (15%)	649 (34%)	1901

* NTM = Non-tuberculous mycobacteria.

Conclusion: The MTBDRplus assay can be applied to contaminated MGIT cultures, accurately identify *M. tuberculosis*, and predict MDR-TB, and mono-resistance to INH or RMP.

PS-82253-19 Mutations detected by MTBDRplus assay in drug-resistant *Mycobacterium tuberculosis* strains in Western Cape

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Introduction: The MTBDRplus assay (Hain Lifescience) is designed to screen for MDR-TB by detecting mutations in the *rpoB*, *katG* and *inhA* genes conferring resistance to rifampicin or isoniazid. This study aims to determine mutation frequencies associated with resistance in *Mycobacterium tuberculosis* strains in the Western Cape.

Materials and Methods: Mutations detected by MTBDRplus on 154 sputum samples were analyzed. Resistance to rifampicin or isoniazid or both was established by the Middlebrook 7H10 agar method.

Results: Of 154 samples, 97 (63%) were MDR, 75 showing mutations in *rpoB* S531L, 39 in *katG* S315T1 and 33 affecting *inhA* C15T in the -15 promotor region. There were 37 (24%) isoniazid mono-resistant strains, 21 involving the *katG* S315T1 codon and 11 *inhA* C15T. Rifampicin mono-resistance occurred in 20/154 (13%) strains, 12 with mutations in *rpoB* S531L and 5 in *rpoB* H526D.

Discussion: Rifampicin resistance in MDR-TB cases involved mainly mutations in the *rpoB* S531 codon. Mono-resistance to rifampicin compromises the use of rifampicin resistance as sole surrogate marker for MDR-TB in this region. Regarding isoniazid resistance, 60 of 134 MDR plus isoniazid-mono-resistant cases were associated with *katG* S315 and are likely to exhibit high-level resistance while 44 with mutations in the -15 promotor region of *inhA* are likely to have low-level resistance. A substantial proportion of patients in the Western Cape infected with low-level resistant strains will therefore be amenable to high-dose isoniazid treatment. Further genotypic and phenotypic studies, including MIC determinations, need to be performed to confirm the present findings.

PS-82257-19 Comparison of the perception of quantity and quality of sputum specimens from a TB prevalence survey

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Background: In tuberculosis laboratories, routine perception of quantity and quality of sputum samples is

done to ensure appropriate specimen to facilitate diagnosis. Sputum samples collected for mycobacterial culture from participants in a tuberculosis survey in rural Western Kenya, were received at the KEMRI/CDC Kisumu laboratory (KSM), for shipment to the KEMRI/CRDR, Laboratory, Nairobi (NRB).

Objective: To determine agreement between perception of quantity and quality of sputum specimens assessed by the two laboratories.

Methods: Sputum samples were collected in 50 ml sterile centrifuge tubes graduated (with 5 ml intervals), labeled with participants identification, packed and transported to KSM. At KSM, the samples were assessed for quantity in milliliters and quality by variables: tenacious, mucous, blood stained and saliva. The samples were then re-packed for shipment to NRB where again the quantity and quality were observed and recorded by one of the technicians. The comparison was done on 4482 sputum samples with matching study identification numbers.

Results: Quantity: the mean of sputum quantity for KSM was 6.56 (CI 6.43–6.69) ml and NRB 6.94 (CI 6.81–7.07) ml (mean difference: -0.37 , $P < 0.001$). There was a strong correlation between the two (Pearson correlation = 0.89). Agreement for the sputum quality was poor. Of the 4482 samples, KSM judged 937 (20.9%) as salivary and 13 (0.29%) as blood stained, while this was 2568 (57.3%) and 79 (1.8%) respectively at NRB. Kappa's were 0.27 for 'tenacious', 0.21 for 'blood stained', 0.06 for 'saliva' and -0.02 for 'mucus'.

Conclusion: There was a strong correlation between perception of sputum quantities between the 2 laboratories, with only a small (<0.5 ml) mean difference. However agreement in quality did not differ from chance. For quality reporting to be meaningful, training to standardize observations would be required as correct diagnosis is dependent on specimen quality.

PS-82327-19 Genotypic diversity among *Mycobacterium tuberculosis* isolates from the PETTS Study in 6 countries

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Setting: The Preserving Effective TB Treatment Study (PETTS) is a multinational, prospective observational study of consecutive, consenting adults starting treatment for pulmonary MDR-TB in Estonia, Latvia, Peru, Philippines, South Africa, and Thailand, 2005–2008. **Objectives:** The broad objectives of PETTS are to de-

termine the rate of, risk factors for, and consequences of acquired resistance to 2nd-line drugs (SLDs) in MDR-TB patients. The objective of this preliminary analysis is to determine the diversity of *M. tuberculosis* strains in the patient population.

Methods: *M. tuberculosis* isolated from baseline sputum specimens was shipped to CDC for genotyping. DNA was extracted from each isolate and spoligotyped using the Luminex multianalyte platform. Isolates were assigned to families using the most recent published literature.

Results: By March 2008, 519 PETTS isolates were spoligotyped. Of these, 515 could be assigned to 1 of 4 main phylogenetic lineages and 408 of them to known subfamilies. Country-specific and aggregate data are displayed in the following table.

Country	East Asian-Beijing <i>n</i> (%)	Haarlem <i>n</i> (%)	Euro American			East African-Indian-CAS <i>n</i> (%)	Indo Oceanic		
			LAM <i>n</i> (%)	X <i>n</i> (%)	S <i>n</i> (%)		Manila <i>n</i> (%)	Un-known <i>n</i> (%)	Un-known <i>n</i> (%)
Estonia (<i>n</i> = 39)	36(92)	—	3(8)	—	—	—	—	—	—
Latvia (<i>n</i> = 44)	26(59)	2(5)	11(25)	—	—	5(11)	—	—	—
Peru (<i>n</i> = 88)	3(3)	21(24)	32(36)	3(3)	—	27(31)	—	—	2(2)
Philippines (<i>n</i> = 112)	6(5)	—	11(10)	2(2)	—	1(1)	1(1)	82(73)	9(8)
S. Africa (<i>n</i> = 205)	40(20)	13(6)	35(17)	27(13)	28(14)	48(23)	7(3)	—	7(3)
Thailand (<i>n</i> = 31)	19(61)	—	—	—	—	2(6)	—	8(26)	2(6)
Total (<i>N</i> = 519)	130(25)	36(7)	92(18)	32(6)	28(5)	83(16)	8(2)	82(16)	24(5)

Conclusions: Four of the 6 previously described main phylogenetic lineages are represented among PETTS isolates. The level of diversity differs by country, ranging from 2 families/subfamilies in Estonia to 8 families/subfamilies in South Africa. Ongoing MIRU-VNTR studies with these strains should allow further discriminatory characterization of the multinational PETTS isolates.

PS-82335-19 Mutation analysis of drug resistance genes in Tunisian *Mycobacterium tuberculosis* clinical isolates

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Aim: Characterization of mutations associated with drug resistance in *M. tuberculosis* isolates displaying resistance to one or more of the first line drugs, rifampicin, ethambutol, and pyrazinamide.

Results: We performed a mutation profiling of genes conferring resistance to rifampicin, ethambutol, and pyrazinamide, in a total of 154 Tunisian *M. tuberculosis* isolates displaying resistance to one or more of these drugs. Resistance to rifampicin was found essentially

associated with the expansion of a previously described MDR outbreak characterized by the double mutation S531L and V610M in the *rpoB* gene. The latter was specific to the outbreak strain and has never been described elsewhere. Aside from this MDR outbreak, 5 additional MDR isolates and 9 RIF-resistant strains were studied. These strains were either wild-type in the sequenced region or showed previously reported mutations. Ethambutol resistance was mainly associated with codon 306 of the *emb* gene. Pyrazinamide resistance was analysed in the *pncA* gene which showed mutations in both the promotor and the coding region. No mutations or indels could be observed in 57% of cases.

Conclusion: Aside from checking the quality of drug susceptibility testing, this study will help to implement rapid hybridization-based assays to detect drug resistant tuberculosis in Tunisia.

PS-82354-19 A microarray targeted to PE/PPE genes of *Mycobacterium tuberculosis* reveals frequent deletion events

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Aim: To increase our understanding of the role of PE/PPE genes in the genome plasticity, evolution, and pathogenesis of mycobacteria.

Design: We developed an optimized microarray protocol that allows for the efficient and specific detection, at the genome scale, of individual members of PE/PPE genes.

Methods: The microarray is based on 50-mer oligonucleotides that were carefully selected and tested for specificity and sensitivity, using Cy5-labelled genomic DNA of strains with known deletions in PE/PPE genes.

Results: Application of the microarray to a collection of 33 Tunisian clinical isolates of *M. tuberculosis* allowed detecting six deleted genomic regions involving a total of 2 PE and 7 PPE genes, some of which are known to be immunodominant or involved in virulence. Among the five deletions whose boundaries were determined to the base pair, four were flanked by 400 to 500 bp stretches of identical sequences, thus suggesting that they may have been generated through homologous recombination.

Conclusion: We believe that the use of this microarray with larger collections of clinically relevant mycobacterial strains will help us to better decipher the role of PE/PPE genes in several aspects pertaining to evolution and host-pathogen interaction of mycobacteria.

PS-82472-19 *Mycobacterium tuberculosis* genotype distribution and associations with drug resistance in Vietnam

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Background: Local studies have suggested high prevalence of Beijing genotype infections in Vietnam, and associations between the Beijing genotype and multi-drug resistance.

Aim: To study the distribution of MTB genotypes at the country level as well as associations with drug resistance and differences between new and re-treatment patients.

Design: Isolates were obtained in a standard TB drug resistance survey done in 2005 in 80 clusters. All isolates were tested for resistance against isoniazid, rifampin, streptomycin and ethambutol by proportion method using LJ medium according to WHO guidelines. For each isolate, information is available for geography (including urban/rural/remote), age, sex, TB treatment history, risk group and HIV status (by patient history only). All isolates will be genotyped by spoligotyping by standard methods.

Methods: We assessed the genotype by spoligotyping of all *M. tuberculosis* strains isolated in a nationwide representative drug resistance survey done in 2005.

Results: Isolates and complete drug susceptibility results were available of 1611 (92%) of 1756 new patients, and of 207 of 255 (81%) of previously treated patients. Multidrug resistance was observed in 44 (2.7%) of new and in 40 (19.3%) of previously treated patients.

Discussion: Vietnam has a moderate prevalence of multidrug resistance. Results of genotyping and associations will be presented at the conference.

PS-82446-19 Peripheral immune response in pulmonary tuberculosis

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The immunopathogenesis of pulmonary tuberculosis (PTB), mainly cellular immune response and delayed type hypersensitivity reactions are considered to play an important role in whose pathogenesis, could not be clarified completely. Th1 cells involved mainly in

cellular immune response provide a normal healing process with minimal or no sequel while Th2 cells and CD8⁺ T lymphocytes may cause to develop more severe type of the disease. In this study, peripheral blood immune response was shown by flow cytometry. The study group consists of smear positive young adult male soldier PTB patients with a negative HIV serology ($n = 15$, mean age = 22 ± 4), and the control group consists of healthy young adult volunteer male soldiers without a history of PTB ($n = 15$, mean age = 23 ± 3). Lymphocyte subpopulations in peripheral blood samples and, within cell cytokine content including IL-2, IL-4, IL-5, IL-10 and IFN- γ of CD8⁺ T cells and all lymphocytes were determined by flow cytometry. IL-2, IL-4, IL-5, IL-10, IFN- γ and TNF- α serum levels were measured by CBA Th1/Th2 kit. Student's t -test was used for parametric values and Mann-Whitney U test was used for non parametric values. No difference was obtained between the percentages of T, B, NK cells and HLA-DR expression in both groups, however the number of CD3+HLA-DR+ activated T cell percentages was higher in PTB group than that in control group ($P < 0.01$). IL-2, IL-4, IL-5, IL-10 contents of CD3+ and IFN- γ + CD8⁺ T lymphocytes were significantly lower in PTB patients compared to healthy subjects ($P < 0.001$, $P < 0.01$, $P < 0.01$, $P < 0.05$, and $P < 0.05$, respectively). Serum IL-2, IL-4, IL-5 and TNF- α levels were also significantly lower in PTB patients ($P < 0.001$, $P < 0.01$, $P < 0.05$ and $P < 0.01$, respectively). Our findings suggest that cytokine production and utilization might be effective in disease site as inversely related to peripheral blood in PTB patients.

TUBERCULOSIS IN HIGH BURDEN COUNTRIES—II

PS-81646-19 Defining priority areas for TB control in Brazil based on epidemiological data

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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. Brazilian Ministry of Health (BMoH) defines 315 of a total of 5560 municipalities as priorities for the national TB control program (NTCP). The BMoH priorities definition criteria included political issues and was not based on continuous areas.

Objective: To define high risk areas based on epidemiological data.

Method: Data on reported TB cases from 2003 to 2005 and municipalities' population for 2004 were provided by the BMoH. High risk areas with a maxi-

mum diameter of 100 km were defined by spatial scan statistics, using a Poisson model.

Results: Ten high risk clusters were defined with 218 municipalities and 50% of TB reported cases. Nine clusters included 10 metropolitan areas and its neighborhood—Rio de Janeiro, Salvador, Recife, Porto Alegre, São Paulo and Baixada Santista as one big cluster, Fortaleza, Manaus, Belem and Sao Luis—and a tenth cluster was defined in the border of Minas Gerais e Rio de Janeiro states. Only 35.2% of the municipalities included in the high risk clusters are priorities under BMoH criteria, and among the priorities defined by BMoH only 24.2% are included in the high risk clusters.

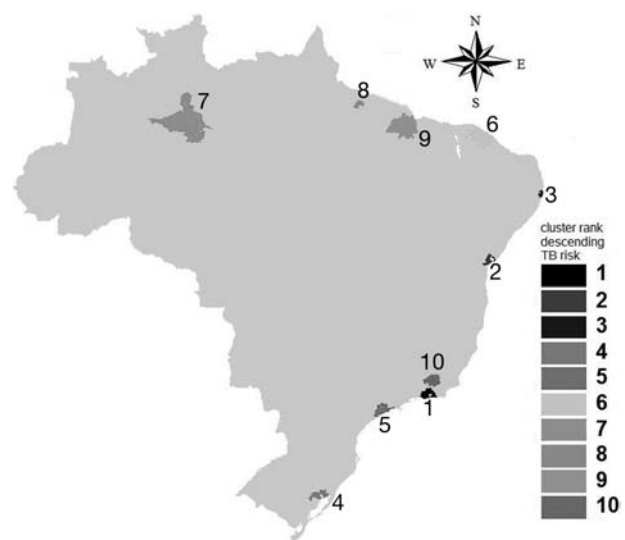


Figure TB spatial clusters, Brazil, 2003–2005

Conclusion: The spatial scan statistics was able to define ten high risk areas responsible for half of the country's TB reported cases. The overlap with the municipalities defined as priorities by BMoH is not large. As infectious diseases do not respect administration borders, the definition of high risk areas with several municipalities as intervention priorities is surely more effective than working with spatially discontinuous priorities. It also allows cooperation of neighbor municipalities, which may include the reference system. We believe that setting priorities on epidemiological grounds may be central for the success of TB control in a huge country as Brazil.

PS-81674-19 Determinants of mortality in HIV-infected tuberculosis patients: EthiopiaM Desai,^{1,2} B Feleke,³ R Fantu,³ G Wondimagn,⁴M Demissie,⁵ E Vitek,² L Nelson,⁶ A Finlay,² K Cain.²

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Background: Tuberculosis (TB) is the leading cause of mortality among HIV-infected persons in Ethiopia. Globally, and in Ethiopia, cotrimoxazole preventive therapy (CPT) is recommended for all HIV-infected TB patients, and antiretroviral therapy (ART) for those with CD4 < 350 cells/ μ L. However, the impact of these interventions in routine program settings in resource-limited countries, such as Ethiopia, is not known.

Methods: We evaluated the impact of ART and CPT among HIV-infected TB patients attending all 16 hospital-based ART clinics in the Southern Nations, Nationalities, and Peoples Region of Ethiopia. Data were collected from the clinic registers and medical records for all patients enrolled in care from September 2006 through March 2007. We compared the risk of death for HIV-infected patients with TB to those without TB as of January 2008, and we compared the risk of death among HIV-infected TB patients receiving ART and CPT, to those not receiving them.

Results: Data were collected on 3349 HIV-infected persons, of whom, TB was diagnosed in 591 (18%). Of the TB patients, 39 (7%) had died, compared to 112 (4%) of the 2758 persons without TB ($P = 0.008$). Among the TB patients, 29/317 (9%) of those on ART died compared to 10/92 (11%) of those not on ART (relative risk [RR] = 0.84, 95% confidence interval [CI] = 0.42–1.66); while 28/353 (8%) of those on CPT died compared to 9/51 (18%) not on CPT (RR = 0.45, 95%CI = 0.23–0.89). The impact of potential confounding variables, including CD4, as well as analyses involving time to death are currently pending.

Conclusion: The population of HIV-infected persons in Ethiopia has a high burden of TB. While death is more common in HIV-infected TB patients compared to HIV-infected persons without TB, use of CPT is strongly associated with improved outcomes. The benefit of ART will be more fully explored once CD4 data are available.

PS-81681-19 Global TB trends: a reflection of social or medical progress?O A Oxlade,¹ A Benedetti,¹ D Menzies.^{1,2} ¹McGill

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Background: In many Western European countries tuberculosis (TB) morbidity and mortality declined steadily for more than 100 years before the introduction of BCG or effective antibiotics. This decline is unexplained, but was coincident with steady improvements in socio-economic conditions and life expectancy (LE). In the modern era, trends have varied, with some countries experiencing declining TB rates, and others experiencing an increase. In some of these latter countries the increasing rates have been attributed to the HIV epidemic, but in others HIV rates have been low.

Objective: To investigate the possible association between LE and TB incidence, and how and why TB incidence trends may have changed over time.

Methods: We carried out an ecologic analysis using historical data and modern data. Historical data was taken from the literature, while modern data, for the years 1990 and 2005, was obtained from publicly accessible databases. Univariate, multivariate and stratified analysis were carried out using data from 157 countries from the modern era.

Results: In the pre-antibiotic era, a 1% annual increase in LE was associated with an average annual decline in TB infection in Western Europe of approximately 4.7%. Remarkably, in a modern setting, a virtually identical effect was calculated using multivariate analysis across all countries. The effects of both TB treatment and HIV were found to be very small. A 1% increase in treatment effectiveness was associated with a 0.07% annual decline in TB incidence, while a 1% increase in HIV seroprevalence was associated with a 0.3% annual increase of TB incidence. Stratified analysis by HIV status and global region provided more insight into the findings.

Implications: Our ecologic analysis suggests that more general approaches—which act on improving socio-economic status and its various components, such as nutrition, poverty and accessibility to health care—may have a significant impact on TB control.

PS-81732-19 Analysis of retreatment tuberculosis patients in Punjab, Pakistan

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Objective: To find out risk of treatment failure in retreatment TB patients.

Background: Punjab Province of Pakistan is moving ahead to achieve TB related MDG targets. In Qtr2 2007 Case Detection Rate was 70%, treatment success rate 85% and default rate 5%. Presently no data is available on MDR-TB and there is need to conduct drug resistance survey. A study was designed to know status of retreatment TB patients in Punjab and find out risk of treatment failure in retreatment cases who are potential candidates of MDR-TB.

Methodology and Study Design: Descriptive Observational study. Study Area; 35 districts of Punjab having 89.1 Millions of population. Study Subjects; Cohorts of retreatment TB patients registered under DOTS in year 2006 Data Collection; Quarterly Reports and TB register, Interview from DOTS Staff.

Results: Total patients registered, all types in year 2006 were 91 927. Of these Cat I patients were 89 330 (98%), cat II patients 2197 (2%). Out of 2197 Cat II, 841 (38%) were relapse cases, 494 (22%) treatment failure cases and 862 (39%) return after default. Outcome of relapse TB cases shows cure rate 57%, treatment completion rate 28%, treatment success rate 86%, failure rate 1%, default rate 6% and transfer out rate 2%. Outcome of treatment after failure case shows cure rate 61%, treatment completion rate 28%, treatment success rate 79%, death rate 4%, failure rate 4%, default rate 7% and transfer rate 3%. Outcome of treatment after default patients shows cure rate 42%, treatment completion rate 27%, treatment success rate 68%, death rate 4%, default rate 22% and transfer out rate 3%. Outcome of total 2197 TB retreatment shows 51% cure rate, 27% treatment completion rate, 78% treatment success rate, 4% death rate, 2% failure rate, 12% default rate, 3% transfer out rate.

Type of patient	Patients	Cure rate	Treatment completion rate	Treatment success rate	Death rate	Failure rate	Default rate	Transfer out rate
Relapse	841 (38%)	57%	28%	86%	5%	1%	6%	2%
Treatment after failure	494 (22%)	61%	28%	79%	4%	4%	7%	3%
Treatment after default	862 (39%)	42%	27%	68%	4%	2%	22%	3%
Total	2197	51%	27%	78%	4%	2%	12%	3%

Conclusion: Treatment failure rate is not the major problem in retreatment cases. Patients registered as treatment after defaults are at greater risk of having outcome as default.

PS-81761-19 Gender differences in the yield of smear microscopy and radiological findings of patients with tuberculosis

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Setting: 8 district hospitals, Abuja.

Background: There are significant gender differences in TB, from service accessibility to clinical presentation, reflecting interactions between biological responses and socially-constructed patterns. There is limited information on these differences in West African patients.

Objective: To describe the yield of smear microscopy and radiological findings of patients with symptoms of TB and how these vary by gender and HIV.

Methods: A survey of patients >15 year with cough >3 weeks. 3 sputum samples were examined with ZN and one was cultured. Chest X-rays were obtained from smear-positive patients. Lung lobes were classified as 0–1 (normal/affected) and cavities were scored as 0 (none), 1 (diameter <2 cm), 2 (2–4 cm) and 3 (>4 cm). Smear-positive patients were tested for HIV and smear-negative patients were tested if requested.

Results: 262/774 (34%) males and 137/547 (25%) females enrolled were smear-positive ($P < 0.01$). 1186 (90%) were cultured. The proportion of positive cultures did not vary by gender (437/691 [63%] males; 294/495 [59%] females). 317/626 (56%) males and 249/419 (44%) females were HIV positive. Smear microscopy was more likely to be positive in HIV-negative than HIV-positive patients, but these differences did not vary with gender. Males had more lung lobes affected, more lung cavities (39% vs 14%) and larger cavity diameters ($P < 0.01$). These latter gender differences were not apparent in HIV co-infected patients.

Conclusion: More male patients consulted and were smear-positive than females, while similar proportions of males and females had positive culture, suggesting that women are more likely to produce paucibacillary sputum. Females had less lung involvement and cavitations than males. These differences disappeared with HIV co-infection. Differences between males and females are likely to be a combination of gender-constructed patterns and sex-related biological response to infection.

PS-81785-19 A mathematical model of the joint epidemics of TB and HIV in a South African township

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Setting: A large set of demographic and epidemiological data has been gathered in recent years in a township near Cape Town with very high HIV prevalence and TB notification rate.

Objectives: To integrate the data in a mathematical model of TB and HIV transmission, estimate unknown parameters, and study the potential impact of various interventions, in particular the upscaling of antiretroviral therapy (ART).

Methods: The dynamic model contains six compartments combining two states for HIV (HIV– and HIV+) with three states for TB (susceptible, latent TB and active TB). Primary TB disease, reactivation and reinfection are taken into account. The model contains 22 parameters. Some are fixed according to the medical literature. The others are estimated by fitting the model to the data. It is then possible to study the

potential impact of interventions by letting some parameters vary.

Results: Assuming that ART reduces the rate of progression from latent to active TB by 80% in HIV+ people, that ART increases the life expectancy of HIV+ people from 10 to 20 years, and that ART divides by two the mortality of HIV+ TB cases, the model suggests that the upscaling of ART could decrease considerably the incidence of TB even if it increases the prevalence of HIV.

Conclusion: This model is a first step towards a better estimation of epidemiological parameters for joint epidemics of HIV and TB.

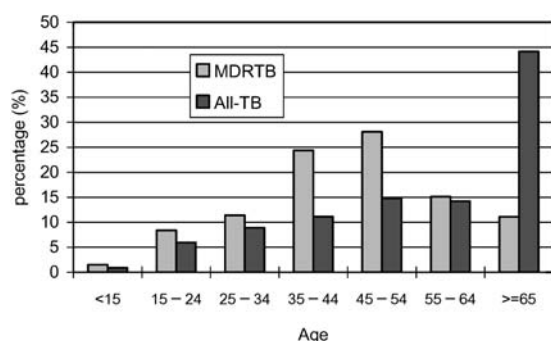
PS-81822-19 The current status of multidrug-resistant and extensively drug-resistant tuberculosis in Taiwan

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Objective: The threat of multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB) has become a significant public health problem. In Taiwan, MDR-TB became a notifiable disease in December 2006. The aim of this study is to characterize current MDR-TB and XDR-TB cases in Taiwan.

Methods: All MDR-TB and XDR-TB patients under surveillance in March 2008 were enrolled. Data was extracted from National Surveillance Network of Communicable Disease.

Results: A total of 412 MDR-TB patients, including 9 XDR-TB patients were registered in March 2008. There were 405 Taiwan-born and 7 foreign-born patients. 310 (76.5%) of the Taiwan-born MDR-TB patients were male. The proportion of male was significantly higher compared with non-MDR-TB patients in 2007 (7839/11 292, 69.4%, $P < 0.01$). The age distribution among Taiwan-born MDR-TB patients was significantly different from the age distribution of all TB patients (Figure). The largest age group



in MDR-TB patients was those aged 45–54 years (28.5%), but the largest age group in all TB patients

was those aged >65 years (44%). The proportion of diabetes mellitus (DM) was significant (22.5%). Eighty-six (21.2%) of MDR-TB patients were aborigines and the proportion was much higher than those of all TB patients (6.3%).

Conclusion: Compared to all TB patients, MDR-TB patients were significantly more male, younger, DM and were aborigines. The reasons for the difference are unknown. Additional studies are needed to investigate the etiology and the clinical outcome of MDR-TB patients. Aggressive TB control should be enforced to prevent spread of MDR-TB among these high risk groups.

PS-81838-19 Factors associated with prevalent TB at screening prior to isoniazid preventive therapy

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Setting: The Thibela TB study is a cluster randomised trial of community-wide isoniazid preventive therapy (IPT) in 3 gold mining companies in South Africa where TB control programmes include radiological screening at least annually.

Objectives: To estimate the prevalence of and factors for undiagnosed TB at the screen prior to initiation of IPT.

Methods: We included participants who completed the TB screening process between Jul 06–Oct 07, excluding those currently on TB treatment. TB screening was based on symptoms (cough >2 weeks, night sweats, weight loss) and digital chest X-ray. TB suspects (defined as symptom(s) and/or chest x-ray compatible with active TB) provided a sputum for microscopy and culture using MGIT. Undiagnosed TB at screen was defined as a positive culture for *Mycobacterium tuberculosis*. Logistic regression was used to identify factors associated with outcome. HIV status was not available.

Results: 13 482 participants satisfied inclusion criteria; median age 39 yrs, 97% male, 11% had a history of TB, 0.9% previously taken IPT and 2.3% currently taking ART. A total of 1427 participants (10.7%) were classified as TB suspects. Overall 2.1% (278/13 482) were culture +ve; 1.2% (156/13 482; 95%CI 1.0–1.4) had undiagnosed TB. On a univariable analysis increasing age, yrs in workforce, residing in hostel/informal settlement, previous TB and ART use were associated with an increased risk of undiagnosed TB. Previous IPT was not associated with undiagnosed TB. A multivariable analysis showed age, previous TB (OR 1.7, 95%CI 1.1–2.5) and residing in hostel/informal settlement (OR 1.5, 95%CI 1.0–2.2 and OR

1.7, 95% CI 0.9–3.5, respectively) were independently associated with undiagnosed TB.

Conclusion: Undiagnosed TB was relatively common despite active screening, arguing for intensification of this programme. Prevalence was higher amongst participants from hostel/informal settlement suggesting that crowded living conditions may contribute to prevalent TB.

PS-81852-19 Two *M. tuberculosis* lineages are overrepresented among new cases of MDR- and XDR-TB in Argentina

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Setting: Argentina 2003–2006.

Objective: To determine frequencies of *Mycobacterium tuberculosis* lineages responsible for new cases of multidrug-resistant (MDR) and extremely drug-resistant (XDR) tuberculosis (TB) reported to the national surveillance system.

Methods: *M. tuberculosis* IS6110 RFLP fingerprinting and spoligotyping were performed on strains isolated from all new MDR-TB cases whose drug susceptibility tests were done or confirmed at the national reference TB laboratory. Lineages were assigned as stated in SpolDB4 (www.pasteur-guadeloupe.fr:8081/SITVIT). Frequencies were compared to those found in pansusceptible strains of a population-based study conducted in the period.

<i>M. tuberculosis</i> sub-lineage	MDR strains	XDR strains	Pansusceptible strains
Haarlem 2	140 (35%) $P < 0.000001$	15 (45%) $P < 0.000001$	1 (<1%)
Other Haarlem types	31 (8%)	2 (6%)	37 (14%)
LAM3	59 (15%) NS	2 (6%) NS	24 (9%)
LAM5	34 (8%) $P < 0.000001$	6 (18%) $P = 0.000009$	1 (<1%)
Other LAM types	35 (9%)	2 (6%)	56 (22%)
T1 (Tuscany variant)	21 (5%)NS	0	26 (10%)
Other T types	52 (13%)	5 (15%)	50 (20%)
S & LAM3/S convergent	13 (3%)	0	11 (4%)
Beijing & Beijing-like	2 (0%)	0	1 (<1%)
Miscellaneous	15 (4%)	1 (<1%)	49 (19%)
Total	402 (100%)	33 (100%)	256 (100%)

Results: Strains isolates from 402 (87%) of 461 new MDR-TB cases were available for genotyping (111/

116, 120/126, 98/117 and 73/102 in 2003, 2004, 2005 and 2006, respectively) including those obtained from all 33 XDR-TB cases diagnosed in the period. As compared to frequencies found among pansusceptible *M. tuberculosis* strains, H2 and LAM5 lineages, which had caused hospital MDR-TB transmission in the '90s, were overrepresented among MDR and XDR strains in our study (table). Frequencies of LAM3 and T1 Tuscany variant strains, also MDR outbreak-associated lineages, showed neither an increased frequency among MDR strains nor a leaning towards a drug resistance gain.

Conclusion: Lineages formerly associated to MDR-TB transmission still prevail over other MDR-TB strains circulating in our country. In particular, Haarlem 2 and LAM5 local strains, which are hardly found in our setting as pansusceptible strains, seem to possess a singular ability to build up drug resistance without impairing the ability to spread.

PS-81866-19 Incidence and mortality of extrapulmonary TB by HIV infection status: does site of disease matter?

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Objective: To assess incidence and mortality by type of extrapulmonary tuberculosis (EPTB) and HIV status. **Methods:** Data from TB patients in Kinshasa, Democratic Republic of the Congo, were collected using routine TB treatment cards. Patients were offered HIV counseling and testing. TB diagnosis was made by primary health care providers based on symptoms, clinical exam, smear microscopy, and radiography if indicated. HIV co-infected patients received cotrimoxazole prophylaxis and were referred for antiretroviral treatment.

Results: Between January 2006 and January 2008, data were obtained from 6367 patients; 5385 (84.6%) were HIV-negative and 982 (15.4%) were HIV-positive. HIV-positive patients were more likely to present with EPTB than HIV-negative patients (24.2% vs. 19.3%, $P < 0.001$). Lymph nodes (cervical and other) were the most prevalent site of EPTB for both HIV-positive and HIV-negative patients (42 and 50%). TB of the pleura (39% vs. 29%, $P < 0.001$) and pericardium (3.3% vs. 1.5%, $P = 0.01$) were the only EPTB sites more frequent among HIV-positive than HIV-negative patients. Overall, 15.3% of HIV-positive and 4.5% of HIV-negative patients died prior to treatment completion. HIV-positive patients had a higher risk of death for both pulmonary TB (risk ratio [RR] 2.1; 95% CI 1.3–3.3) and EPTB (RR 3.8; 95% CI 3.1–4.7). Only HIV co-infected patients had a higher risk of death from pulmonary TB than EPTB (RR 1.7;

95%CI 2.1–2.7). Patients with abdominal and pleural TB had the highest risk of death, independent of HIV status; only lymph node TB had a higher risk of death among HIV-positive vs. HIV-negative patients (RR 5.2; 95%CI 2.1–2.7).

Conclusions: Independent of HIV status, lymph node TB was the most frequent type at presentation, and abdominal and pleural TB the most deadly types of EPTB during TB treatment. Compared to HIV-negative patients, those HIV co-infected were more likely to present with pleural or pericardial TB and die from lymph node TB.

PS-81888-19 Time to TB diagnosis in non-DOTS vs. DOTS facilities in Rio de Janeiro, Brazil

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Rationale: Among other strategies, the STOP-TB recommends DOTS implementation and expansion, which should result in increased access and rapid diagnosis of TB. In Rio de Janeiro (RJ), DOTS implementation was started in 1998. Regardless if supervised or not, treatment has been free and primary care units equipped to collect sputum for AFB staining since the 60's. We aimed at comparing time for TB diagnosis in DOTS vs. non-DOTS facilities.

Methods: We interviewed 194 bacteriologically confirmed pulmonary TB patients between the 4th and the 12th week of treatment in twelve facilities where DOTS was implemented and seven non-DOTS facilities in six RJ state counties. Duration of symptoms before search for help and until diagnosis, type of facility first searched for and number of visits were analyzed.

Results: Among 194 patients interviewed, 62.9% were male, median age was 37 (18–75) years, and 66% were from DOTS facilities. Median delay to diagnosis was 62 days in DOTS vs. 83.9 in non-DOTS facilities. Facilities other than primary care units were the first place visited by patients in 66% and 55% in DOTS and non-DOTS facilities, respectively. Hospitalization was necessary in 13.3% of patients from DOTS facilities, with a median duration of hospitalization of 7 (1–90) days, and in 10.6% of patients from non-DOTS facilities, where the median hospital stay was 12 days (2–45).

Conclusion: While diagnosis of TB is still delayed in both DOTS and non-DOTS facilities, in places where DOTS was implemented, time spent for TB diagnosis was shorter. However, the number of visits was significantly higher, which incurs in financial burden for patients and the health system. Despite free access to basic units, patients still go to hospitals or pharmacies. While DOTS strategy reduced time to diagnosis,

it is still insufficient to achieve the STOP-TB aims. Community empowerment and patients' education may shorten diagnosis delay.

	DOTS <i>n</i> = 128 median (range)	Non-DOTS <i>n</i> = 66 median (range)	<i>P</i> value
Patient delay (days)	29.8 (0–240)	37.5 (0–660)	0.11
≥60 days	34%	50%	0.16
System delay (days)	19.3 (0–308)	26.5 (0–375)	0.02
≥30 days	35%	47%	0.04
Total delay (days)	62 (0–368)	83.9 (4–1031)	0.02
Pre-diagnostic visits	4 (0–16)	2 (0–9)	<10 ^{−3}
≥5 visits	42%	12%	<10 ^{−3}

PS-81963-19 Provider-initiated HIV testing among TB patients in China

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Setting and Aim: The magnitude of TB-HIV co-epidemic is unknown in China. We piloted a new collaborative program between the National AIDS Program and the National TB Control Program (NTP) to increase identification of HIV-infected TB patients and thus permit more accurate measurement of the TB-HIV co-epidemic.

Methods: We piloted the program in three high HIV-prevalence counties in Henan (county A) and Sichuan province (county B & C) with a combined population of 2.5 million. Primary route of HIV transmission is illegal blood plasma donation in Henan and is injection drug use in Sichuan. From September 2006 to February 2007, we carried out provider-initiated HIV testing for all TB patients diagnosed in the county CDC. Patients could opt-out of HIV testing. We also set up collaborative mechanisms for symptomatic persons living with HIV/AIDS (PLWHA) to be referred for evaluation of TB. In counties A & B, both TB evaluation and HIV testing are performed in the same building. In county C, they are performed in separate sites; thus requiring referral mechanisms to be established.

Results: See table.

County	Newly registered TB pts	No. of known HIV+ at registration	No. needing HIV testing	No (%) with HIV testing	No (%) of tested pts with HIV	Overall no (%) of TB pts with HIV
A	354	36 (33*)	318	314 (98.7)	3 (1.0)	39 (11.1)
B	494	16 (16*)	478	387 (80.1)	10 (2.6)	26 (6.5)
C	215	5 (5*)	210	204 (97.6)	4 (2.0)	9 (4.3)

* Patients referred from HIV/AIDS program.

Conclusion: A program combining both provider-initiated HIV testing for TB patients in the NTP and referral of PLWHA for TB evaluation was successfully implemented in China and enabled us to more accurately estimate the magnitude of the TB-HIV co-epidemic. Without effective referral of PLWHA for TB evaluation, HIV testing for TB patients alone would have substantially underestimated the magnitude of the TB-HIV co-epidemic.

PS-81969-19 Anti-tuberculosis drug resistance survey in West Nile, Uganda

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Setting: Emergence of multidrug-resistant (MDR) and extensively drug-resistant (XDR) tuberculosis (TB) is a serious concern in high HIV prevalence countries of sub-Saharan Africa but remain poorly documented.

Objectives: To measure the prevalence of MDR and XDR in pulmonary TB patients and HIV co-infected patients living in the West Nile region, North-western Uganda.

Methods: The cross sectional survey included consecutive new (NC) & previously treated (PTC) smear positive TB cases. Culture and drug susceptibility testing (DST) of anti-TB drugs was performed using the Mycobacteria Growth Indicator Tube (MGIT) and indirect proportion method on solid Löwenstein-Jensen medium for 1st line drugs and on agar 7H11 medium for 2nd line drugs.

Results: As of March 2008, 101 TB smear-positive patients were included: 83 (82.2%) NC and 18 (17.8%) PTC. 38.0% were HIV co-infected. A total of 64 (63.4%) had positive, 2 (1.9%) negative and 4 contaminated culture results. 31 results were pending. Of the 64 with available DST results, 16 (25.0%) were resistance to at least 1 drug: 10/49 (20.4%) were NC and 6/15 (40.0%) PTC. There was 18.8% (12/64) overall resistance to isoniazid. The overall prevalence of MDR-TB was 4.7% (3/64, 95%CI 1.5–13.9) and 8.0% (2/25, 95%CI 1.8–29.1) in HIV co-infected patients. All MDR-TB patients were PTC and none of them were XDR. DST results will be available by September 2008 for a sample of 200 patients.

Conclusions: The absence of MDR among NC is encouraging but needs to be confirmed in a bigger sample size, as does its presence in HIV-infected individuals. An elevated prevalence of isoniazid resistance in new cases is of concern, as patients may be cured less often and develop additional resistance with the standard regimen, complicating future treatment options. As more data accrues on the prevalence of drug-resistant TB in sub-Saharan Africa, so too does

the urgency for the need of clinic-level tools and new drugs for its diagnosis and treatment.

PS-82000-19 National drug resistance surveillance of tuberculosis in the Philippines

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The primary objective of the survey is to determine the national prevalence of primary resistance to the four major anti-tuberculosis drugs, i.e., isoniazid (H), rifampicin (R), ethambutol (E) and streptomycin (S). The secondary objectives are 1) to determine the national prevalence of acquired resistance to the four major anti-tuberculosis drugs, i.e., H, R, E, S and 2) to determine the prevalence of multidrug-resistant tuberculosis (MDR-TB), i.e., resistance to at least both H and R (MDR-TB). A total of 1091 cases consisting of 935 new smear positive cases and 156 previously treated cases coming from 83 randomly selected rural health units/city health centers (RHU's/CHC's) have been enrolled in the survey using cluster sampling method. Two sputum specimens were processed and inoculated at the RHU/CHC using Modified Ogawa method transported to 5 designated culture centers for incubation and those with growth transported to the National Tuberculosis Reference Laboratory for sub-culture and sensitivity testing (DST) by proportion method using Löwenstein-Jensen medium. Quality assurance on the DST laboratory results was undertaken by the Research Institute of Tuberculosis, Tokyo, Japan. The national prevalence of primary resistance to the four major anti-tuberculosis drugs are as follows: among the 935 new smear positive cases, any resistance to H 11.65%, R 3.90%, E 3.97% and S 11.70%. Multidrug resistance (MDR) rate for new smear positive cases is 3.53%. The national prevalence of acquired resistance to the four major anti-tuberculosis drugs are as follows: among the 156 previously treated, any resistance to H 30.22%, R 21.84%, E 8.84% and S 15.74%. The MDR rate for previously treated cases is 19.32%. There is an increasing problem of drug resistance in the Philippines and a programmatic plan of action has been started.

PS-82004-19 Structure of TB patient mortality in the Russian Federation

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Background: Effective TB control management requires TB patient mortality data stratified by death

from TB and death from other causes. Russia calculates the TB mortality rate based only on deaths from TB. Meanwhile, 36.8% of deaths of TB patients in 2006 were not from TB.

Methods: Data from two groups of TB patients who died in 2006 from TB (456 cases, 'T' group) and from other causes (208 cases, 'NT' group) in 3 regions were analysed. Death certificates, autopsy protocols, and TB notification forms were used.

Results: There were no differences ($P > 0.05$) between T and NT for gender (male 80.7% and 83.2%, respectively) and disabled status (9.5%, 12.6%). T group had lower odds for retired (OR = 0.5; 95%CI 0.3–0.8) and higher odds for unemployment (OR = 1.6; 1.1–2.4). Three distinct age groups were defined: for <30 yrs, no differences were found between T and NT ($P > 0.05$), while T more often had ages 30–60 yrs (OR = 2.0; 95%CI 1.4–2.9) and NT more often had ages >60 yrs (OR = 1.9; 1.2–2.9). Multivariable analysis revealed the 30–60 age group as the only significant differentiating characteristic. T and NT groups had similar proportions of TB patients who died ≤ 1 year after notification as a new TB case or relapse (49%, 47.6%), while 1–3 years before death were more often registered for NT (34.3% for NT vs 23.2% for T; $P < 0.001$); and >3 years, for T (27.8% for T vs 18% for NT; $P < 0.001$). Meanwhile, 29.9% of deaths from TB were registered during 1 month (NT-18.7%) and 22.8% during 1 week (NT-13.3%) after TB case notification.

Conclusion: TB patient deaths from TB and non-TB causes play significant roles in TB epidemiology in Russia and are subject to different management. Reduction of the general level of TB patient mortality requires improvement in case-finding and TB therapy primarily in order to decrease deaths from TB, and effective treatment of concomitant diseases and social support for vulnerable patients primarily in order to decrease deaths from other causes.

PS-82021-19 Case-finding of extra-pulmonary TB in comparison with pulmonary TB in the Russian Federation

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Background: Unlike pulmonary TB (PTB), extra-pulmonary TB (EPTB) can be considered to be an implicit indicator of the spread of TB in a population. However, EPTB case-finding activities in Russia are not as developed as those for PTB, which leads to under-notification of EPTB. Comparative evaluation

of TB risk groups and detection methods for EPTB vs. PTB can allow for the situation to be improved.

Methods: Uni- and multivariable analysis of adult (>17 years) new TB cases, including 17 324 EPTB cases (9.3%) in comparison with 169 217 PTB cases. We examined 2001–2005 national TB data, covering all new TB cases notified in 29 regions (38.4% of the Russian population).

Results: EPTB cases were more likely than PTB cases to be female (49.8% vs 28.8%, $P < 0.05$); among all TB cases, the highest portions of EPTB cases were in the age groups <30 (11%) and >60 years (13%). EPTB cases were more likely than PTB cases to have been found using passive case-finding (90% vs 40.4%, $P < 0.001$), as opposed to active. Compared to PTB, EPTB cases had a lower odds of being homeless (OR = 0.28; 95%CI 0.23–0.34), ex-prisoners (OR = 0.32; 95%CI 0.28–0.36), and alcohol abusers (OR = 0.33; 95%CI 0.30–0.37), which may indicate the under-estimation of EPTB cases from vulnerable population groups. PTB were more often than EPTB to have been detected in primary health care (PHC) facilities (OR = 2.4, 95%CI 2.3–2.5); while EPTB, in the TB service (OR = 2.4, 95%CI 2.3–2.5) and PHC hospitals (OR = 2.8, 95%CI 2.7–3.0). At the same time, EPTB cases were more often from the urban population (OR = 1.19, 95%CI 1.15–1.23), office workers (OR = 2.3, 95%CI 2.2–2.4), students (OR = 2.0, 95%CI 1.8–2.1) and retirees (OR = 1.5, 95%CI 1.6–1.4), all of who have more opportunities for access to well-equipped medical facilities.

Conclusion: Strong efforts are needed to improve EPTB case-finding, especially among the traditional TB risk groups.

PS-82045-19 Assessing the spread of MDR-TB in Russia: findings and capabilities of the national reporting system

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Background: According to Russian regulations, all regions must provide culture examination and DST for most new cases and a significant portion of retreatment cases. Despite external quality control for laboratory services not being widespread, it can be shown that the Russian TB statistical system has capabilities for wide analysis of MDR-TB spread in the country.

Methods: MDR-TB levels in 3 Russian regions and countrywide in 2006 were evaluated based on: 1) quarterly cohort TB recording forms (07-TB), providing data on MDR-TB rates among new cases, coverage by culture examination and DST; 2) DRS data from the 4th WHO/IUATLD Global Report on Drug Resis-

tance (WHOGH) based on standardized procedures; and 3) national aggregated annual reports, registering MDR-TB among new cases and among all cases followed up at the end of the year.

Results: With regards to new TB cases from the 3 regions included in WHOGH (Orel, Mari El and Tomsk), 07-TB showed high coverage by culture examination- 98–99%, and by DST- 98–100%. 07-TB data (8.8%, 12.7% and 15.0% respectively) demonstrate a good concordance ($P < 0.01$) with WHOGH data for the MDR-TB rate among examined new TB cases in each region. In contrast to the former indicator, the public health burden of MDR-TB can be reflected by the rate of MDR-TB cases per 100 000 population. This MDR-TB prevalence, based on all MDR-TB cases data from aggregated reports, with and without prison data, was 19.5 and 16.9 per 100K, respectively; 25–75% quartiles of civilian data from regions: 8.9–24.3 per 100 000. The 2006 WHO Stop TB Department estimation of 23.8 per 100K (95%CI 14.7–33.6) shows a similar result. For regions included in WHOGH: 8.8, 24.6 and 57.3, respectively.

Conclusion: The Russian statistical system has the capability to provide different views on MDR-TB data. In coming years, data in selected regions will be verified by standardized procedures, providing results in line with international standards.

TUBERCULOSIS IN LOW BURDEN COUNTRIES

PS-81270-19 Inequality and TB notification in the EU: an ecological analysis

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Background: All EU countries differ by socioeconomic indicators. There is evidence that these indicators correlate with health inequalities within and between countries. As concerns TB, incidence rates vary widely within the EU from below 10/100 000 to over 100/100 000. In this analysis we correlated variations in TB incidence between EU countries through an indicator that combines wealth with income inequality.

Methods: We developed a socioeconomic indicator that crudely assesses the combination of a country's wealth with its degree of social cohesion. This indicator was calculated for EU countries and correlated with TB incidence rates.

Results: There is a strong correlation ($R^2 = 0.71$) between our indicator and total TB incidence rates for the 26 countries included in the analysis. When the analysis is stratified according to country of origin ('nationals' vs. 'foreign-born'), the correlation holds for 'nationals' ($R^2 = 0.55$) but not 'foreign-born' ($R^2 = 0.01$).

Conclusion: The macro-social environment influences TB incidence rates. Although wealth alone (as measured by GDP/capita) is correlated with health, we show here that by including the level of income inequality into the analysis of EU countries, we gain further explanatory power. Importantly, however, there remains the need to identify potentially vulnerable groups even within countries that have a high degree of wealth and income equality. There are important limitations to this analysis, including the ecologic fallacy and the comparability of data.

PS-81316-19 Health seeking behaviour of tuberculosis suspects in Middle and South Jordan

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A community-based cross-sectional survey carried out in 3 regions in Middle and South Jordan, during a four-month period (June–Sept. 2005). It aimed at studying health seeking behaviour of tuberculosis suspects and barriers interfering with their timely diagnosis and treatment in Jordan; it also aimed at determining prevalence of tuberculosis suspects and active TB cases among those suspects. A representative sample of households was stratified according to proximity to tuberculosis centre in each region; within 30 km or further away from the centre. 9251 households were randomly selected from the 3 regions and 61 730 adult household members were screened for tuberculosis symptoms. Tuberculosis suspects, defined as suffering from cough for more than 3 weeks, interviewed according to a structured and pretested questionnaire including information about socio-demographic characteristics, signs and symptoms of the disease, and factors affecting health seeking behaviour. Tuberculosis suspects were referred to the nearest diagnostic centre for sputum smear examination.

Results: Of the screened 61 730 household members, 1544 adults were suffering from cough for more than 3 weeks thereby reporting a prevalence of adult TB suspects of 2.51%. Of these, two were active pulmonary tuberculosis corresponding to a prevalence of 'yet undiagnosed' active pulmonary tuberculosis of 3.24 per 100 000 population. All detected cases were smear positive. The significant risk factors for inadequate health seeking behaviour were female gender, living in Karak and Maan governorates, rural residence, expatriate, using private means of transportation.

Conclusion: A considerable proportion of delayed diagnosed tuberculosis cases exist in the rural community mainly due to their poor accessibility to the TB health services and their low awareness regarding the disease. These constitute a source of transmission of infection in the community and barrier against disease control.

PS-81420-19 Mortality rate and risk factors among successfully treated tuberculosis patients in a European city

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Aim: To identify the probability of death and to determine the influence of tuberculosis (TB) recurrence and risk factors associated with mortality rate in a city with a moderate TB incidence.

Design: A population-based retrospective study in Barcelona, Spain.

Methods: Successfully treated TB cases, diagnosed by culture and with antibiogram were selected from 1995 to 1997 and followed until December 2005. Recurrence was defined as a new TB event after TB cured and being free of disease a minimum of one year. Sociodemographic, clinical and bacteriological variables were studied. Mortality and TB Program registers were reviewed. Kaplan-Meier curves and Cox regression with time-dependent covariates were used for the statistical analysis. Hazard Ratio (HR) and their 95% confidence intervals (95%CI) were calculated.

Results: Among the 762 enrolled patients, the median age was 36 years (interquartile range 28–52). 520 (68.2%) were male, 178 (23.4%) HIV positive and 132 (17.3%) injecting drug users (IDU). Pulmonary TB was most frequent (75.5%) and 11 (1.4%) were multidrug-resistant. A total of 173 deaths (22.7%) occurred during the 8.8 median years of follow-up (mortality rate 3/100 persons-years of follow-up). The factors associated with mortality at bivariate level included age, IDU, HIV, alcohol, smoking and living in the inner-city. At multivariate level only were associated: age 41–60 years (HR = 3.2; 95%CI 1.9–5.1), age greater than 60 (HR = 14.5; 95%CI 9–23), IDU (HR = 3.9; 95%CI 2.1–7.2), HIV (HR = 2.2; 95%CI 1.3–3.7) and alcohol (HR = 1.6, 95%CI 1.1–2.2). TB recurrence was not associated with an increase of mortality (HR = 0.95; 95%CI 0.4–2.2).

Conclusion: TB recurrence is not associated with mortality if the patients are successfully treated for their first episode. The highest probability of death occurs in vulnerable populations such as elderly, HIV, alcoholic and IDU patients. We therefore need to promote and develop interventions and social policies in these groups.

PS-81511-19 Tuberculosis and human immunodeficiency virus co-infection in Queensland: review of cases between 1990 and 2006

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Introduction and aim: Queensland, Australia, has a low incidence of tuberculosis (TB) (<4/100 000/year) and cases occur mainly in migrants. Migration-related TB and human immunodeficiency virus (HIV) screening has reduced HIV-TB co infection resulting in minimal overlap between the HIV and TB risk groups. We describe characteristics of HIV-TB cases during 1990–2006.

Methods: Retrospective review of Queensland TB Control Centre records of HIV-seropositive cases for demographic, clinical and outcome data and comparison with non-HIV infected cases.

Results: There were 2170 cases of TB in Queensland from 1990 to 2006, of which 36 (1.7%) were HIV coinfecting. Of the HIV-coinfecting group, median age was 36.7 years (range 22–64), and 30 (83%) were male. Associations between HIV and Australian (OR 2.2; 95%CI 1.1–4.42, $P < 0.015$) or African birth (OR 3.01; 95%CI 1.24–7.3, $P < 0.012$), males (OR 4.1; 95%CI 1.1–10, $P < 0.001$), disseminated disease (OR 14.2; 95%CI 6.25–32.42), and death from TB (OR 9.46; 95%CI 3.12–28.3) were significant compared with the non-HIV infected group. Twenty-eight cases were culture confirmed and three had multidrug resistance. There were eleven deaths, with eight judged to be TB-related. All had advanced immunosuppression, two had multidrug resistance and six disseminated disease. No deaths occurred in persons treated with antiretroviral medication (ART). We describe radiological, diagnostic and clinical features, drug regimens and outcomes, changing demographics, trends in HIV testing, cross border issues and prevention of HIV-TB.

Conclusion: HIV-TB is rare in Queensland, and ART has reduced its burden and adverse outcomes. Good control and preventive programs with collaboration with HIV care providers is required to protect vulnerable groups.

PS-81632-19 Factors associated with unsuccessful tuberculosis treatment outcome

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Aim: To compare tuberculosis (TB) treatment outcome according to three different criteria for successful outcome and to analyse the risk factors associated with each one.

Design: A population-based retrospective transversal study in Barcelona, Spain.

Methods: All TB cases in city residents detected from 2000 to 2006 by the TB Program (TBP) were analysed. Treatment outcome was defined as cured or treatment completed (CTC), failure, lost to follow-up, death related to TB, other cause of death, still undergoing treatment, or transferred out. Successful treatment

outcome criteria included those used by the TBP (the proportion of CTC patients with respect to CTC and lost to follow-up), the WHO/IUATLD criteria (the proportion of CTC to total patients), and modified WHO criteria (CTC, still in treatment and non-TB related deaths in the numerator). Logistic regression was used to study the risk factors associated with unsuccessful treatment.

Results: 3404 patients were included. The success rates for each criteria were 96, 84 and 92%, respectively. The significant independent risk factors for unsuccessful treatment according to the 1st criteria included under 40 years old, homelessness, resistance to any anti-TB drug and contact tracing not done. Risk factors for the 2nd criteria included males, older than 64 years, resistance to any drug, HIV infection, pulmonary TB smear positive, born in a north African country, homelessness and contact tracing not done. Risk factors for the 3rd included ages 15 to 24, homelessness, resistance to any drug, HIV infection, pulmonary TB smear positive, born abroad and contact tracing not done.

Conclusion: Some risk factors have been identified by all criteria. We identified predictor factors for default patients with the criteria used by TBP. Risk factors are influenced by non TB related mortality among elderly according to WHO criteria. The 3rd criteria included transferred out as an observed risk.

PS-81637-19 Tuberculin skin test reactivity in young adults living in a country with a low incidence of tuberculosis

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Background: The present distribution of tuberculin skin test (TST) reactivity is unknown in most countries with low prevalence of tuberculosis (TB). The relative influence on TST of bacille Calmette-Guérin (BCG) vaccination and other epidemiological variables such as geographical origin, gender and age is also unknown in these settings.

Methodology: The distribution of TST reactivity and the influence of background factors in healthy young adults in Sweden were analysed. A subgroup of non vaccinated subjects was also tested with *Mycobacterium avium* sensitin. A linear regression model was created for the relative contribution of background factors to TST reactivity.

Results: Among the 474 BCG-vaccinated subjects 74% reacted (i.e. indurations of ≥ 1 mm) and among the 612 non-vaccinated ones 8% reacted and the mean TST was 7.5 mm vs. 0.7 mm, respectively. The

expected contribution to TST reactivity was 6.0 mm for a history of BCG vaccination, 3.0 mm for a country of birth with medium/high incidence of TB, 1.4 mm per 10 years of age and 0.3 mm for male gender. More than 3/4 of the non-vaccinated TST positive subjects reacted also with *M. avium* sensitin.

Conclusions: A large proportion of BCG-vaccinated subjects showed considerable TST reactivity, while most non-vaccinated subjects were non-reactive. Geographic origin and age, but not gender, had a decisive influence on TST reactivity in addition to BCG vaccination. Most TST reactions in non-vaccinated subjects were probably caused by cross-reactivity with environmental mycobacteria.

PS-81669-19 Seasonal impact on tuberculosis incidence of Nepal, 1995–2007

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Rationals: Tuberculosis is a public health problem in Nepal. About 45% of total population is infected TB, 40 000 develop active TB, of whom 20 000 are infectious. The surveillance system of new smear sputum positive TB cases at national level shows wide variation with respect to the different seasons. In Nepal there are major three seasons with equal duration known as rainy, winter and summer seasons.

Objective: This is the descriptive study and explains the seasonal variation of reporting of new smear sputum positive TB cases.

Methods: A descriptive study was conducted using TB surveillance data for 1996–2007. First Analysis of variance (F-test) and then *t*-test were used for comparing TB notifications in three seasons. SPSS package was used.

Results: During the study period, 133 295 smear sputum positive tuberculosis cases were reported through routine system of NTP. Out of them, rainy season contributed 41 226 (31%), winter season contributed 36 114 (27%) and summer season contributed 55 955 (42%). The mean notifications rate of new smear sputum positive tuberculosis in winter season was 47/100 000/year summer 72/100 000/year and rainy season 53/100 000/year. The notification rates of new smear sputum positive cases among seasons were almost similar whereas significantly different was found between seasons (F-test, $P < 0.001$). The notification rate in rainy season was significantly higher than in winter season (*t*-test $P < 0.010$). Again comparing incidence of tuberculosis in rainy and summer and winter and summer also shows highly significant during the summer seasons (one tail *t*-test $P < 0.010$). This study concludes that the higher numbers of new smear

sputum positive cases were found during summer followed by rainy and winter seasons respectively.

Conclusion: The notification during the study period was higher in summer than rainy and winter season. The reasons for this difference are unknown but can provide information to guide program policies.

PS-81684-19 A synthetic indicator to assess the quality of tuberculosis case detection

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Objective: To assess results of the beginning test for a synthetic indicator designed to monitoring and evaluating the quality of tuberculosis cases detection.

Design: Using retrospective data from the tuberculosis surveillance system of both Havana City's and Havana's municipalities on some intermedial variables as A = proportion of tuberculosis suspects detected, B = proportion of first sputum smears microscopies, performed to those G = delay between onset of symptoms and first consultation of TB patients to health services, and H = delay between onset of symptoms of TB patients and starting performance of epidemiological investigation tracing contacts (focus control). The synthetic indicator (ISILOC) was estimated by $A + B (G \cdot H) / 8$ which figure must range 0–1.

Results: We labeled as Acceptable both Habana Vieja and 10 de Octubre municipalities, while Marianao municipality achieved Very Good. On Guanajay municipality 2000 and 2001, Excellent and Very Good were labeled respectively. For Havana Province's municipalities in 2000, two Deficient were identified, which turned out to Very Good in 2001.

Conclusion: The Synthetic indicator seems to be feasible, of easy performance and good discriminator tool by integrating four important variables as an additional contribution for monitoring and evaluating TB case detection process under our context and perhaps others; farther studies are in progress.

PS-81753-19 Aspects default three years after implementation of DOTS in Ialomita department, Romania

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There were research the aspects regarding the deficiencies observed after 3 years since DOTS was established in Ialomita department with an agrarian economy, Romania (population 296 486, 44 564 100 acres). We used data of TB register and of other scientific documents resulted from the monitoring of the tuberculosis endemic evolution. In 2005 in Ialomita de-

partment were registered 340 cases (CN + R) which mean a global incidence of about 116.5/100 000. Among these, 286 were new cases, 54 readmitted and 17 children. The pulmonary localization was observed at 225 from new cases. Among these, 86.7% (195 cases) have bacteriological confirmation. The evaluation accomplish to the end of the treatment was pointed out 89% of success at source-cases (close by the objective of 85% of PNCT). The mortality was 4.1/100 000. After the analysis of the activity of Pulmonary Care Units of Ialomita Department, we observed that there was some impediments in the follow of DOTS like discontinuities in the supply with drugs, especially the second line drugs, big distances between some villages and the Pulmonary Care Units or the consulting rooms of the generalists where they ensure DOT, the absence of the communitarian assistants and the sanitary mediators for the community of others ethnics and low level of education. The absence of pulmonologists made difficult the monitoring of TB patients. The aspects observed need a better management of anti-tuberculosis drugs supply in the isolated areas, incentives accorded to TB patients for the amelioration of treatment compliance.

PS-81874-19 Investigation of TB cases in the family health strategy: challenges in TB treatment, Alemão Slum, RJ, Brazil

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Setting: Tuberculosis (TB), a disease that afflicts people even nowadays, is reckoned (considered) as a socially determined illness because its occurrence is associated not only with the way how the social processes of production and reproduction get organized, but also with the implementation of control policies against the disease.

Objectives: To investigate the number of TB cases registered in the Family Health Center on Morro do Alemão, Rio de Janeiro; to identify the TB consultations made by the family health teams. Methods Descriptive study, by means of the quantity approach, with a convenience sampling of the records of five family health teams, about TB cases, between January and November 2007. The first challenge was the lack of TB cases notified by the teams. The data was collected through the Sistema de Informação da Atenção Básica—Information System of Basic Attention. The TB consultations were identified during the same time. After the gathering of data, they were organized in tables.

Results: The data collected from the system information, not only from the production report and the evaluation markers but also from the health situation report and family follow-up, showed the existence of TB consultations in the area. However, none of the

patients consulted are following any kind of treatment in the center. According to the data gathered, among the five teams, ten patients with TB were identified.

Conclusion: The family health teams had a lot of difficulty assembling patients with TB because of many reasons, among them the patient's appointments for consultation in other health centers, causing TB to be a forgotten disease on Morro do Alemão. That fact leads to the need for discussing the Family Health Strategy in areas under the influence of violence and subject to different kinds of privation, and not supported by the State.

PS-81880-19 Treatment outcome of TB patients diagnosed in 2005 in Turkey: analysis of case-based data

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Aim: Data of all TB patients recorded in TB dispensaries were collected individually by the 'Turkey National TB Surveillance Study (TUTSA)'. In this study, we aimed to present treatment outcomes of all TB cases in dispensaries recorded in 2005.

Methods: Patients' names collected by case based data collection system were written on lists and send to dispensaries; they wrote treatment outcomes and additional notes. After collecting, questionable data were rechecked with the dispensaries case by case. Treatment outcomes were recorded by TUTSA computerized recording system and analyzed. To be concordant with the European TB Surveillance, bacteriological results of materials other than sputum (bronchial lavage, fasting gastric lavage, etc) were recorded as 'not done'. Treatment outcome ratios were calculated after subtracting 'not TB' group from the totals.

Results: After subtracting 338 'not TB' patients, there remained 18 448 new, 1749 previously treated and 20 197 total cases. Treatment success in all cases was 87.5% (17 677/20 197). Defaulter rates were 4.9% in new cases, 11.5% in previously treated cases and 5.4% (1096/20 197) in all cases; there were 239 transferred outs, 546 deaths; treatment continues in 507 and treatment outcome not known in 56 cases. Treatment outcome of smear positive pulmonary TB patients; in new cases treatment success was 89.6% (6653/7427), cure rate was 45.2% (3359/7427); in previously treated cases treatment success was 70.3% (737/1048) and cure rate was 36.3% (380/1048).

Conclusion: Treatment success in Turkey in 2005, exceeded WHO's target 85%. Cure rates of smear positive patients was low. Defaulter rates were fairly high. It is obvious that efforts should be intensified to increase cure rates and to decrease defaulter rates. For this purpose, directly observed treatment (DOT) should

be given to all cases by professional health workers and incentives should be used (enhanced DOT).

PS-81884-19 Tuberculosis notifications in Ankara, 1998–2007: results of active surveillance and supervision

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Design: Tuberculosis notifications and outcomes have been recorded systematically since 1996 in Ankara. Because many cases were not notified, active surveillance and supervision (AcSS) for all hospitals in Ankara was initiated in 2003 by the Provincial TB Committee.

Methods: In this study, we searched TB notifications from 1998 to 2007 in Ankara, the hospitals who notified, the outcomes of notifications from TB Control Dispensaries and we compared them with the TB registries of dispensaries in the same years.

Results: The average yearly notification in the 5 years before AcSS was 539 (min. 430, max. 650). and in 5 years after AcSS was 1077 (min. 1026, max. 1135). Before AcSS, the dispensaries didn't notify the patients diagnosed by themselves, so we took out these notifications to compare two periods. The average of yearly notifications from hospitals was 821, and the rate of increase was 52%. If we look for the notification rates of some hospitals in all notifications, before and after AcSS; Atatürk Chest Diseases Hospital 49–61%, Medical Faculties 19–27%, State and Social Security Hospitals 6–13% and Private Hospitals 0.4–1.9%. The outcomes of notifications before and after AcSS, were as follows, respectively; registered by dispensaries 61%–65%, lost to follow up 9%–3%, death 5%–5%, treated by other doctors 7%–2%, not TB 8%–14%, and living in another city 10%–11%. Average annual registered TB cases increased from 611 to 701 (15%) after AcSS. The increase in number of notifications from some hospitals were meaningful.

Conclusion: In spite of the increasing rate of notifications (52%), the registered TB cases increased only 15%, because the patients came to dispensaries without notification before AcSS. The incidence rate of Ankara must be 10% or more, because of the notified patients who were treated by other doctors, died, and lost to follow up were not registered. Improving notification system is a means of increasing case finding.

PS-81900-19 Perspectives for tuberculosis elimination in Cuba

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Although tuberculosis elimination is not a reachable goal at global scale, countries like Cuba try the way

to eliminate it as a matter of Public Health. In Cuba takes place every year an average of 18 000 sputum smear microscopies among TB suspects with a 91% detection ratio. So far it has been reported 4.7% of TB among people living with HIV, cure rate of 91%, and primary multidrug resistant of 0.3%. The possible obstacles that could be found for its elimination are expressed by means of necessities, which are considered as social demands, such as: improving preventive action; to reduce transmission; keeping high cure rates; keeping population highly satisfied with health care services; performance of differentiated interventions. A comprehensive research-development approach aiming to strengthen social and community mobilization, development and introduction of new surveillance tools, strengthening laboratories network and evaluate effectiveness of such intervention must be prioritized. This could contribute to improve even more the preventions of new contagious cases, deaths, disabilities and unnecessary personnel sufferings.

PS-81959-19 Clustering of MT subtypes indicating active transmission among Danes with TB in 1992–2004

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Aim: To describe the epidemiology of tuberculosis (TB) among Danes analysing the frequency of clustered MT subtypes and the proportion of patients in specific clusters.

Method: A nationwide database comprising subtyping results from 95% of culture positive notified TB patients in DK was used. Subtyping was performed by the IS6110 restriction fragment length polymorphism (RFLP) method. If two or more strains had 100% identical RFLP patterns they were regarded clustered.

Material: The database included 1781 Danish TB patients. 38 patients in low-copy-clusters (<6 bands) as well as immigrants were excluded. 1743 patients with 759 different *Mycobacterium tuberculosis* strains were included in the study. 1171 patients had clustered strains distributed in 187 different clusters.

Results: *M. tuberculosis* strains from Danish TB patients were clustered in 25% (187/759) of cases and 67% (1171/1743) of Danish TB patients had clustered strains. 67% (125/187) of the clustered strains were found in clusters with <10 persons. 9% (17/187) of clusters contained >10 persons, including 2 dominating clusters with 143 and 318 persons, respectively. 24% (45/187) of the clusters included only one Danish member, the remaining being immigrants. Clustered patterns identified already in 1992 included more persons than patterns appearing later, adjusted for years of observation.

Discussion: The high frequency of Danish patients with clustered *M. tuberculosis* strains indicates a high level of recent transmission among Danes with TB 1992–2004.

Conclusion:

- 1 There is a high level of *M. tuberculosis* transmission among Danes with TB.
- 2 Earlier diagnosis and treatment may reduce *M. tuberculosis* transmission, and increased contact tracing combined with preventive chemotherapy to *M. tuberculosis* infected persons with recent contact to a patient with infectious TB may reduce the number of TB cases.

PS-81966-19 Survival time of clustered MT subtypes among Danes with TB 1992–2004

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Aim: To examine the survival time of *Mycobacterium tuberculosis* DNA subtypes among Danish tuberculosis (TB) patients in 1992–2004.

Method: A nationwide database comprising subtyping results from 95% of notified culture positive TB cases in Denmark (DK) 1992–2004 was used. Subtyping was performed by the IS6110-restriction fragment length polymorphism (RFLP) method. If ≥ 2 subtypes were 100% identical they were regarded as clustered. Only patients born in DK were included. Proportion of *M. tuberculosis* subtypes surviving was calculated for 1–13 years as number of clustered subtypes surviving \times number of years, in proportion to number of clustered subtypes available for observation \times number of years.

Material: Subtyping results from 1743 Danish TB patients (759 subtypes) were available for this study, after exclusion of 38 patients in 9 low-copy clusters (< 6 bands). 572 subtypes were unique and 187 were clustered (1171 patients).

Results: Average survival time of clustered subtypes was 5 years and among those surviving >5 years, another 50% survived further 5–6 years. 28% (12/43) of subtypes appearing in 1992 and being clustered 2004 or earlier survived all 13 years.

Discussion: This study can only show *M. tuberculosis* subtype survival time through 13 years and will reflect TB epidemiology in DK within the observed timeframe. Survival time for 33 years of *M. tuberculosis* subtypes has been documented in DK, but the frequency of such subtype survival is unknown.

Conclusion:

- 1 Within an observational period of 13 years, 5 years survival time was on average 50% for clustered *M. tuberculosis* subtypes in Danish TB patients.
- 2 Long term survival time will be underestimated by the relative short duration of the study.

- 3 Average cluster survival time can possibly be reduced by early diagnosis and treatment of TB and by extended contact investigation combined with preventive chemotherapy to *M. tuberculosis* infected in recent contact with infectious TB patients.

PS-81980-19 Risk of MT subtype clustering over time, in Danish TB patients 1992–2004

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Aim: To evaluate risk of *Mycobacterium tuberculosis* subtype clustering among Danish tuberculosis (TB) patients in 1992–2004.

Methods: A unique time window was created by introducing nationwide *M. tuberculosis* subtyping of strains from TB patients in Denmark (DK) in 1992–2004. A nationwide database comprising subtyping results from 95% of culture positive notified TB patients in DK in 1992–2004 was used. Subtyping was performed by IS6110-restriction fragment length polymorphism (RFLP) method. If two or > strains had 100% identical RFLP patterns they were regarded clustered. Only Danish patients were included. We calculated risk/time of *M. tuberculosis* subtype clustering. **Material:** Subtyping results from 4632 patients were available. 1781 were Danes. Low-copy-clusters were excluded (<6 bands, 38 patients). The material consisted of 1743 patients with 759 subtypes. 187 unique subtypes became clustered within the observational period of 13 years.

Results: Out of 187 clusters, 45 included only one Danish patient. The remaining 142 clusters included > one Danish patient. 19% of the 759 subtypes became clustered within 5 years and 28% within 12 years. Risk of clustering within 5 years was higher in subtypes identified early in the study than among those identified late.

Discussion: Risk of clustering (19%) was comparable to the theoretical risk of secondary TB after pulmonary TB (25% in 5 years). Risk of clustering could be reduced with earlier diagnosis reducing transmission of infection and contact tracing with preventive chemotherapy to *M. tuberculosis* infected contacts reducing secondary TB.

Conclusion:

- 1 Risk of clustering after recently active TB with unique *M. tuberculosis* subtype in Danes in 1992–2004 was 19% in 5 years.
- 2 Risk of clustering can be reduced with earlier diagnosis of TB and with more thorough contact examination combined with preventive chemotherapy to *M. tuberculosis* infected persons with recent contact to a patient with infectious TB.

PS-81990-19 TB and house prices in North-East London

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Introduction: There has been a general increase in tuberculosis (TB) notifications in England and Wales since 1987 (1). Whilst this trend has been mirrored in North East London local variation is also observed. We investigated whether property price variation may explain variation in TB rates.

Aim: To investigate if there is association between sold house prices and TB notification rates in two neighbouring Primary Care Trusts (PCTs) in NE London: Newham and Hackney.

Methods: Sold house price data was downloaded from the Land Registry website (2) and available TB notification data from the enhanced TB surveillance dataset were extracted (2002–2006). Data were entered into SPSS® program and plotted together graphically.

Results: The Figure shows TB and house price data plotted separately for Newham and Hackney PCTs. In Hackney sharp recent increases in house prices (2004–2006) may have resulted in decreases in TB notifications. Similarly, sharp temporary increases in house prices in Newham (December 2004 and December 2005) may have inversely affected TB notifications against a general increase in both rates.

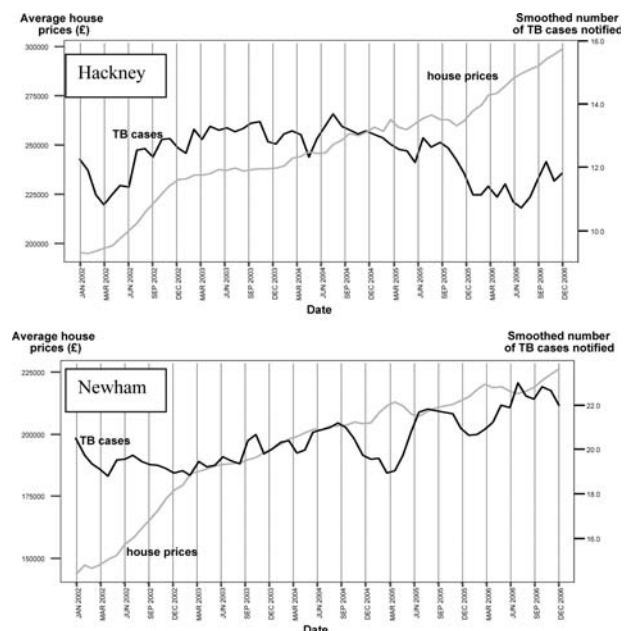


Figure House prices and TB notifications in Hackney and Newham, London.

Conclusion: Although both TB rates and house prices have been increasing in recent years, sudden increases or increases above a 'ceiling' level in house prices may have a paradoxical effect on TB rates. Further work is being conducted to elucidate 1) whether the association

between house prices and TB is artefact, and if not 2) if this association is observed when other factors such as immigration is accounted for.

References

- 1 HPA, 2008, www.hpa.org.uk
- 2 Land Registry website, 2008, www.landreg.gov.uk/houseprices

PS-81996-19 Annual incidence rate of unique TB among *M. tuberculosis* infected Danes, 1992–2004

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Aim: Calculate incidence rate of tuberculosis (TB) in Danes due to *Mycobacterium tuberculosis* with unique subtype per 100 000 *M. tuberculosis* infected.

Method: Tuberculosis infection prevalence (TIP) in the Danish population was calculated using assumptions for the annual rate of *M. tuberculosis* infection (TIR) in 1900–2000. Number of Danish TB cases caused by strains with unique IS6110-restriction fragment length polymorphism (RFLP) subtype was known from a nationwide database comprising subtyping results of 95% of notified culture positive TB cases in 1992–2004. Immigrants were excluded. Annual incidence rate of TB with unique *M. tuberculosis* subtype (unique TB) was calculated/100 000 of *M. tuberculosis* infected in total and for each age group. TIP in Danes in future decades was estimated and future risk of unique TB was calculated.

Results: TIP was estimated to be 7.5% in 1998 declining to 0.2% in 2040. Incidence rate of unique TB among *M. tuberculosis* infected Danes in 1992–2004 was 11.5/100 000, declined with increasing age and was <10/100 000 in those >60 years old. Occurrence of unique TB in Danes in the future will nearly exclusively be from *M. tuberculosis* infections acquired prior to 1992. Such cases will disappear within a few decades.

Discussion: There are assumptions in calculating TIP, but the level of TIP and its future trend is thought to be realistic.

Conclusion:

- 1 Incidence rate of unique TB in *M. tuberculosis* infected Danes is 11.5/100 000/year and declines with age.
- 2 Unique TB in Danes will disappear within 30 years.
- 3 Routine examination for *M. tuberculosis* infection is not indicated in Danes without symptoms or recent contact to infectious TB patients.

PS-82107-19 Analysis of forms of pulmonary TB on the materials of forensic bureau of Barnaul, Russian Federation

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The value of autopsy material in forensic medicine is correlated not only to the identification of cause of death in cases of non-violent death, but to its contribution to the general picture of epidemic situation, since autopsy material allows to judge about incidence of TB in the region. Based on the data of Barnaul branch of Altay bureau of forensic medicine we have analyzed all cases of TB (66 cases) in 2007. Out of 1703 cases of non-violent death in 66 cases (52 males and 14 females) we diagnosed pulmonary TB. In 55 cases we found destructive forms with caseous pneumonia, cavity formation, that explained the cause of death. In 11 cases during the autopsy we found non-destructive forms of pulmonary TB including fibronodular TB and tuberculoma. In three cases the diagnosis of TB during the autopsy was not confirmed in the histological research. The middle age dominated in the group of pulmonary TB. All cases of pulmonary TB were distributed as follows: 20–29 years old—7 cases, 30–39 years old—15 cases, 40–49 years old—24 cases, 50–59 years old—17 cases, older than 60—3 cases.

Conclusion:

- 1 Altay represents a reservoir of TB infection, that is reflected in the incidence of destructive forms of pulmonary TB in the autopsy material.
- 2 Based on the results of forensic research of autopsy material we determined the group of risk for pulmonary TB, males aged over 40 years.

PS-82215-19 All-cause mortality among tuberculosis cases reported in England and Wales

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Setting: Mortality among tuberculosis cases is underestimated by national surveillance in England and Wales. Deaths are only routinely collected on reported cases who die within 12 months of starting treatment or notification.

Objective: To investigate causes of, and risk factors for mortality among reported tuberculosis cases.

Methods: Information on 13 176 cases reported in 2001 and 2002, including treatment outcome at one year after diagnosis, were cross-referenced with the Office for National Statistics death certificates and the National Health Service central register to deter-

mine deaths occurring before 31st May 2006. Risk factors for dying after diagnosis were determined using Cox regression.

Results: Cases were followed up for a mean time of 4 years and 13% (1704) died. Across all age groups, a much higher proportion of cases who were UK born died from any cause than those born outside the UK (22% vs. 7%, $P < 0.001$) especially among individuals aged 40–64 (19% vs. 8%, $P < 0.001$). On multivariate analysis being male (Hazard Ratio 1.4, 95% confidence interval 1.3–1.6), aged 40–64 (5.1, 95%CI 4.1–6.5) or 65 years or older (22.0, 95%CI 1.6–27.5) vs. being aged 15–39, being white (2.6, 95%CI 2.2–3.0) or black Caribbean (1.6, 95%CI 1.2–2.1) vs. from the Indian sub-Continent, having pulmonary disease (1.6, 95%CI 1.4–1.9) and being HIV positive (3.2, 95%CI 2.4–4.3) were found to have an association with death ($P < 0.001$).

Conclusion: Few studies have explored risk factors for death among tuberculosis cases who die beyond one year after diagnosis. Our initial analyses suggest an unexpectedly high proportion of deaths within five years of diagnosis among UK born cases aged 0–64 years. Further investigation into causes of death will be presented.

PS-82269-19 Screening health care workers in Montreal, Canada, using QuantiFERON-TB-Gold in tube

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Aim: Many developed countries now recommend the use of Interferon gamma release assays (IGRAs) for the diagnosis of latent TB infection (LTBI), particularly for screening programs, such as for health care workers. However, limited evidence exists on the performance of IGRAs in this setting. The objective of this study is to evaluate the performance of QuantiFERON-TB Gold In-Tube (QFT-GIT) in health care workers, and to compare with conventional tuberculin skin testing.

Methods: We are recruiting a cohort of health care workers from the McGill University Health Center (MUHC) who require routine TB screening. Participants undergo TST and QFT-GIT at baseline, and at 1 year intervals. Data was collected on risk factors and TB exposure history. QFT-GIT was performed as per manufacturer's instructions (cut point IFN- $\gamma \geq 0.35$ IU/mL) and TST was performed using 5 TU PPD (cut off ≥ 10 mm).

Results: To date we have recruited 74 health care workers. Among our cohort: 74% are female, median

age of 38.64 years old, and 68% were born in Canada. Among study participants, 50% report having been BCG vaccinated at some point. Of the 74 participants, 10 were TST positive, while 7 were QFT positive, and only 4 positive by both tests. The concordance between TST and QFT results was 87.8% ($\kappa = 0.4043$) Among those with discordant results, the most frequent were QFT Negative/TST positive ($n = 6$), all but one of whom reported having had BCG vaccination.

Conclusion: Early results show a lower prevalence of TB in this cohort when the QFT test was used as opposed to the conventional TST. In addition, previous BCG vaccination may be responsible for causing false positives among some individuals.

PS-82297-19 Predominance of few genotypes of *Mycobacterium tuberculosis* in Tunisia

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Aim: The population structure and transmission of *M. tuberculosis* in Tunisia was evaluated by spoligo-typing and MIRU analysis.

Results: Typing analyses of 378 *M. tuberculosis* isolates collected between years 2001 and 2005 from three northern representative regions of Tunisia revealed a highly homogeneous population. Indeed, 84.9% of all TB cases were attributed to Haarlem, LAM, or T family. Strikingly, within each family, more than 60% of TB cases were due to a single genotype. ST50 (Haarlem3) and ST42 (LAM9) genotypes were exceptionally predominant, representing 46.3% of all typed isolates. ST50 showed an increased tendency for clustering and was more predominant in the extreme north of the country. By contrast, the more widespread ST40, which apparently predominated since 17 years ago, displayed weak cluster individualization and a low recent transmission rate, consistent with its stable association with the Tunisian population.

Conclusion: It is believed that both mass BCG vaccination, strictly applied since four decades, and the high endogamy rate that characterizes the Tunisian population could have profoundly shaped the population structure of *M. tuberculosis* by concurrently favouring the selection and accommodation of particular genotypes.

PS-82302-19 Treatment-related adverse events among multidrug-resistant tuberculosis patients in Latvia, 2000–2003

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Background: Approximately 13% of tuberculosis (TB) patients in Latvia have multidrug-resistant (MDR) TB, defined as TB caused by a strain of *M. tuberculosis* resistant to at least isoniazid and rifampicin. MDR-TB treatment requires lengthy multidrug regimens that often cause adverse events.

Objectives: To evaluate treatment-related adverse events and factors associated with experiencing an adverse event in a large MDR-TB cohort.

Methods: We reviewed treatment records of MDR-TB patients who began treatment between 1 January 2000 and 31 December 2003.

Results: Among 819 patients, 661 (81%) experienced at least one adverse event, with a median of three per patient (range 1–14). The most common were nausea (513, 63%), vomiting (340, 42%), abdominal pain (220, 27%), dizziness (210, 26%), diarrhea (180, 22%) and hearing loss (171, 21%). More serious events such as psychiatric episodes (107, 13%), hepatotoxicity (83, 10%), and renal failure (36, 4%) were also common. Doses were altered in 183 (22%) patients and >1 drugs were discontinued (temporarily or permanently) in 584 (71%) due to adverse events. Drug-associated adverse events (>1) were associated with being female (odds ratio [OR] = 2.5, 95% confidence interval [CI] = 1.5–4.2), age > 42 years (OR = 2.3, 95%CI = 1.6–3.3) and having >1 co-morbid condition (OR = 1.4, 95%CI = 1.0–2.1).

Conclusion: Adverse events are common among MDR-TB patients especially among patients who are female, older, or have co-morbidities. Over two-thirds required discontinuation of at least one drug. Diligent monitoring, prevention, and management of adverse events is crucial in treatment of MDR-TB.

PS-82306-19 Tuberculosis in the elderly in Germany

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Background/Aims: With increasing longevity and waning expertise, tuberculosis (TB) in older individuals needs increased attention in Germany. So far, the national data for older patients have been analysed for those aged >69 years (y) as one age group. Further data are needed to optimise TB control in seniors.

Methods: The national data of TB patients registered from 2002 to 2006 were analysed with special focus

on the age group ≥60 y (referred to as ‘the elderly’) and comparative analysis with adults (age group ≥15 to ≤59 y) and children (<15 y).

Results: A total number of 32 777 TB cases were registered (incidence 7.9/100 000) with a declining trend in all age groups. With rising age the age specific incidence increases considerably in the elderly from 9.0 (65–69 y) to 14.9 (85–89 y), followed by a decline to 11.8/100 000 for those above ≥90 y. Interestingly, in the elderly the proportion of culture confirmed pulmonary TB (PTB) increases slightly with age (≥90 y: 88% of PTB), up to 45% were smear positive. Resistance rates in those aged ≥60 y were—independent of country of birth—significantly lower than in younger adults except for pyrazinamide (3.2% vs. 2.6% in the age group 15–59 y). Compared to children (3.6%) and adults (3.1%) the lowest MDR-TB proportion was found in the elderly (0.6%). According to birthplace MDR-proportion in adults and the elderly was higher in foreign borns (adults: 5.0% vs. 0.7%; the elderly: 1.3% vs. 0.4%) while in children the indigenous population was slightly more affected (4.1% vs. 3.0%). Treatment success rates drop steadily from ≥85% in younger adults (up to 44 y) to 36.8% (≥90 y), with continuously increasing mortality (highest in men ≥90 y: 4.4/100 000).

Conclusion: Despite available diagnostic opportunities and a favorable susceptibility situation in Germany TB in the elderly presents an increasing problem. Better knowledge of epidemiological characteristics will help to optimise TB management.

PS-82469-19 Spatial variation in drug therapy for tuberculosis in Scotland

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Setting: Tuberculosis (TB) surveillance in Scotland through the Enhanced Surveillance of Mycobacterial Infection (ESMI) scheme provides information on the demographics of TB cases and their treatment and outcomes. The gold standard for TB treatment for many years has been a six-month four-drug regimen.

Aim: To investigate spatial and demographic factors associated with receiving fewer than four TB drugs.

Methods: Anonymised ESMI data from 2000–2006 for patients aged ≥15 years were georeferenced based on home postcode. SaTScan (Kulldorff) was used to scan for spatial and spatio-temporal clusters. A Bernoulli model was used to compare non-standard therapy (≤3 drugs) with standard therapy (≥4 drugs). Logistic regression was utilised to determine demographic and social risk factors associated with receiving non-standard therapy.

Results: 2265 (92.4%) of records could be georeferenced, of which 16 (0.7%) were excluded as aged under 15 years. 1140 (50.7%) of included cases had

non-standard therapy. Spatial and spatio-temporal analysis identified two significant non-overlapping geographical clusters. Logistic regression showed the likelihood of receiving non-standard therapy was significantly increased with being female, having no previous history of TB; and decreased with being non-Caucasian, born outside the UK and aged 15–24, 25–34 or 45–54 years (reference age-band 75 and over).

Conclusion: Distinct spatial and demographic patterning exists in drug therapy for TB in Scotland. Further investigation is required to understand the public health implications of this and its impact on treatment outcome.

Reference

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DRUG SUSCEPTIBILITY TESTING AND CLINICAL TUBERCULOSIS

PS-81220-19 Multiple mutations in the *katG* correlate with high level of resistance to isoniazid in tuberculosis

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The aim of this study was to investigate the significance of multiple-mutations in the *katG* gene, predominant nucleotide changes and its correlation with high level of resistance to isoniazid in *Mycobacterium tuberculosis* isolates that were randomly collected from sputa of 42 patients with primary and secondary active pulmonary tuberculosis from Belarus. DNA extraction, *katG* gene amplification, and DNA sequencing analysis were performed. Thirty four (80%) isolates were found to have multiple-mutations (composed of 2–5 mutations) in the *katG* gene. Increased number of predominant mutations and nucleotide changes were demonstrated in codons 315 (AGC→ACC), 316 (GGC→AGC), 309 (GGT→GTT) with a higher frequency among patients bearing secondary tuberculosis infection with elevated levels of resistance to isoniazid (MIC µg/ml ≥ 5–10). Furthermore it was demonstrated that the combination of mutations with their predominant nucleotide changes were also observed in codons 315, 316, and 309 indicating higher frequencies of mutations among patients with secondary infection respectively. In this study 62% ($n = 21$) of multi-mutated isolates found to have combination of mutations with predominant nucleotide changes in codons 315 (AGC→ACC), 316 (GGC→GTT), 309 (GGT→GGT), and also demonstrated to be more frequent in isolates of patients with secondary infections, bearing higher level of resistance to isoniazid (≥5–10 µg/ml).

PS-81373-19 Prevalence of drug resistance associated mutations for *Mycobacterium tuberculosis* strains circulated in Russia

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Setting: In Russia, TB morbidity was about 73 cases per 100 000 of population in 2006. The situation remains alarming due to a major spread of multidrug-resistant (MDR) and extensively drug-resistant (XDR) *Mycobacterium tuberculosis* strains. It is obviously, regular molecular monitoring of *M. tuberculosis* strains is need for prevent transmission and spreading of MDR strains in the human population.

Objectives: The aim of this study was to estimate the prevalence of drug-resistance associated mutations for *M. tuberculosis* strains, circulated in three regions of Russia. The high-throughput technology based on MALDI-ToF mass-spectrometry (MS) was used for SNP scanning in microbial genome.

Methods: Epidemiologically unrelated *M. tuberculosis* strains ($n = 976$) were collected during 2005–2007 from sputum of pulmonary TB patients in Central Russia, Western Siberian and Ural regions. Strains identification and drug susceptibility testing were performed according to WHO protocols. Three genetic loci—*rpoB* and *katG* genes and the promoter of the *fabG1-inhA* operon—were analyzed. Minisequencing reaction followed by MALDI-ToF MS of the reaction products was used for point mutations detection as described previously.

Results: Commonly 553 (56.7%) *M. tuberculosis* strains were identified as MDR, 278 (28.4%) were susceptible to RIF and INH and 14 (1.4%) and 131 (13.5%) strains were resistant, respectively, to either RIF or INH. Among RIF-resistant strains the 89.2% carried any mutations within *rpoB* gene with prevalence substitutions in Ser531 (74.7%), Asp516 (8.3%) and His526 (7.9%). For 91.4% of INH-resistant strains the point mutations in Ser315 of *katG* (74.7%) and/or in *inhA*-promoter (16.7%) were revealed. Comparison analysis reveals different mutation profiles for strains circulating in different regions of Russia.

Conclusion: Identification of drug-resistance association mutations may be a useful and effective tool for regional features of MDR-strain spread monitoring.

PS-81421-19 Rapid detection of *M. tuberculosis* drug resistance in sputum samples by using modified real-time PCR

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We developed complex diagnostic kit utilizing the real-time PCR for quantitative determination of *M. tuberculosis* complex and modified allele-specific real-time PCR for identification of *M. tuberculosis* strains mutations, associated with resistance to rifampicin, isoniazid and ofloxacin in sputum samples.

To detect the corresponding mutations, quantitative real-time PCR was performed, and the number of DNA inserted IS6110 copies was determined. If no less than 10³ copies were present, mutational analysis with respect to *rpoB*, *katG*, *inhA* and *gyrA* genes mutations associated with drug resistance was conducted. For this purpose, DNA fragments from the relevant genes were amplified using a preliminary short (20 cycles) round of multiplex PCR. After that, mutations were analyzed by using simultaneously a set of 5'-fluorescent allele-specific primers and linear fluorogenic DNA probe detecting *M. tuberculosis*.

87 sputum samples from TB patients were studied by cultural (Bactec 960) and real-time PCR methods to determine isoniazid and rifampicin drug sensitivity simultaneously. In 67 of 87 samples drug sensitivity was detected by cultural analysis, while in 81 cases interpretable results were obtained with real-time PCR. In 20 cases results of drug sensitivity were not interpretable because of contamination or lack of mycobacteria growth in Bactec tubes and only 6 cases of uninterpretable results were detected with real-time PCR method. In conclusion, the coincidence results of culture and real-time PCR were in 93% of cases and the number of interpretable results of drug sensitivity obtained by real-time PCR was higher than by cultural method at approximately 20%.

PS-81661-19 Prevalence of drug resistance among patients entering a DOTS programme, Rio de Janeiro, Brazil

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Objectives: To determine the proportion of drug resistance of *M. tuberculosis* isolates among new and previously treated pulmonary tuberculosis (TB) cases entering a clinic-based DOTS program in central Rio de Janeiro city, Brazil.

Methods: TB patients attending 3 municipal health centers from November 2000 to December 2004 were eligible for enrolment in the DOTS program and thus for the drug resistance survey. Sputum specimens were collected from each patient with verbal consent and culture was performed in Löwenstein-Jensen (LJ). For drug susceptibility test (DST), the proportions method on LJ was used for standard anti-tuberculosis drugs INH, SM, RMP and EMB.

Results: Of the 723 patients included in the DOTS program, 525 had sputum culture performed, 133 patients were either culture-negative or contaminated. A total of 392 specimens (294 from new cases and 99 from previously treated TB cases) were tested for susceptibility to RMP and INH and 232 specimens (173 new cases and 59 from previously treated cases) were also tested for susceptibility to EMB and SM. Among the new cases resistance to each of the four drugs was observed in 32 (10.9%) patients for INH, 11 (3.7%) patients for RMP, 14 (8.1%) for SM and 4 (2.3%) for EMB. Of the isolates tested from previously treated cases resistance was observed in 24 (24.4%) patients for INH, 15 (15.1%) patients for RMP, 4 (6.7%) for EMB and 12 (20.3%) for SM. Multidrug-resistant TB (MDR-TB) occurred in 11 (3.7%) of the new cases and in 13 (13.1%) of the retreatment cases.

Conclusions: In this study, resistance to INH was the highest, followed by SM. This pattern is similar to most frequent drug resistance patterns observed globally. As seen in many other settings, patients with previous anti-tuberculosis treatment had higher prevalence of MDR-TB, the 3.7% prevalence of MDR-TB in new patients is a major concern, however. This result will need to be confirmed in other districts of this large and populous city.

PS-81739-19 Thin layer agar method for rapid detection of resistance to rifampicin, ofloxacin and kanamycin in *M. tuberculosis*

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The emergence of multidrug-resistant tuberculosis (MDR-TB) and, more recently, of extensively drug-resistant (XDR-TB) is a real threat for TB control programmes. Especially in low-income high-burden countries there is a great need for rapid, reliable, and economical methods for testing the susceptibility of *M. tuberculosis* to antibiotics. Fully automated commercial systems such as the BACTEC MGIT 960 have shown their reliability for the rapid detection of resistance to first- and second-line drugs with results available in an average of 10 days; however, they require heavy and costly equipment not universally available or not suitable for poor countries. The Thin Layer agar (TLA) method has been successfully proved as a

method for the rapid culture of *M. tuberculosis*. We have applied the TLA for rapid drug susceptibility testing of clinical isolates of *M. tuberculosis* to rifampicin, ofloxacin and kanamycin. Results were compared to the conventional proportion method on 7H11 agar. TLA results were obtained on an average of 8 days compared to 21 days using the standard method. TLA uses solid medium, results are observed with a standard microscope and no special equipment is required. This faster method for the detection of resistance to rifampicin, ofloxacin and kanamycin in *M. tuberculosis* is inexpensive and simple to perform providing an alternative method when more sophisticated techniques are not available in low-resource settings.

PS-82060-19 The evaluation of some South African plants against *Mycobacterium* species for treatment of tuberculosis

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Aim: The recent increase in the incidence of tuberculosis (TB) with the emergence of multidrug-resistant (MDR) cases has lead to the search for new drugs that are effective against MDR strains of *Mycobacterium tuberculosis*. Plants contain numerous biological active compounds, many of which have been shown to have antimicrobial activity. The search for biologically active extracts based on traditionally used plants is still relevant due to the appearance of microbial resistance of many antibiotics and the occurrence of fatal opportunistic infections. In this study, ethanol extracts of seven ethnobotanically South African medicinal plants, (*Artemisia afra*, *Dodonaea angustifolia*, *Drosera capensis*, *Galenia africana*, *Prunus africana*, *Syzygium cordatum* and *Ziziphus mucronata*) were screened for their antimycobacterial activity against two *Mycobacterium* species.

Results: When using the microplate dilution method, the minimum inhibitory concentration (MIC) of *A. afra*, *D. angustifolia*, *D. capensis* and *G. africana* ranged from 0.781 to 6.25 mg/mL. *G. africana* showed the best activity exhibiting an MIC of 0.781 mg/mL and minimum bactericidal concentration (MBC) of 1.563 mg/mL against *M. smegmatis*. A drug sensitive strain of *M. tuberculosis* was found to be susceptible to the ethanol extracts of *D. angustifolia* and *G. africana*. (MICs 5.0 and 1.2 mg/mL respectively) when using the BACTEC method. The phytochemical analysis of *G. africana* led to the isolation and identification of 5,7,2'-trihydroxyflavone and found to exhibit at MIC of 0.0312 and 0.1 mg/mL against *M. smegmatis* and *M. tuberculosis* respectively.

Conclusion: This study gives some scientific basis to the traditional use of plants.

PS-82076-19 Drug susceptibility testing for second-line anti-tuberculosis drugs and their association with treatment outcomes

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Introduction: World Health Organization (WHO) guidelines are not explicit about whether Individualized Treatment Regimens (ITR) can be designed based solely on first-line Drug Susceptibility Test (DST) results or whether full first- and second-line results are necessary to be considered ITR. The changes that the Peruvian NTP has experienced in the last decade, particularly in relationship to availability of DST, can give important insight into whether having second-line DST results affects treatment outcomes.

Aim: To evaluate the association between having second-line DST results and treatment outcomes of patients under ITR.

Methods: We extracted from the Peruvian MDR-TB registry cases that began ITR from January 1997 to July 2005 and have DST for either first-line or first- and second-line anti-tuberculosis drugs. Patients are grouped by whether they had either only first-line, or full (first- and second-line) DST results dated before or up to 60 days after treatment initiation ('early' DST results). Logistic regression is used to test the association between having only first or full DST and cure rates; the tests are adjusted for initial culture status.

Results: Of 1244 cases included in the analysis, 472 had first-line and 772 cases had full DST results before or up to 60 days after treatment initiation. Of the group with full DST results 68.5% cured, compared to 58.1% with only first-line DST (OR = 1.57, 95% CI = 1.2–2.0). This difference in cure rate is significant even after adjusting for initial culture status (OR = 1.48, 95% CI = 1.1–2.0). Similarly, failures and deaths were less common in the group with full DST compared to first-line group, though these differences were not significant (OR = 0.69 and 0.79 respectively).

Conclusion: Having DST patterns that include first- and second-line drugs early in treatment is associated with higher cure rates regardless of the culture status at start of treatment.

PS-82292-19 External quality assurance for drug susceptibility testing of *Mycobacterium tuberculosis* in Peru, 2006–2007

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Aim: To evaluate the technical competition of the drugs susceptibility testing of *M. tuberculosis* for the

proportions method on Löwenstein-Jensen (LJ) medium in Peruvian regional laboratories of public health. **Setting:** External Quality Assurance Program (EQAP) for the National Mycobacteriology Reference Laboratory at the Instituto Nacional de Salud of Peru (NMRL-INS) led to six regional laboratories of public health testing susceptibility.

Methods: In 2006–2007, three rounds with panels of 20 to 30 *Mycobacterium tuberculosis* strains with different patterns of resistance from isoniazid (INH), streptomycin (SM), ethambutol (EMB) and rifampicin (RIF), were sent to the regional laboratories for the external control of quality (ECQ) of the drugs susceptibility testing of *M. tuberculosis* for the proportions method on LJ medium.

Results: The efficiency of the drugs susceptibility testing for the proportions method on LJ medium, has stayed stable during the three rounds for RIF (mean, 97%) and INH (mean, 90%). In the case of SM the values of efficiency have been variable during the development of the three rounds (mean, 90%). An important improvement in the efficiency of the EMB with respect to the two previous rounds is observed (55%, 65% and 96%).

Conclusions: This study has shown that the ECQ with the corresponding technical attendance of NMRL-INS improves the quality of the drugs susceptibility testing for the proportions method on LJ medium in the regional laboratories of Peru.

PS-82342-19 Homemade vs. commercial OADC enrichment: testing anti-tuberculosis drug susceptibility in agar-based plate

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Setting: One of the supplies of higher cost for the susceptibility testing for anti-tuberculosis drugs in agar 7H10 Middlebrook is the OADC enrichment media (oleic acid, albumin, dextrose and catalase). An alternative is homemade preparation for limited resources countries.

Objective: Comparing drugs susceptibility in 7H10 media enriched with commercial and homemade OADC.

Methods: The OADC was made with SIGMA supplies. The indirect-proportion method was used with 65 *Mycobacterium tuberculosis* clinical isolates and a control strain (H37Rv). The strains were cultured in control plates (free drug) with bacterial solution (McFarland 0.5) and –2 and –4 dilution and in drug plates. The procedures were carried out blindly. We compared the proportion of *M. tuberculosis* growth in control plaque and the number of UCF in –4 dilu-

tion. The susceptibility to RIF, INH, ETM, STM, ETH, KAN, PAS, CIP, CAP and CS were tested. For each drug, the sensitivity, specificity, agreement and kappa was determined. For the sensitivity and specificity the gold standard was the OADC commercial.

Results: Four and two samples in the commercial and homemade OADC, respectively, were excluded of the analysis by contamination. The growth proportion was 90% (56/62) and 76% (49/64) in commercial and homemade OADC, respectively ($P < 0.003$ McNemar). The UCFs was higher in the commercial OADC ($P = 0.03$ Wilcoxon). The values of sensitivity, specificity, agreement and kappa index for 47 comparative results are shown in the table below.

Table Comparison of the susceptibility testing to anti-tuberculosis drugs between commercial and homemade OADC

	<i>n</i>	Sensitivity	Specificity	Agreement (%)	Kappa
Rifampicin	47	100 (12/12)	100 (35/35)	100	1.0000
Isoniazid 0.2	46	100 (13/13)	100 (33/33)	100	1.0000
Isoniazid 0.1	46	100 (5/5)	98 (40/41)	97.8	0.8969
Ethambutol	45	100 (9/9)	56 (20/36)	64.4	0.3333
Streptomycin	46	53 (8/15)	100 (31/31)	84.8	0.6064
Ethionamide	47	100 (5/5)	83 (35/42)	85.1	0.5155
Kanamycin	47	100 (3/3)	100 (44/44)	100	1.0000
P-amino salicylic acid	47		100 (47/47)	—	—
Ciprofloxacin	47	80 (4/5)	100 (42/42)	97.8	0.8773
Capreomicin	47	75 (3/4)	100 (43/43)	97.9	0.8459
Cycloserine	42	0 (0/1)	93 (43/46)	91.5	–0.0330

Conclusion: The proportion of *M. tuberculosis* growth and the UCFs in the media enriched with OADC commercial was statistically higher than in homemade OADC. Nevertheless, the agreement is high in the susceptibility testing in the most important drugs used to determine multidrug-resistant (INH and RPM) and extreme-drug resistant *M. tuberculosis* (KAN, CIP and CAP).

PS-82363-19 Third national survey of anti-tuberculosis drug resistance in Peru, 2005–2006

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Setting: Peru successfully implemented DOTS in the 1990s, but MDR-TB has challenged TB control. National surveys from 1996 and 1999 showed a non-significant increase of resistance in new cases (2.5–3%). However, changes were introduced in national TB control policies in 2001.

Objectives: To determine the trends of resistance of *Mycobacterium tuberculosis* to first-line drugs in Peru, 2005–2006.

Methods: We followed the WHO international guidelines for national surveys of resistance of *M. tuberculosis*, and obtained samples from 34 health regions across the country through proportional cluster sampling. Susceptibility test was done using the proportion method in Löwenstein-Jensen media.

Results: From August 2005 to March 2006, 2169 patients were enrolled, of whom 1809 were new cases and 360 previously treated cases. Half of patients lived in the capital city, Lima. The prevalences of any primary and acquired resistance were 23.2% (95%CI 21.3 - 25.1) and 41.7% (95%CI 36.5–46.8) respectively. The prevalences of MDR-TB in new and previously treated patients were 5.3% (95%CI 4.2–6.3) and 23.6% (95%CI 19.2–28), respectively. Others results are shown in the Table. There was more resistance and multidrug resistance in the regions of the capital (Lima and Callao) than other regions. We identified an increased risk of primary MDR-TB (OR 4.1, 95%CI 2.4–7.2) and primary resistance (OR 2.3, 95%CI 1.7–2.7) for patients who lived in Lima and Callao compared to other regions in the country ($P < 0.001$). All resistance estimates were higher than those of previous surveys.

Table Prevalence of primary and acquired anti-tuberculosis drug resistance, Peru, 2005–2006

		Primary resistance		Acquired resistance	
		<i>n</i>	%	<i>n</i>	%
Fully susceptible		1389	76.8	210	58.3
Any resistance	INH	209	11.6	109	30.3
	RMP	105	5.8	95	26.4
	SM	342	18.9	107	29.7
	EMB	36	1.9	33	9.2
Resistance to one drug	INH	45	2.5	13	3.6
	RMP	9	0.5	8	2.2
	SM	200	11.1	31	8.6
	EMB	0	0.0	0	0.0
Resistance to two drugs	EMB + SM	1	0.1	0	0.0
	INH + EMB	1	0.1	0	0.0
	INH + RMP	17	0.9	18	5.0
	INH + SM	67	3.6	10	2.8
	EMB + RMP	0	0.0	0	0.0
	RMP + SM	1	0.1	0	0.0
Resistance to three drugs	INH + RMP + EMB	6	0.3	4	1.0
	INH + RMP + SM	45	2.5	37	10.3
	INH + EMB + SM	1	0.1	1	0.3
	RMP + EMB + SM	0	0.0	2	0.5
Resistance to four drugs + SM	INH + RMP + EMB	27	1.5	26	7.2
MDR		95	5.3	85	23.6
Resistance to one or more drugs		420	23.2	150	41.7

INH = isoniazid; RMP = rifampicin; EMB = ethambutol; SM = streptomycin.

Conclusion: In recent years there has been a significant increase in primary and acquired MDR resistance in Peru, mainly in the capital Lima. Urges a more active supervision by the NTP operations in order to improve and strengthen the diagnosis, treatment and control of TB and MDR/XDR-TB.

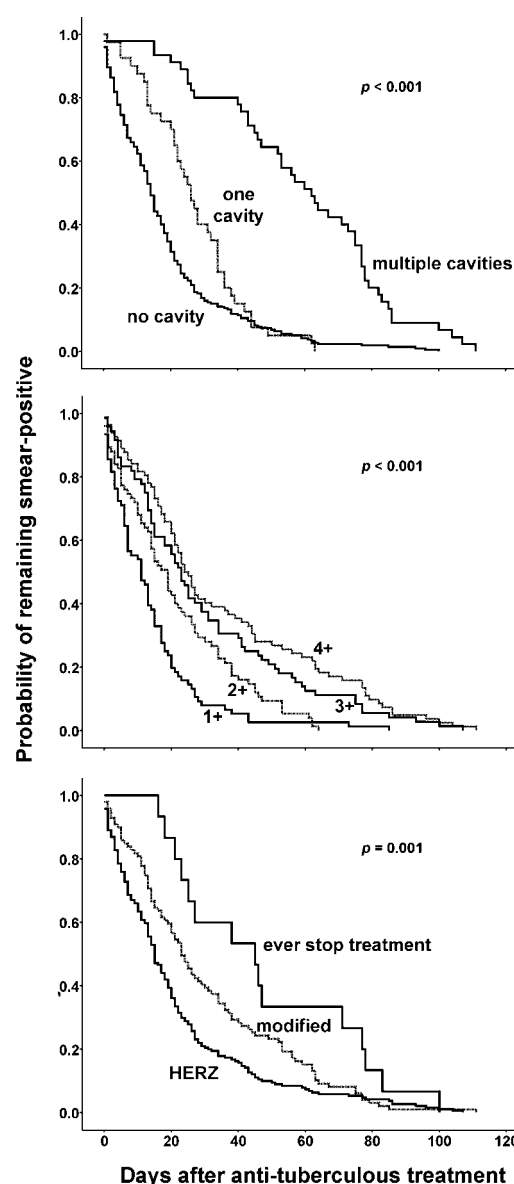
PS-81209-19 Factors influencing time to smear conversion in patients with smear-positive pulmonary tuberculosis

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Aim: Persistent smear-positivity in patients with pulmonary tuberculosis has been shown to predict unfavorable outcome. This study aimed to identify factors influencing the time to sputum smear conversion.

Design: Retrospective chart review.

Methods: From July 2003 to June 2007, all patients with smear-positive and culture-confirmed pulmonary tuberculosis in a medical center and a local-teaching hospital were identified. Factors were analyzed using time-to-event analysis.



Results: A total of 305 patients were included in the study (mean age: 58.6 years). Diabetes mellitus was the most common underlying co-morbidity. Eight (2.6%) had acquired immunodeficiency syndrome, 11 (3.6%) Hepatitis B carriers, 18 (5.9%) Hepatitis C carriers, and 1 (0.3%) co-infected with both viruses. After 2 months of treatment, 34 (11.1%) patients remained smear-positive and culture-positive. Cox proportional hazard regression analysis revealed that multiple cavitations, smear grading, and first 2-month regimen were independent factors influencing the time to sputum smear conversion. In patients without underlying co-morbidities, continuous use of isoniazid, rifampin, ethambutol, plus pyrazinamide (HERZ) at the initial phase of treatment tended to have longer survival.

Conclusion: Our analysis revealed that 11.1% of tuberculous patients remained smear-positive after 2 months of treatment. Patients with multiple cavitations, higher smear grading, and without continuous HERZ therapy at the initial phase had a longer time to sputum smear conversion. Because of superior bactericidal activity and potential survival benefit, maintaining HERZ at the initial phase of treatment is very important.

PS-81255-19 Reasons for development of drug-resistant tuberculosis in Georgia

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Setting: TB control in Georgia follows the WHO recommended DOTS strategy and has reached Global TB Control targets in treatment of STB, but the management of DRTB still represents a serious problem. A country-wide drug resistance survey found that 6.8% of MDR-TB was in new and 27.4% in re-treatment cases (July 2005–May 2006).

Objective: To define and assess reasons for development of DRTB in Georgia among hospitalized TB patients.

Methods: Selected group was made-up of 605 hospitalized patients (2005–2007). Statistical processing of data was done with 'Epi Info-2000' software.

Results: Out of 605 patients DRTB was found in 491 (81.2%) cases, MDR-TB in 261 (43.1%) [51 (23%) in new, 210 (55%) in re-treatment cases], XDR-TB in 33 (5.5%), polyres. in 67 (11.1%), monores. in 130 (21.5%) and 114 (18.8%) were STB. Statistical analysis showed the following social and medical factors were associated with the risk of development of DRTB: Female gender (in females risk of development of MDR-TB is higher compared to males (OR 2.02; CI 1.3–3.06); living in densely populated capital (MDR-

TB was documented more frequently in our patients living in Tbilisi compared with the inhabitants of other regions (OR 1.47; CI 1.05–2.06); family TB contact (compared to other TB contacts, family contact is associated more closely with the development of MDR-TB (OR 1.4; CI 1.22–2.2); previous TB treatment (MDR-TB was documented more frequently in previously treated cases compared with new (OR 4.03; CI 2.73–5.97).

Conclusion: The study of social and medical risk-factors among hospitalized patients in Georgia showed that female gender, living in densely populated capital, family TB contact and previous TB treatment are associated with higher risk for having MDR-TB. These findings confirm the necessity of improvement of infection control measures, especially in densely populated cities and within families and availability of standardized TB treatment.

PS-81261-19 Clinical, laboratory features, bacteriological characteristics and drug resistance of new smear-positive TB patients with diabetes

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The study on clinical, laboratory features, bacteriological characteristics and drug resistance of 260 TB patients with new AFB (+) (130 diabetic and 130 non diabetic patients) showed:

- 1 32.3% of diabetes mellitus pts have got TB within 1–5 years. The early detection (<2 months) was observed in 60.8%. The significant different ($P < 0.05$) at the breathless 48.5%–28.5%.
- 2 The cavity tuberculosis form was presented in 50.8% of TB patients with diabetes mellitus (TB-DM). The significant different ($P < 0.01$) at the level III between 2 groups 63.1%–20.8%. Concentration of AFB was higher in TB-DM patients in comparison with that of TB patients alone: 28.5%–18.5% correspondence.
- 3 The results showed that protective capacity of immune cells from peripheral blood of TB patients with or without diabetes is significantly weaker than those of healthy control and especially weakest in diabetic tuberculosis patients. The levels of IL-2 and TNF- α produced by peripheral blood monocyte cells of TB patients were significantly lower than those of healthy controls (IL-2: 50.91 ± 3.48 pg/ml vs. 67.74 ± 2.69 pg/ml, $P = 0.001$; TNF- α : 480.3 ± 37.4 pg/ml vs. 648.4 ± 30.51 pg/ml, $P = 0.002$). These cytokine productions were also significantly lower in TB patients complicated with diabetes than that in TB patients (IL-2: 45.17 ± 22.08 pg/ml vs. 56.65 ± 30.33 pg/ml, $P = 0.049$; TNF- α : 414.72 ± 306.37 pg/ml vs. 545.9 ± 260.82 pg/ml, $P = 0.0397$). The results showed the

similarity in levels of serum IgA and IgG specific to Mtb-hsp70 in TB patients of both groups, with or without diabetes and these were significantly higher in comparison with those of healthy group ($P < 0.05$).

- 4 The rates of drug resistance form TB-DM patients were 37.5% higher than of TB patients 27.7%. Especially, the rate of multidrug resistance is 12.5%–2.4%, and the rates of resistance to INH, SM are 20%–6.02% respectively ($P < 0.05$).

PS-81314-19 Return of the infectious ghost: a review of 123 cases of abdominal tuberculosis

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Aim: To find out the presentation and operative findings in abdominal tuberculosis along with its complications.

Design: Prospective, experimental study from Jan. 2001 to Dec. 2004.

Methods: The study was conducted in Surgical Unit-III/Medical Unit-III, Bahawal Victoria Hospital/Quaid-e-Azam Medical College, Bahawalpur, Pakistan. All patients with confirmed (on histopathology) abdominal tuberculosis both ileo-caecal tuberculosis and peritoneal tuberculosis were included in the study. The data of the patients was collected and analyzed.

Results: A total of 123 patients (male = 65, female = 58). Eighty four patients presented with acute abdominal symptoms; 23 had intestinal obstruction, 49 peritonitis, while 12 patients had mesenteric lymph node abscess or primary tuberculous peritonitis with military tuberculosis. The remaining 39 patients presented with subacute intestinal obstruction/abdominal masses. At laparotomy 31 cases had ascites and 49 cases gut perforations, fifty five cases had strictures/adhesions. Lymphadenopathy in 24 and abscesses in 13 cases. Five patients had masses in the ileocaecal region. In the majority 63 of patients an ileostomy was made either alone or with resection and anastomosis, stricture-plasty or closure of perforation. In the post-operative period high morbidity was noted in the form of wound infection in 54 (43.9%) cases, while intra-abdominal abscesses were found in 7 and severe sepsis in 8 patients. Faecal fistula due to anastomotic leakage was noted in 05 cases. Total mortality was 3.25%.

Conclusion: In our region abdominal tuberculosis is more prevalent in young adults with longer duration of symptoms before presentation. Most of the patients either presented with intestinal obstruction or peritonitis therefore requiring surgical intervention. So early suspicion of abdominal tuberculosis in patients with low grade fever with evening rise and abdominal distention can decrease the morbidity and mortality.

PS-81445-19 Tuberculosis of male genital organs

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We have studied the medical cases of 32 men suffering from tuberculosis (TB) of genital organs. They received treatment in the TB dispensary. According to the study TB of male genital organs was equally frequent (30%) with young (age 15–24) and middle-aged men (25–34). Among men above 54 the disease was observed in 40% cases. As far as our patients were concerned 35% of them were detected to have primary TB, 40% received treatment for the recurrent disease, and 25% were the chronic patients. 85% of TB of genital organs was concomitant with TB lesion of other organs and was detected during the thorough medical examination of the patients in our dispensary, and only in 15% cases isolated lesion was observed. The character of TB lesions is as follows: infiltrate changes, 46.9%; sclerotic, 18.7%; tissue destruction, 34.4%. In case of 11 patients the medical recovery was achieved through the conservative method. As a result of 6-month directly observed treatment short-course (DOTS) of chemotherapy the affected appendages of genital organs reduced in size and hardened. Upon 21 (65.6%) patients surgical interventions were performed in the TB dispensary. More often patients underwent epididymectomy (76.2%) and orchiepididymectomy (5 patients 23.8%) operations. Thus, very often (85%) TB of male genital organs was diagnosed in the TB dispensary where patients were received because of TB of other organs. 34.4% of patients was detected to be suffering either from tissue destruction of genital organs or sclerotic changes (18.7%). The latter came to prove the delayed diagnostics of given pathologies.

PS-81568-19 Les atouts d'un programme africain de lutte contre la tuberculose: cas de la République Démocratique du Congo

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Contexte : Avec une population près de 60 millions d'habitants la RDC est l'un des 22 pays du monde identifiés comme ayant la plus forte morbidité de tuberculose.

Organisation du PNT : Chaque district sanitaire a environ 3 CDT entourés des CT satellites. Le LNR assure la qualité du réseau de microscopie. L'Unité Centrale travaille avec 24 coordinations provinciales. L'appui technique et financier des organismes internationaux est resté constant et a été renforcé depuis 2000.

Résultats : L'extension du PNT a permis d'atteindre en 2005 les objectifs fixés par l'OMS avec pour les nouveaux cas TP M+ : taux de détection de 73%, taux de succès de 85%. De 1990 à 2006, le nombre de TB notifiées est passé de 19.197 à 98.139, le taux de détection 28% à 73%. L'amélioration la plus importante a été obtenue depuis 2000 après la relance du PNT. Depuis 2 ans, la détection des cas a diminué en RDC et particulièrement à Kinshasa soulevant l'hypothèse du début de la diminution de la transmission de la tuberculose en RDC.

Conclusion : Le découpage progressif du pays en coordinations, le suivi des résultats par CSDT, la formation continue du personnel, la stabilité du personnel du niveau intermédiaire, l'intégration dans les soins de santé primaire, le renforcement des ressources humaines et financières ont constitué des atouts majeurs pour le succès du PNT.

PS-81862-19 Tuberculosis in elderly patients

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Background: Elderly patients still represent the majority of cases among Italian born TB patients. A careful watch must be kept for the side effects (SE) of treatment particularly the very old cannot be relied upon to recognize their significance.

Objective: To describe safety and efficacy of the treatment in elderly patients.

Methods: The medical records of patients aged ≥ 65 years diagnosed with TB attending Sondalo Hospital were reviewed in the period 2005–2007. Medical follow up and laboratory tests were scheduled monthly.

Results: A total of 131 patients, mainly Italians (122/131) were enrolled. 70 (53.4%) were males and 61 (46.6%) females with median age of 75 years (IQR: 71–80). We reported SE in 36/131 (27.4%). Standard treatment was modified in 32/131 cases (24.4%). 24 for severe liver toxicity 8 for gastric intolerance. All SE reverted after drug substitution. Other reason for choosing alternative regimen was drug resistance in 7 patients (5.3%) and contraindications in 2 (1.5%). Treatment outcome did not differ in patients with modified treatment. It was favourable in 113/131 patients (86.2%). All deaths 13/131 (9.9%) occurred in median time of 9 days (IQR: 7–28). No unfavourable outcome was due to severe side effects.

Conclusions: In our experience even though elderly persons were at greater risk for hepatic toxicity from TB treatment compared to younger patients and required more frequent modification of standard regimen, acceptable outcome has been achieved. Special attention was given to monitoring side effects of treatment and drug-drug interactions. Monthly monitoring of serum transaminases is advisable in such patients.

PS-81971-19 Risk factors associated with tuberculosis (TB) treatment failure in Ouagadougou, Burkina Faso

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Setting: Burkina Faso is a West African Country. It is estimated that 99 new cases of smear-positive pulmonary tuberculosis (PTB+)/100 000 population occur every year. Nationally, failure cases incremented by 3.5% in 2002 to 8.3% in 2006.

Objective: To identify risk factors associated with TB treatment failure among tuberculosis new PTB+ in Ouagadougou, the capital city of Burkina Faso.

Design: Case control analysis of patients registered in 5 TB treatment centres during 2006. Treatment failure case is defined as a person who continued to have sputum smear positive status at >5 months during treatment. Control case is defined as a PTB+ case declared cured. The TB register was reviewed to obtain information about sex, age, grade of smear, baseline weight in Kg and HIV status in all failure patients and in control cases (2 control cases for each failure case). The anti-tuberculosis regimens used for Category I was 2RHZE/6EH. Analysis was performed using Epi Info 2000 and SPSS, Version 12.0 to identify the independent risk factors for failure. *P* values of less than 0.05 were considered significant.

Results: 62 failure patients and 121 control cases were analysed. The median age was 37 years in cases and 33 in controls ($P = 0.027$). Men were 66.1% and 59.5% in failure and control cases respectively ($P = 0.383$). HIV positives patients were 35.8% in cases and 28.6% in controls ($P = 0.358$). In 65.6% of failure cases and in 34.2% of controls, the grade of smear was >1 BAAR/field ($P < 0.001$). Patients with grade of smear >1 BAAR/field had high odds of failure in multivariate analysis (OR = 3.67, 95%CI 1.82–7.43).

Conclusions: This finding needs to be corroborated by other studies. The implementation of additional strategies, such as improving treatment adherence and performing quality laboratory control and drug susceptibility testing for all failure cases, will be discussed in the National Tuberculosis Program.

PS-82036-19 Diagnostic and therapeutic particularities of pulmonary tuberculosis in elderly compared to young patients

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Aim: Despite the overall decline of its incidence in many countries, pulmonary tuberculosis (PTB) remains

a threatening health problem. The age of its onset gives the disease particularities that could be determinant in the management and outcome.

Methods: To identify differences in the clinical, radiological and microbiologic features of PTB in the elderly (>65 yr) compared to younger people, we performed a retrospective analysis of the medical charts and chest X-rays of 28 elderly and a comparative group of 50 young PTB patients.

Results: Cough is less frequent than in younger patients (YP) (34% vs 85.1%) and haemoptysis is absent in YP (0% vs 37.7%). Elderly have more underlying diseases (46.42% vs 2.1%), with cardiovascular disorders (23% vs 0%), diabetes mellitus (30.7% vs 2.1%) and chronic lung disease (46.15% vs 0%). Chest X ray showed a significantly higher frequency of lower lung involvement by TB lesions in the elderly (32% while it remains rare in the young 1%). However, there was no difference between the two groups in terms of sputum acid-fast bacilli positivity. Adverse drug reactions are more frequent in the elderly (35% vs 17.2%). TB related mortality was high in the elderly 17.8% while it was absent in the comparative group. PTB in the elderly is particular with atypical clinical and radiological features compared to young patients despite a similar microbiological profile.

Conclusion: The most important result of our study is a high rate of mortality mainly due to a delay in medical consultations, leading to extensive lung involvement and respiratory failure, associated to frequent adverse drug reactions.

PS-82113-19 Imaging outcome of vertebral tuberculosis based on MRI findings: can it be an useful tool for cure definition?

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Aim: Vertebral tuberculosis (TB) represents the main site of osteoarticular TB. Criteria for clinical cure are non standardized: the value of magnetic resonance imaging (MRI) has not been established. We evaluated MRI findings at the end of treatment for vertebral TB to establish if MRI findings can be used to define clinical cure of vertebral TB.

Methods: Consecutive cases of vertebral TB diagnosed in IITD from 1999 to 2007 were prospectively enrolled; clinical and MRI findings were recorded at the beginning of therapy and at the end of at 9–12 months of anti-mycobacterial treatment. Follow up MRI results were classified as improved, unchanged or worsened; specific MRI findings (gadolinium enhancement, STIR hyperintensity and paravertebral abscess) are described.

Results: A total of 57 cases of vertebral TB were included: the median age was 38 years (range 11–84),

72% were males, 81% were foreign born. Thoracic and/or lumbar involvement were present in 93% of patients; intervertebral disk lesions and paravertebral abscesses in 86% and 89% respectively. Forty-seven patients (82%) completed antimycobacterial therapy. Follow up MRI was available for 38 of them (81%) after a median period of 355 days (range 265–717). No patient showed at MRI complete resolution of lesions described at the beginning of therapy. Ninety seven percent of the cases had improved MRI, including complete resolution of paravertebral abscess in 74%, reduced gadolinium enhancement in 89% and decreased STIR hyperintensity in 55%.

Conclusion: The recommended 9–12 months course of antimycobacterial therapy does not achieve complete MRI resolution of vertebral TB lesions. MRI findings should be used with caution to define clinical cure of vertebral TB.

PS-81598-19 Computed tomography and fiberoptic bronchoscopy correlation of central airways involvement of TB in children

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Aim: To describe the CT scan findings of central airway involvement in pediatric patients with primary progressive TB and correlate them with the gold standard diagnostic test, fiberoptic bronchoscopy. The spectrum of other associated pulmonary and extrapulmonary thoracic CT findings will also be described.

Design and Methods: This is a prospective review of CT scans of 25 pediatric patients with active TB and suspected central airways involvement, age ranging from 2 to 17 years old. The diagnosis of TB was established by clinical information and laboratory tests. Imaging was performed on 16 or 64 multidetector CT scans and was reviewed by three pediatric radiologists using multiplanar and 3D reconstructions with virtual bronchoscopy. A questionnaire was used to evaluate lung parenchymal disease, lymphadenopathy, and central and peripheral airways abnormalities. All of these patients also underwent fiberoptic bronchoscopy. Results were tabulated for statistical analysis.

Results: All patients showed abnormalities on the CT with various degrees of tracheal and bronchial narrowing. The central airways abnormality was confirmed on fiberoptic bronchoscopy. In all patients, abnormally enlarged lymph nodes are closely adjacent to the central airways causing tracheo-bronchial effacement. Other associated significant CT imaging findings include cavitary infiltrate/consolidation, atelectasis, nodules, hyperaeration, and bronchiectasis.

Conclusions: The gold standard for the diagnosis of central airway TB involvement is fiberoptic bronchoscopy but this is invasive. CT with its multiplanar

and 3D capability demonstrates central airway abnormality with a high degree of accuracy and it was able to demonstrate lymphadenopathy as the main cause of tracheo-bronchial compression. CT has the advantage of evaluating the central airway distal to the area of abnormality. CT can also assess peripheral airways disease, pulmonary lesions, and other thoracic abnormalities not seen on FOB.

PS-82234-19 Non-conversion of sputum smears in TB patients 2 months after anti-tuberculosis treatment in Yaounde, Cameroon

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Objectives: Determine the frequency of non-conversion of sputum smears in new smear positive pulmonary tuberculosis (PTB) patients two months after treatment and identify its determinants in Yaounde, Cameroon.

Setting: Tuberculosis (TB) Centre of Hôpital Jamot in Yaounde, Cameroon.

Design: All consecutive new patients with sputum smear positive PTB admitted in the TB Centre from April 2006 to March 2007 were systematically included after informed consent. Information on age, sex, past history of BCG vaccination, associated history of diabetes, alcohol and tobacco use as well as the duration of each symptom before diagnosis was obtained from each patient. Admission chest X-rays were reviewed and the extent of disease as well as cavities noted. Serological testing for HIV was done for each patient. Sputum smear results obtained at diagnosis based on the semi quantitative method were also recorded. Patients then received standard short course chemotherapy under direct supervision in hospital during the intensive two months phase of treatment. Sputum smear examinations were again done for each patient at the end of this initial phase of treatment and the results recorded.

Results: A total of 436 patients were enrolled. Twenty-four of these were excluded from analysis. Of the 412 analysed (mean age = 33 ± 12.7 years), 234 (56.8%) were males and 121 (29.4%) were HIV positive. Sputum smears did not convert in 55 (13.4%) patients at the end of two months of treatment. Non conversion of sputum smears was more prevalent in patients aged ≥ 40 years ($P < 0.001$), in males ($P < 0.01$), in alcohol consumers ($P < 0.001$) and tobacco smokers ($P < 0.01$).

Conclusion: Identification of determinants of non-conversion of positive sputum smears after two months of treatment may help to easily identify those at risk of potential adverse outcomes and consequently better manage them.

PS-82112-19 A 3-month-old infant with perinatal TB

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Perinatal TB a rare clinical entity, with 300 reported cases, may be acquired transplacentally or during labor. Suspicion disease must follow study protocol concerning approach to a patient with perinatal tuberculosis. A case 3-month old infant is presented, with adenopathy from birth and maternal background of pelvic inflammatory disease.

To present an overview of diagnosis, treatment, outcome of younger infants with perinatal TB.

Review clinical history of patient, evaluation of criteria for diagnosis of children with TB; epidemiology, signs and symptoms, radiographic, immunologic and bacteriologic findings; and evaluation of clinical course.

3 month-old female with mass on right anterolateral region on neck since birth, fever with prolonged duration.

Maternal background during third trimester of pregnancy with unspecified pelvic disease, lower respiratory tract infection with negative AFB smear, and poor outcome with conventional antibiotics.

Histopathology: Lymph node biopsy with active tuberculous lymphadenitis, Ziehl-Neelsen's stain and positive Tuberculosis Mycobacterium culture, with sensibility to first line anti-TB drugs.

Chest radiograph compatible with right apical pneumonia, HIV and PPD tests negative.

Completed six months scheme of pediatric treatment with good clinical resolution.

Maternal background of pelvic inflammatory disease during third trimester of pregnancy, negative AFB smear and adenopathy since child birth suggesting diagnosis of perinatal Tuberculosis. Given that the patient did not manifest hepatomegaly or important systemic findings, this suggests a transplacental transmission during the final stage of pregnancy or during labor.

PS-81582-19 Incidence of disseminated and meningeal TB disease in New Zealand children over the last decade

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Aim: To document the incidence and presentation of severe TB disease in children in NZ.

Methods: TB cases in children < 16 years of age between January 1992 to June 2001 were identified retrospectively by notifications and discharge codes.

Those with severe TB disease—designated as disseminated and/or meningeal—were identified separately. **Results:** 346 notifications with 274 (79%) meeting diagnostic criteria for TB were recorded. This included 53 cases (19%) of extra-pulmonary disease and of these 23 (8.5%) were miliary (13), meningeal (5) or both (5). All but 6 were born in NZ, but of the non-Maori children most had parents who were not NZ-born. Only 5 were identified through contact tracing, the rest presented with symptoms. A source case was identified in 14 cases and was a close household or family member. The outcome of the 10 with meningitis were 1 death and 6 developing hydrocephalus requiring ventriculoperitoneal shunt insertion with 5 having long-term neurological sequelae. All those with miliary TB alone had normal longterm outcome.

Conclusions: The incidence of TB over this period was 4.8/100 000 children with 8.5% having miliary and/or meningeal disease. Even when children are born in a low TB endemic country, health practitioners need to be aware of the possibility of TB if their family are from countries of high TB incidence.

TB-HIV

PS-81505-19 TB-HIV in El Salvador: trends in clinical outcomes

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Setting: El Salvador would be classified as a country of high prevalence of HIV not because of the prevalence of HIV in adult pregnant women, where figures have never exceeded 1% but because of the fact that since 2003 the percentage of HIV in TB cases has been consistently over 5%.

Objectives: ART therapy was introduced in the public system of care in the year 2000 and we were interested in surveying the national trends regarding cure and mortality rates in the national cohort of TB-HIV patients as reported to the National TB Program since that year.

Method: The cure and mortality rates for TB-HIV as reported to the National TB Program from the year 2000 to 2006 were reviewed.

Results: Cure rates for TB-HIV patients have been consistently improving from the year 2000 (42.1%) to the year 2006 (72.1%). Consequently mortality rates have come down from 47.4% in the year 2000 to an all time low of 17.6% in 2006.

Conclusion: El Salvador implemented DOTS in 1997 and clearly regarding TB-HIV coinfection it was not enough, consequently cure and mortality rates in this population were unacceptably low and high respectively. The country has vigorously pursued the STOP

TB strategy since its inception and in collaboration with the National AIDS program has focused on TB-HIV coinfection. The introduction in the year 2000 of ARV therapy has managed to improve both cure and mortality rates in the TB-HIV population.

PS-81699-19 Assessment of improvement of TB-HIV care service in districts where a mobile ART service has been introduced

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At the last 38th Union World Conference, we presented the scale-up of anti-retroviral treatment (ART) service by the introduction of 'the mobile ART service' in the districts where peripheral health facilities can not provide ART service by themselves due to serious lack of medical staff and, as a result, there is poor accessibility of population to health service. We reported the first 8 months situation of this service and the TB-HIV management at Rural Health Centers (RuHCs) where the mobile ART service was introduced. This time, we assessed the effectiveness of the mobile ART service on TB-HIV management at three RuHCs in Mumbwa District of Zambia by comparing the following indicators before and after the introduction of the mobile ART service; α = number of total HIV positive TB patients/number of TB patients, and β = number of total ART patients among total HIV positive TB patients/number of total HIV positive TB patients. The preliminary results are:

	Before	After
α	29.0%	45.6%
β	65.0%	38.9%

The result shows that the mobile ART service promotes the detection of more HIV-positive patients among TB patients. β is reduced probably because the higher coverage of HIV testing might have found more HIV positive TB patients who are not yet eligible to ART. Since the results are still preliminary due to a short period of observation of the mobile ART service, we will further collect and analyze data, and show the effectiveness of the mobile ART service on TB-HIV.

PS-81704-19 TB-HIV in Vietnam: analysis of treatment results in 6 high-prevalence provinces in the period 2005–2007

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Introduction: Since 2005, the HIV affection in Vietnam has been diagnosed in 1212 AFB (+) TB patients

in 6 provinces among the 10 highest HIV per 100 000 citizens affected rate provinces. TB patients were divided into 2 groups of having HIV (+) and (-), which were studied by the district level under the supervision of the provincial level.

Aim and Design: Giving estimation of the treatment by various domains: by criteria (cured, complete treatment, death, failure, give up and transfer); by sex, geography of provinces. Giving comparison and judgment of each situations: cured, complete treatment, death, failure, give up and transfer between the two groups.

Methods:

- 1 Achieve the number of patients in each of two groups: a) Group TB-HIV (+), called HIV (+):100 patients, b) Group TB-HIV (-), called HIV (-): 1117 patients.
- 2 Using TB Registration Management Book/District level Treatments Book: In order to achieve the treatment analysis, it is necessary to base on the smear results after 2, 5, 7 (8) months.
- 3 Diagnosis the treatment result in 6 criteria given by Vietnam National TB Control Program: Cured, Complete treatment, Death, Failure, Give up, Transfer.
- 4 Complete general files in order to analyze data.
- 5 Comparison with the data of the Vietnam National TB Control Program in 12 months of the analyzed provinces.

Results: With the mean value level $\alpha > 90\%$,

- AFB (+) new: the cured ratio of group HIV (+) was 67.8% and of group HIV (-) was 93.1%.
- AFB (+) returned: the cured ration of group HIV (+) was 67.8% and of group HIV (-) was 93.1%.
- AFB (+) failure and retreatment after given up: the cured ration of group HIV (+) was 33.3% and of group HIV (-) was 80.0%.

Conclusion:

- Cured ratio of group TB-HIV (+) was 67.8% lower than the one of group TB-HIV (-) which was 25.30%.
- Death ratio of group TB-HIV (+) was 18.4% higher than the one of group TB-HIV (-) which was 15.60%.

PS-81707-19 Characteristics of newly diagnosed HIV patients with TB as the presenting illness at a national TB centre

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Setting: While Singapore's TB incidence rate declined to its lowest level at 35/100 000 resident population in 2006, new HIV/AIDS infections in Singapore residents rose by a record 357 cases that year. The Singapore TB Control Unit (TBCU) serves as the national referral centre where approximately 50% of the country's TB cases are treated. From 2007, all TB patients with unknown HIV status were offered HIV screening at the TBCU.

Aims: To determine the characteristics of newly diagnosed HIV patients with TB as the presenting illness.

Method: Data were extracted from the TBCU clinical records of patients with newly diagnosed HIV infection who presented with TB in 2007.

Results: Of the 792 Singapore residents treated at the TBCU in 2007, 33 patients were diagnosed HIV when they presented with TB. Eight patients were identified from routine HIV screening of 708 patients at the TBCU, while 25 were diagnosed at other treatment centres prior to their referral to TBCU. The median age was 49 years (range 27 to 67). All were male; 17 (51%) were single or divorced. None gave a history of known TB contact. Weight loss was a presenting symptom in 25 patients (75%), cough in 23 patients (70%) and fever in 20 (60%). Seven (21%) had enlarged cervical lymph nodes at presentation. 17 (51%) patients had CD4 count <50 (range 4 to 599, median count was 49). Seventeen (51%) had pulmonary and extrapulmonary TB, 13 (39%) had pure pulmonary TB, 3 (9%) had pure extrapulmonary TB. Sputum TB cultures were positive in 30 patients; 28 (93%) had pan-sensitive cultures; one patient had multidrug-resistant organisms.

Conclusion: The incidence of newly diagnosed HIV among TB patients was about 4%. The majority had advanced AIDS at diagnosis.

Table HIV (+)/HIV (-)

Name of province	Number of patients	Cured %	Complete treatment %	Death %	Failure %	Give up %	Transfer %
Hai Phong	33/210	87.9/97.1	0/0.5	6.1/1	3.0/0.0	0.0/1.0	3.0/0.5
Baria-Vung Tau	33/164	51.5/89.6	0/1.8	27.3/2.4	6.1/1.4	6.1/2.4	9.1/2.4
Can Tho	12/178	58.3/89.3	0/0	16.7/9	8.3/0	16.7/1.1	0/0.6
Cao Bang	2/70	50/94.3	0/0	50/0	0/1.5	0/0	0/4.3
Khanh Hoa	5/248	80/92.7	0/0	20/2	0/2.2	0/2.8	0/0.4
Lang Son	2/117	50/96.6	0/0.9	50/0.9	0/0	0/1.7	0/0
By sex: male	81/749	67.9/92.3	0/5.4	18.5/3.2	3.7/0.8	4.9/2.1	4.9/0.9
By sex: female	6/238	66.7/95.8	0/0	16.7/1.7	16.7/0.8	0/0.4	0/1.3
General	87/987	67.8/93.1	0/0.5	18.4/2.8	4.6/0.9	4.6/1.7	4.6/1

PS-81824-19 Pilot study to develop clinical case definitions for the rapid diagnosis of MDR-TB in resource-limited settings

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Background: Diagnosing MDR-TB in HIV-infected patients is a significant barrier to timely and effective treatment. Access to culture and sensitivity techniques are restricted in resource-limited settings, and full sensitivity testing can take up to 8 to 16 weeks. A set of clinical guidelines to accurately identify patients infected with MDR-TB is urgently needed.

Methods: 50 HIV-positive medical inpatients who meet one of 5 MDR-TB clinical case definitions will be enrolled for an 8-week observation period. The definitions include: 1) patients who remain sputum smear positive after >2 months of treatment, 2) sputum smear negative patients who meet 'failure to thrive' criteria after ≥2 weeks of therapy, 3) sputum smear positive re-treatment cases who are failing therapy after >2 weeks, 4) patients who have completed a course of TB therapy within the last 6 months who present with sputum positive TB or meet expanded WHO smear negative criteria, and 5) newly-diagnosed TB patients with a confirmed household MDR-TB contact. Sputum and other appropriate TB culture and sensitivity data will be used to determine the accuracy of the definitions. 8-week mortality will also be measured. Baseline clinical data will be collected, along with weekly C-reactive protein, hemoglobin, weight, and functional status to determine whether certain clinical factors predict for HIV/MDR-TB co-infection.

Results: 123 patients have been screened to date and 21 participants enrolled. Culture data is available on 9 participants. 5 of 9 cultures were positive for TB, with all 5 displaying resistance: 2 XDR-TB, 2 MDR-TB, 1 mono-resistant. 4 patients were culture-negative. 10 of 21 participants have died (47.6% mortality) a mean 31.6 days (range 2–94 days) after admission to the hospital.

Conclusion: Preliminary results suggest that clinical case definitions may predict for drug resistance in culture-positive TB cases. Completed data analysis will be presented in October 2008.

PS-81914-19 Response to threats to lung health: collaborative TB-HIV activities in Korogwe district

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Aim: To provide an overview of TB-HIV collaborative activities in Korogwe District.

Design: This was a descriptive cross sectional study.

Methods: The five centres were purposefully sampled. Data was collected from the clinics records and reports.

Results: Out of 875 registered TB cases, 93% were counselled. Five hundred forty-nine (68%) agreed to be tested, half (52%) tested positive. One hundred fifty-four (54%) were referred to CTC of which only 67 (23%) had access to ARVs.

Conclusion: There is a need to create awareness on TB-HIV diseases in the community. Training of HCWs on TB diagnosis, treatment and PITC is crucial. Intensified TB case finding using TB screening tool in all HIV clinics. Expansion of TB-HIV units is necessary. Expand CTC services to Health Centre level. All these responses of the health system will address the threats to lung health in Korogwe district.

PS-82131-19 Adverse events toxicity profiles in TB-HIV patients on ART roll-out programme, Mulago Hospital, Kampala

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Introduction: About 50% of TB patients in TB Treatment Centre are HIV co-infected and about 50% of these have CD4 count below 200 cells/mm³ who will need ART. ART roll out programme is being implemented in most health facilities in Uganda.

Aim: To evaluate TB patients for ART initiation in a newly established TB-HIV clinic and to study anti TB/ART toxicity profiles.

Design: A prospective study.

Methods: All TB patients presenting to the TB clinic between June 2005–February 2008 were offered routine counselling and testing (RCT). History and physical exam, CXR, CBC, CD4 counts, were done. TB-HIV co-infected patients who qualified for ART were started on HAART and monitored for toxicities.

Results: Of 1219 patients enrolled, 1052 (86%) were ART naïve, 589/1052 (56%), with mean CD4 of <200 cells/mm³ were started on HAART. Toxicity profiles of TB-HIV patients on HAART were as follows; rash 55/60 (92%), neuropathy 84/97 (87%), hepatotoxicity 5/6 (83%) and gastrointestinal intolerance 8/10 (80%).

Conclusion: More than 56% of TB-HIV co-infected patients required HAART. Rash, neuropathy and

hepatotoxicity are commonest toxicities. HAART toxicity may reduce both TB and HIV treatment adherence.

PS-82203-19 Intérêt de la collaboration PNT et PNLS dans le cadre de la prise en charge TB-VIH

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Objectifs :

- Analyser les principaux résultats du projet d'intégration des activités.
- Dégager les avantages obtenus grâce à cette collaboration.

Méthodes :

- Mise en place d'un cadre de concertation, le comité de pilotage qui regroupe les membres du PNT et du PNLS.
- Formation de toutes les catégories de personnel des 2 programmes sur le counselling, le diagnostic et la prise en charge des coinfectés TB-VIH.
- Formation des médiateurs, tradipraticiens, journalistes et membres d'ONGs sur la prise en charge psycho-sociale des patients TB-VIH et leur suivi dans la communauté.
- Responsabilisation de chaque programme pour différents types d'approvisionnement.
- Mise en place de la numération des CD4 dans les CDT périphériques.
- Elaboration de supports contenant des données communes aux 2 programmes.

Résultats :

- Taux d'acceptation du test VIH : 94%.
- Séroprévalence du VIH: au sein des TPM+ nouveaux cas : 14% ; chez les cas retraités : 17% ; les TPM- : 29% ; les TEP : 18%.
- 94% des coinfectés ont bénéficiés de Cotrimoxazole, 68% de la numération des CD4 avant la fin du traitement anti tuberculeux et 31% sont mis sous ARV.
- Des 47 sites de prise en charge du PNLS, 25 sont CDT (53%) et 03 sont CTDO (centres de traitement directement observé) du PNT.
- Le suivi des activités TB-VIH est intégré à celles du PNT et se réalise en collaboration avec le PNLS.

Avantages :

- Augmentation du nombre d'agents formés sur la prise en charge de la coinfection.
- Meilleure prise en charge des malades dans la communauté.
- Intégration des soins au niveau des centres de santé généraux.
- Facilité d'accès aux bilans pré thérapeutiques et de suivi.

Conclusion: L'intégration de la prise en charge des coinfectés se traduit par le renforcement de la collaboration PNT/PNLS qui a aboutit à une meilleure prise en charge de la coinfection.

PS-82301-19 Prise en charge de la coinfection tuberculose-VIH en 2007 au centre antituberculeux d'Adjamé, Abidjan, Côte d'Ivoire

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Introduction : Coinfection Tuberculose VIH problème majeur de santé dans les pays en voie de développement. 1988, séroprévalence du VIH chez les Tuberculeux réalisée par le Projet RETROCI/CDC d'Atlanta. 1998, accréditation CATA avec l'Initiative ONUSIDA. 2004, soutien du Fonds Mondial VIH/SIDA et Tuberculose. 2005, soutien de EGPAF aux activités de Prise en Charge TB-VIH. Quelle situation de cette prise en charge au Centre Antituberculeux d'Adjamé en 2007? **Objectifs :** Décrire les résultats du dépistage volontaire du VIH/SIDA au CAT d'Adjamé

—Déterminer le niveau de coinfection TB-VIH

—Décrire les résultats du traitement antiretroviral (ARV) des patients coinfectés TB-VIH

Méthodologie : Etude prospective 5119 tuberculeux dépistés conseillés au VIH/SIDA et à la Tuberculose au CATA. Tout sexe et toutes formes de TB confondues du 02 Janvier au 31 Décembre 2007. Bilan initial pour traitement ARV des patients séropositifs. Traitement ARV des patients éligibles.

Résultats : 6456 patients TB dépistés dont 5931 conseillés, âge moyen 24 ans, sexe ratio = 1,71. Dépistage VIH/SIDA : 5119 dépistés (86%), 812 refus (14%) ; 3289 VIH Négatifs (64%) 1830 VIH Positifs (36%). 3843 Annonces résultats (75%) ; 749 Bilans initiaux pour traitement ARV (41%) ; 420 éligibles traitement ARV (56%). Résultats traitement ARV/Cotrimoxazole : 387 tuberculeux VIH positifs sous traitement ARV (21%), 1443 TB-VIH sous Co-trimoxazole (79%).

Conclusion : Dépistage VIH/SIDA chez les tuberculeux = grande nécessité pour pays en voie de développement. Forte prévalence coinfection TB-VIH (36%). Besoins d'améliorer dépistage VIH et annonce des résultats.

Problématique: Réalisation systématique bilan initial, frein probable du traitement ARV (21%).

PS-82413-19 HIV prevention, treatment and care for TB patients in Thailand

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Settings: 15 public hospitals geographically distributed around Thailand.

Objectives: To assess rates of HIV testing for all registered TB patients and rates of cotrimoxazole preventive therapy (CPT) as well as antiretroviral therapy (ART) for HIV-infected TB patients.

Method: TB patients received HIV prevention through Diagnostic HIV counseling and Testing (DCT) process during the beginning of TB treatment either at TB clinic or HIV clinic. To avoid visiting repeatedly, HIV positive TB patients received HIV services at once at either TB or HIV clinic. Criteria for HIV treatment included CPT for all HIV-infected TB patients and ART were for those with CD4 cell count <200 cell/ μ l.

Results: Between July and December 2007, 1260 TB patients were registered and 117 (9%) cases were known to be HIV positive before TB diagnosis. Over all, HIV testing rate was 83% and HIV prevalence among TB patients was 19% (196). During TB treatment, CD4 testing and CPT were provided for TB patients with co-infection as 82% and 74% respectively. Of 140 patients with CD4 <200 cells/ μ l, 60% began ART during TB treatment.

Conclusion: HIV testing rate was above the national target of 80% in 2007. However, HIV treatment and care need to be improved through staff capacity building, strong coordination within the hospital, close field supervision, and clear standard of procedure to guide all relevant staff.

DRUG RESISTANCE/ MDR-TB MANAGEMENT-I

PS-81242-19 The problem of tuberculosis with multidrug resistance in the Republic of Kazakhstan

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Target of this study was to evaluate the epidemiological situation on MDR-TB in Kazakhstan and to plan the activities on MDR-TB control. Frequency of primary drug resistance in Kazakhstan constituted 14.2% in 2005 while 13.6 in 2006. Acquired drug resistance was 41.9% in 2005, while 39.1% in 2006. By the end of 2006 absolute number of patients was 7023. The high level of MDR-TB is registered in the penitentiary sector where the level of primary resistance varies from 21.1% to 46.6%. Along with there are the problems of timely diagnostics of MDR-TB, full cover of all cases of active TB by testing drug sensitivity. In 2000 implementing pilot projects of the Programme DOTS-Plus started. Main issue is in insufficient providing with TB drugs of the 2nd line. Yearly treatment under DOTS-Plus regimen endorses 20 to 25% of MDR-TB cases only. Since 2006 Protocols of directly observed treatment were absent such as the social support for patients, and management of continued procurement

with anti-TB drugs and their quality control. In 2006, to decide the problems of MDR-TB growth and spreading, there were developed the protocols of detection, diagnostics, treatment and monitoring system on the base of international recommendations with following their implementation. Beside this, Proposal to the Green Light Committee was adopted in the parallel pilot project. The comprehensive approach to MDR-TB control will allow to decrease the growth and spread of drug resistant TB.

PS-81245-19 The effectiveness of treatment of different cases of MDR-TB with second-line anti-tuberculosis drugs

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Target of our study was to give the comparative effectiveness evaluation of treatment with 2nd line anti-TB drugs in different groups of patients with MDR-TB. Outcomes of treatment of 464 patients with MDR-TB in age of 18 to 65 years were analyzed to obtain this target. All the patients were treated with 2nd line anti-TB drugs in clinics at the National TB Center during 4 months in average. After discharge from clinics they continued to take the 2nd line drugs up to 12–21 months. Out of 464 patients analyzed 208 (44.8%) were the patients with firstly detected TB and disease relapses while 265 (55.2%) patients were with chronic TB. As a result of treatment completed with 2nd line anti-TB drugs there were cured 174 (83.7%) with firstly detected TB and TB relapses while 198 patients (77.6%) only with chronic TB. Comparative analysis of treatment outcomes in patients with MDR-TB with 2nd line anti-TB drugs showed that the effectiveness of treatment is significantly higher among new cases and TB relapses than among patients with chronic TB. In connection with this, in the countries with limited resources priority for 2nd line anti-TB drugs administration is to be given to firstly detected patients and those with relapses with determined multidrug resistance (MDR), in which high treatment outcomes could be obtained if following principle of direct observation of drugs taking.

PS-81432-19 Treating 'difficult to treat' MDR-TB cases: the Belgian experience

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MDR-TB in Belgium has remained at a relatively stationary level since 2001 (annual average: 1.2% of all TB cases), but the number of 'difficult to treat' cases

has been on the increase. From 2001 to November 2005, one XDR case and 7 MDR cases with additional resistance to either amikacin or the quinolones were diagnosed. The outcome of these patients was very poor: the XDR and 4 others died, 2 defaulted, and only 1 was cured. Since December 2005, two XDR cases, 2 MDR cases with additional resistance to the quinolones and 4 'complicated' cases (MDR cases resistant to all first-line drugs and to at least 3 second-line drugs but who are not XDR) were diagnosed. Of these 8 cases, 7 are cured or show a favourable evolution (bacteriological negatvation and satisfactory clinical progress).

In December 2005, the BELTA-TBnet project was launched to ensure that all TB patients in Belgium have access to free anti-tuberculosis treatment. BELTA-TBnet covers the cost of prothionamide, cycloserin and capreomycin, which are not available on the market in Belgium, and linezolid, which is not recognised as an anti-tuberculosis drug by the health insurance. Out of the 8 'difficult to treat' patients since December 2005, five received prothionamide (cost: 3.5€/day), 7 cycloserine (cost: 16€/day), 5 capreomycin (cost: 41€/day) and 4 linezolid (cost: 132€/day).

As it becomes more difficult to treat MDR patients because of decreasing drug sensitivity patterns, the role of less common or less easily available second line drugs becomes more important. Since these drugs often are expensive and difficult to obtain, national TB control programmes need to develop strategies and procedures to ensure access for all patients to the drugs they require. As the BELTA-TBnet project in Belgium illustrates, such initiative will be beneficial both to the patients and to MDR-TB control in the country. The Belgian experience also shows that XDR-TB does not equal untreatable TB.

PS-81433-19 Multidrug-resistant pulmonary tuberculosis in pregnancy: report of seven cases

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Setting: Little is known about the safety of drugs to treat multidrug-resistant pulmonary tuberculosis (MDR-TB) during pregnancy. The clinicians must evaluate the risk of dissemination in mother and newborn and the risk of adverse effects from the administration of drugs for MDR-TB.

Objective: To report cases of MDR-TB treated during gestation in Campinas-SP, Brazil.

Methods: A retrospective study of pregnant women treated between 1995 and 2007 for MDR-TB was carried out at the referral ambulatory in Campinas-SP, Brazil. This ambulatory is reference for MDR-TB patients from other cities besides Campinas. Inclusion criteria were (1) cases with a strain resistant to at least

isoniazid and rifampin and (2) pregnancy at any time while receiving treatment.

Results: Seven cases of MDR-TB were identified during pregnancy: one was infected with bacilli resistant to 2 drugs and 3 to four drugs. Before presentation at the ambulatory all women had received prior treatment with first line drugs (isoniazid, rifampin and pyrazinamide). Two were also Aids patients. The cases began receiving individualized treatment regimens based on drug-resistance patterns. Four women were found to be pregnant before initiation of MDR regimen, 3 others during treatment. For 5 patients the median time to sputum smear conversion was 4 months (range 3–10). No serious adverse effects were observed during pregnancy. One patient experienced treatment failure, 2 were still under treatment, one transferred and 3 cured. All received prenatal care, one had a spontaneous pre-term birth and four of the women were sputum positive at delivery. There were no congenital or neonatal complications in this group. Two HIV exposed neonates were medicated with zidovudine and were asymptomatic at follow up.

Conclusion: MDR-TB can be favourably treated during pregnancy and a successful outcome for the newborn is possible by using a regimen including effective drugs.

PS-81461-19 Drug resistance pattern in MDR-TB from a high burden developing country

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Objective: Pakistan ranks sixth among the high TB burden countries. Multidrug-resistant tuberculosis (MDR-TB) is becoming a major concern in the treatment and control of TB. This study was design to assess the drug resistance profiles of *Mycobacterium tuberculosis* isolates of HIV negative MDR-TB patients treated at Ojha Institute of Chest Diseases (OICD), a reference hospital for TB in Karachi, Pakistan.

Methods: Descriptive study for the period 1998–2006. All the *M. tuberculosis* strains isolated from culture and sensitivity proven cases of MDR-TB (resistant to both isoniazid [INH] and rifampicin [RMP]) were included. All patients had a history of treatment with first line anti-tuberculosis drugs. Drug susceptibility was determined by using modified agar proportion method except for pyrazinamide (PZA) which was tested on Bactec 7H12.

Results: Five hundred and seventy-seven adult patients (59.7% male) with mean age of 32.4 years were studied. Of 577 isolates tested, 510 (88%) were resistant to at least one anti-tuberculosis drug other than INH and RMP and 326 (56.5%) were resistant to all five first-line drugs. The resistance pattern against

first line drugs reveal, 421 (73%) were resistant to ethambutol, 393 (68%) to streptomycin and 417/544 (76%) isolates were resistant to PZA. Of 545 isolates tested against second-line drugs revealed 10 (1.8%) were resistant to ethionamide, 14 (2.5%) to cycloserine, 7 (1.2%) to capreomycin and 40 (7.3%) to quinolone (ofloxacin/ciprofloxacin).

Conclusion: Very high drug resistance pattern in MDR-TB patient is alarming. Continuous monitoring of drug resistance pattern especially of MDR isolates and treatment in specialized centers is a crucial need for future TB control in Pakistan.

PS-81585-19 Drug-resistant profiles of multidrug-resistant tuberculosis patients in Taiwan

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Background: Taiwan CDC implemented a DOTS-Plus program for the management of multiple-drug resistant tuberculosis (MDR-TB) patients in May 2007. *Mycobacterium tuberculosis* isolated from a TB case should be tested for susceptibility to first-line anti-tuberculosis drugs, and all of the identified MDR isolates would be subjected to the second-line drug (SLD) susceptibility testing.

Methods: An algorithm for drug susceptibility testing (DST) rechecking, including strain identification, purity check and DST confirmation, was established. From May to December 2007, a total of 127 isolates of patients intended to enroll in the program were analyzed. Approximately 75% of the study population was retreated cases. The DST methods applied in this study were liquid (BACTEC™ MGIT™ 960 SIRE and PZA Kits) and agar proportion methods.

Results: This survey demonstrated that the combined first-line anti-tuberculosis drug resistance rates were: 94.5% (120/127) for isoniazid, 90.6% (115/127) for rifampin, 61.4% (78/127) for ethambutol, 43.3% (55/127) for streptomycin, 44.1% (56/127) for pyrazinamide, 94.5% (120/127) for any drug; and 90.6% (115/127) for MDR. Of the 115 MDR isolates, 41.7% (48/115), 11.3% (13/115), 6.1% (7/115), 15.7% (18/115), 22.6% (26/115), and 87.0% (100/115) were ofloxacin, kanamycin, capreomycin, ethionamide, para-aminosalicylate and rifabutin resistant, respectively. Furthermore, 9.6% (11/115) were extensively drug-resistant TB.

Conclusions: Resistance to anti-tuberculosis drugs is a serious concern in this preliminary survey. A strengthened strategy for MDR-TB management has to be instigated more thoroughly to improve the treatment outcome.

PS-81593-19 Efficacy and tolerability of a daily dose of 300 mg linezolid in patients with intractable MDR- and XDR-TB

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Introduction: Although linezolid (LZD, 600–1200 mg/day) has good in vitro activity against *M. tuberculosis*, its long-term use in the treatment of MDR-TB may be limited by its cost and serious adverse reactions.

Methods: Eleven patients with intractable MDR- ($n = 6$) or XDR-TB ($n = 5$) were treated with 300 mg/daily oral dose of LZD in combination with other anti-tuberculosis drugs. The serum LZD levels of Cmin (trough level) and Cmax (2 hours after dose) were measured at the steady state determined by HPLC assay.

Results: As of March 2008, eleven HIV-negative patients have been treated with LZD for 8 months (range 3–17 months). All were ofloxacin-resistant. In 7 patients, initially 600 mg/day of LZD was administered for a mean duration of 3.4 months (range 0.5–7 months) followed by 300 mg/day LZD, and in 4 patients 300 mg/day LZD was prescribed from the beginning. In four out of 7 patients, the reason for change from 600 mg/day to 300 mg/day was due to side effects of 600 mg/day LZD (2 peripheral neuropathy, 1 cytopenia, 1 optic neuropathy). After reducing the dosage, cytopenia and optic neuropathy disappeared completely, and the paresthetic symptom of peripheral neuropathy persisted but has been stable. In one patient LZD was discontinued after 11 months of medication due to peripheral neuropathy and economic reason. AFB culture was converted to negativity in 5 patients including 4 out of 5 patients in whom LZD was administered for more than 6 months. The other 6 patients are still taking 300 mg/day LZD with favorable responses based on symptoms and chest radiographic findings. The mean (\pm SD) serum Cmin of LZD was 2.6 ± 1.6 ug/ml (range 0.99–5.36 ug/ml) and the mean serum Cmax was 13.2 ± 3.4 ug/ml (7.96–17.95 ug/ml).

Conclusion: The serum concentrations of 300 mg/day of LZD remain above the MIC for *M. tuberculosis*, permitting efficacy against MDR-TB and possibly reducing the side effects. Further studies are needed to determine the optimal dose of LZD for MDR-TB patients.

PS-81625-19 Analysis of treatment outcome of MDR pulmonary tuberculosis from Karachi, Pakistan

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Objective: To assess the outcomes of human immunodeficiency virus (HIV) negative multidrug-resistant tuberculosis (MDR-TB) patients treated at Ojha Institute of Chest Diseases (OICD), a reference hospital for TB in Karachi, Pakistan.

Design: Clinical study for the period 1996–2006, with follow-up until June 2007. All the culture and sensitivity proven cases of MDR-TB were initially admitted for 3–6 months till the sputum converts negative. Specialized nurse gave supervised treatment to all patients during the hospitalization. After a period of initial hospitalization, treatment was continued as out patient basis at OICD. Drugs for the month were pre-packed and handed over to the patient. Patients attended OICD at monthly intervals for clinical and bacteriological evaluations.

Results: Five hundred and seventy-nine adult patients (60% male) with mean age of 32.44 were studied. All patients had a history of treatment with first line anti-tuberculous drugs. Treatment regimen was decided on individual basis. The most frequently used second-line drugs were 5-F-quinolones, cycloserine, kanamycin and ethionamide in susceptibility based individually tailored four to six drug regimens. The duration of treatment was 18–24 months. Treatment was successful in 227 (39.2%). The mortality rate was 27 (4.6%) during hospitalization. 83 (14.3%) left treatment during admission, 239 (41.2%) defaulted the treatment during follow up period. Three patients were positive at the end of one year so they were labeled as chronic cases.

Conclusion: The main challenge in this study was high default rate that have an impact on final outcome. The high burden of MDR-TB, prolonged infection, treatment cost and difficulties, low rates of cure and treatment adherence can be improved by strengthening TB control programme activities.

PS-81639-19 Implementation of the DOTS-Plus Project in the Republic of Moldova, 2005–2007

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Objective: To analyze implementation of the DOTS-Plus Project in Moldova.

Methods: Cohort analyses of MDR-TB patients enrolled on DOTS-Plus treatment by the NTP during 2005–2007.

Results: MDR-TB is a growing health problem in the country, the number of cases increased substantially during last years. DOTS-Plus treatment of MDR-TB patients has started in December 2005 through the GLC approved Project for 100 patients, covering civil sector and prisons. The extension of project for additional 600 patients has been obtained in 2006. In 2008 country will be under UNITAID support for 150 patients. Country use a standard scheme of treatment which includes 6 Cm 6Et + Cs + Of + Z (Paser) /18 Et + Cs + Of + Z (Paser). A total of 359 MDR-TB patients have started treatment since December 2005 by the end of 2007. Since 2005: 20 patients were cured, 2 were with treatment completed, 4 died, 30 failed the treatment and 15 defaulted. A total of 288 patients continue to still on treatment. According to the National DRS organized in 2006, data available at the end of 2007, the level of MDR-TB between new cases were 19.4% and between previously treated cases—50.8%. Additional activities and funds are necessary to answer to challenges of MDR-TB in country.

PS-81656-19 Drug-resistant tuberculosis in Belgorod Oblast, Pskov Oblast and Republic of Khakasia

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Setting: Belgorod oblast, Pskov oblast and Republic of Khakasia of the Russian Federation.

Objectives: Annually about 300–350 new TB cases with smear and culture positive cases are detected in these regions. About 60–80 cases are registered as relapses with smear and culture positive. MDR-TB among new patients is 12.6% in Belgorod oblast, 8.6% in Pskov oblast and 19.7% in Republic of Khakasia. MDR-TB among relapses is 39.7%—Belgorod, 26.5%—Pskov, 44.9%—Khakasia.

Methods: International standards for TB diagnosis and TB treatment were implemented in these projects since 2002 with technical assistance of IFRC (International Federation of RED Cross). Three reference-laboratories in Belgorod, Pskov and Khakasia perform high quality testing of drug resistance to the first and second line drugs. They use absolute concentrations method for all culture positive patients. Applications to GLC (Green Light Committee) for concessionally-priced second line drugs from all three regions were approved in 2006 and 2007. It is necessary to know % of XDR-TB for the infection control and adequate treatment regimen. XDR was defined as MDR plus resistance to ofloxacin and to kanamycin or capreomycin.

Results: XDR-TB was not detected among new cases in 2007. Also, Belgorod and Pskov oblasts have not XDR-TB among relapses. But 5.7% of XDR-TB among relapses were registered in Republic of Khakasia.

Conclusion: High level of MDR-TB cases was detected in Belgorod oblast, Pskov oblast and Republic of Khakasia. XDR-TB is not a big problem for these regions at present, but drug resistance survey is needed.

PS-81685-19 Extensively drug-resistant tuberculosis: a virtually untreatable disease? The experience from Peru

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Aim: To describe the incidence of extensive drug-resistant tuberculosis (XDR-TB) reported in the Peruvian National multidrug-resistant tuberculosis (MDR-TB) registry over a period of more than ten years and presenting the treatment outcomes for a cohort of these patients.

Methods: From the Peruvian MDR-TB registry we extracted all entries that were approved for second-line anti-TB treatment between January 1997 and June of 2007 and that had drug susceptibility test (DST) results indicating resistance to both rifampicin and isoniazid (i.e. MDR-TB) in addition to results for at least one fluoroquinolone and one of the second-line injectables (amikacin, capreomycin and kanamycin). Patients who began Individualized Treatment Regimen (ITR) before March of 2005 were included in the cohort analysis and stratified in the following 3 groups: (1) patients with DST dated before, or up to up to 31 days after treatment initiation; (2) patients with DST dated 31 days after treatment initiation; (3) patients diagnosed with XDR-TB more than 31 days after starting treatment but that had a previous DST result indicating no XDR-TB.

Results: Of 1989 confirmed MDR-TB cases with second-line DSTs, 119 (6.0%) XDR-TB cases were detected between January 1997 and June of 2007. Lima and its metropolitan area account for 91% of cases, a distribution statistically similar to that of MDR-TB. A total of 43 XDR-TB cases were included in the cohort analysis, 37 of them received ITR. Of these, 17 (46%) were cured, 8 (22%) died and 11 (30%) either failed or defaulted treatment. Of the 14 XDR-TB patients diagnosed as such before ITR treatment initiation, 10 (71%) were cured and the median conversion time was 2 months.

Conclusion: In the Peruvian context, with long experience in treating MDR-TB and low HIV burden, a large proportion of XDR-TB patients can be cured if

DST to second-line drugs is performed early and treatment is delivered according to the WHO Guidelines.

PS-81714-19 The yield of household contact investigations for MDR-TB cases in Istanbul, Turkey

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Aim: To investigate tuberculosis (TB) risk among household contacts of MDR-TB patients.

Material and methods: This study includes 157 index MDR-TB cases who were registered at 13 different Anti-Tuberculosis Dispensaries in Istanbul, Turkey in the period 1997–2005. MDR-TB diagnosis was based on laboratory findings and treatment failure seen under standard treatment regimes. We retrospectively examined their household contacts' records in dispensary files and in December 2007, we asked the patients and/or household members via telephone about any TB diagnosis by any of the household members since the time the index patients was diagnosed as MDR-TB..

Results: Mean age of 126 male and 31 female, a total of 157 MDR-TB patients was 35.9 (15–69). There were 87 (55.4%) new and 70 (44.6%) previously treated cases. 142 of 157 patients had been treated with individualized regimen. Clinic follow-up of MDR-TB patients was treatment success in 80 patients (56.3%), default in 24 patients (16.9%), death in 20 patients (14.1%), transfer in 1 patient (0.7%) and 17 (12%) patients were still under treatment. 16 of 157 cases did not have household contact, and contacts of three MDR-TB cases were not examined. Other 142 MDR-TB patients had total of 542 household contacts of whom 296 (54.6%) were female and 246 (45.4%) were male. The mean follow-up period of the contact patients was 72.9 months after the first laboratory MDR-TB diagnosis of their index cases. In the follow-up period of these contacts, 73 (13.5%) patients were diagnosed as TB, 21 (3.9%) of these 73 cases were MDR-TB. In male contacts, MDR-TB rate was 5.3% (13/246) and in females 2.7% (8/296). MDR-TB was most common in 15–24 age group with a rate of 7.1% (10/141).

Conclusion: High rate of new MDR-TB patients burst among the household contacts of MDR-TB patients. We think that rapid diagnosis of MDR-TB cases and intensified screening of contacts is essential.

PS-81715-19 Traitement standardisé de la TB-MDR à Kinshasa : résultats d'une cohorte de 37 patients

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Cadre : Avant l'approbation de son projet DOTS-Plus en 2006 pour la prise en charge des cas MDR-TB, la République Démocratique du Congo, dans un contexte de revenu faible avait initié un traitement standardisé pour les cas chroniques. Ce schéma contenait trois anti-tuberculeux de seconde ligne, la kanamycine, l'ofloxacine et la prothionamide avec une durée totale de vingt quatre mois. La présente étude se déroule à Kinshasa.
Objectif : Evaluer les patients MDR-TB mis sous traitement pendant 24 mois, dont la plupart ont été suivi en ambulatoire.

Méthodologie : Une cohorte de 37 patients MDR-TB confirmés (souches de *M. tuberculosis* résistantes à au moins la rifampicine et l'isoniazide) recrutés entre le 1er janvier et le 30 juin 2004 au laboratoire national de référence (LNR) à Kinshasa sont soumis au schéma thérapeutique suivant : 3 KM + OFL + PTH + E + Z 18 OFL + PTH + E + Z. La supervision du traitement était réalisée par l'infirmier au centre de traitement ou à domicile par un membre de la communauté sous le contrôle des deux grands hôpitaux de la ville. Les cultures de contrôles étaient effectuées tous les trois mois au LNR pour une durée minimale du suivi de 27 mois.

Résultats : L'âge moyen était 34.6 ans. Le taux de conversion notifié au 6ème mois, était de 81,1%. Vingt six (70,3%) patients pouvant être considérés comme guéris, avec 10,8% d'échec bactériologique. Les effets secondaires avaient montré une prédominance des maux digestifs chez plus de la moitié des patients, suivi des arthralgies et surdité à divers niveaux chez respectivement 7 et 6 malades. Les autres effets indésirables étaient négligeables malades.

Issues	Au 3ème mois	Au 6ème mois	Au 12ème mois	Au 18ème mois	Au 24ème mois
N évalués au LNR	35	34	33	31	30
Cultures négatives	32 (86.5)	30 (81.1)	29 (78.4)	27 (72.9)	26 (70.3)
Cultures positives	3 (8.1)	4 (10.8)	4 (10.8)	4 (10.8)	4 (10.8)
Décès	2 (5.4)	2 (5.4)	2 (5.4)	3 (8.1)	4 (10.8)
Perdus de vue	1 (2.7)	1 (2.7)	2 (5.4)	3 (8.1)	3 (8.1)

Conclusions : Le régime thérapeutique de 24 mois appliqué à cette cohorte de patients MDR-TB nous donne des résultats satisfaisants.

PS-81722-19 MDR-TB treatment outcomes in Nukus, Uzbekistan: development of XDR-TB accounts for high proportion of failures

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Setting: MDR-TB programme in Karakalpakstan, Uzbekistan.

Objectives: Description of treatment outcomes, analysis of risk factors for poor outcome and development of XDR-TB.

Methods: We analysed the treatment outcomes of all MDR-TB cases enrolled from Sep 2003–Dec 2005. We performed a multivariate analysis of risk factors for poor treatment outcomes, including a variety of biomedical and socio-demographic variables and patient adherence. We present the risk factors of developing XDR-TB while on treatment.

Results: Out of 178 patients 109 (61%) had treatment success, 20 (11%) died, 23 (13%) defaulted and 26 (15%) were failures. 14 of the failure cases had developed XDR while under treatment. Treatment efficacy was 70%. Overall, 23 developed XDR during treatment (14 failed, 4 died, 5 completed). Risk factors for poor treatment outcome included use of 2nd line drugs prior to entering the programme, extensive cavitation of the lungs, poorer adherence to treatment, and development of XDR-TB. The risk factors for development of XDR were 2nd line drug resistance on admission and poor adherence to treatment.

Conclusions: Compared to reports from elsewhere success rates are relatively low for an MDR-TB project, despite similar protocols being used. The failure rate is high, for which likely reasons include the local TB strains ability to develop resistance and the extensive use of TB drugs in the community. The widespread availability of 1st and 2nd line drugs is undermining the efforts of TB treatment and control and contributes to the development of XDR-TB. The available drugs are not potent enough to achieve good success rates in a setting where TB strains are able to amplify resistance under treatment.

PS-81745-19 Outcome of treatment of MDR-TB patients with standardised regimens: Iran's experience, 2002–2006

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Design: This study reports on Iran's Second National Cohort for treatment of MDR-TB.

Methods: The study comprises all MDR-TB documented cases in Iran referred to our center during the

period of 2002–2006. All patients received standardized second-line regimen uniformly consisted of ofloxacin, cycloserine, prothionamide and amikacin. Based on drug susceptibility tests ethambutol and pyrazinamide were added to the regimen.

Results: Finally, 43 patients with diagnosis of MDR-TB were involved for treatment, among those 27 (62.8%) were male. Mean age was 44.38 ± 19.05 . Twenty-three (53.5%) of them were Iranians and the remaining were Afghan. All patients were secondary MDR-TB cases. Of total 43 cases, 25 (58.1%) experienced major and clinically significant adverse effects. 29 (67.5%) had successful outcome. Conversely, overall 14 (32.5%) showed poor outcome {treatment failure in 6 (14%) and death in 8 (18.6%)}. Mortality was higher in Iranians (P -value: 0.039) and in patients whose initial regimen was changed due to adverse drug reaction (P -value: 0.01).

Conclusion: MDR-TB treatment using standardized regimen showed favorable outcome in our study, comparing with previous studies.

PS-81765-19 Programmatic management of MDR-TB in Dominican Republic

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Introduction: In October 2005 the National Tuberculosis Program started the registration of Category IV patients and first patients started to receive treatment approved by the Green Light Committee and finance by the Global Fund to fight AIDS Tuberculosis and Malaria in August 2006. In this study we will review the data registered during the first 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: 134 cases were analyzed, all pulmonary: 114 had confirmed MDR, 7 reminded as suspect and 13 were excluded of Category IV. Of Category IV 71 were male and 50 female; 87 (72%) were between 15 to 45 years old; 48 (40%) had history of second-line drug used. The distribution by previous treatment was: 52 (43.0%) failure to Category II, 37 (30.6%) failure to Category I, 14 (11.6%) 11 (9.1%) after relapse, 6 (5%) after default and 1 (0.8%) new case. 61 (50%) have initiated treatment and 45 (37%) have

died in waiting list. In 33 (54%) the standardized regimen was prescribed.

Conclusion: Although a significant effort has been made to improve MDR management, new strategies must be develop to increased the access of MDR patients to treatment and prevent death.

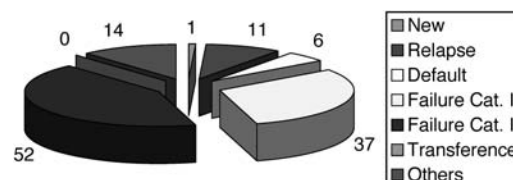


Figure Distribution of Category IV patients by previous treatment history

PS-81832-19 Category IIB pulmonary TB cases: DST data and treatment effectiveness

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Setting: DOTS TB control program in Vladimir oblast, Russia. Category IIB is used for the treatment of TB patients with high probability of drug resistance according to history and clinical data. No rapid DST methods were available there at the moment.

Objective: To evaluate the reliability of WHO recommended criteria routinely used as predictors of drug resistant TB.

Design: Retrospective analysis of TB register and DST results for category IIB patients registered in 2005 and 2006. Proportion method on solid media was used for first line drugs susceptibility testing.

Results: Among category IIB patients there were 21 (56.8%) men and 16 (43.2%) women in 2005, and 80 (67.8%) men and 38 (32.2%) women in 2006.

—The DST results of these patients were:

Resistance to at least one first line drug in 2005, 22 (59.5%); in 2006, 50 (42.4%);

Among them:

to Isoniazid (H) and Rifampicin (R) in 2005, 13 (59.1%); in 2006, 22 (44.0%)

to H in 2005, 4 (10.8%); in 2006, 16 (32%)

to R in 2005, 1 (2.7%); in 2006, 3 (6%)

to other first-line drugs in 2005, 4 (10.8%); in 2006, 9 (18%)

—The treatment results for these patients were:

Cured in 2005, 22 (59.5%); in 2006, 77 (65.2%);

Treatment failure in 2005, 10 (27%); in 2006, 12 (10.2%);

Default in 2005, 2 (5.3%); in 2006, 8 (6.8%);

Death in 2005, 2 (5.3%); in 2006, 17 (14.4%), 8 of them had other than TB cause of death;

Transferred out in 2005, 1 (2.7%); in 2006, 4 (3.4%).

Conclusion: WHO recommended criteria for prediction of drug resistant TB are effective for selection of

appropriate TB patients for category IIB treatment. Utilization of rapid DST techniques could further improve the selection and treatment results of drug resistant TB patients.

PS-81845-19 Sputum conversion time in patients treated for MDR-TB in the Dominican Republic

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Introduction: Treatment of MDR-TB started in August 2006 under programmatic guidelines. Sputum conversion will define the duration of the treatment phases and allows evaluating the probability of success. The study will review the sputum conversion time in the first group treated.

Aim: To obtain information to establish duration of treatments and that will help to monitor the regimens used.

Design/Methods: Descriptive study. Time of sputum conversion is defined as the first of two consecutive (separated by 1 month) smear and culture negative results. All patients with one or more years of treatments were included. Their smear and culture controls results and demographic, clinical and treatment data were obtained from the Category IV register book. This data was processed and analyzed.

Results: 34 cases, all confirmed MDR, were analyzed. 17 (50%) has history of second line drug (SLD) used and 3 (10%) have contact that used SLD. 14 (4.2%) are using standardized treatment (Km + Z + Ofx + Eth + Cs (E)/Z + Ofx + Eth + Cs (E)) and 20 (58.8%) empiric. 3 (10%) patients died and 3 (10%) are still positive. Conversion of the rest (28) occurred: 4 (14.3%) first, 13 (46.4%) second, 3 (3.7%) third, 3 (3.6%) fourth, 1 (3.7%) fifth, 2 (7.1%) sixth, 1 (3.6%) seventh and 1 (.6%) tenth months. None of them have abandoned.

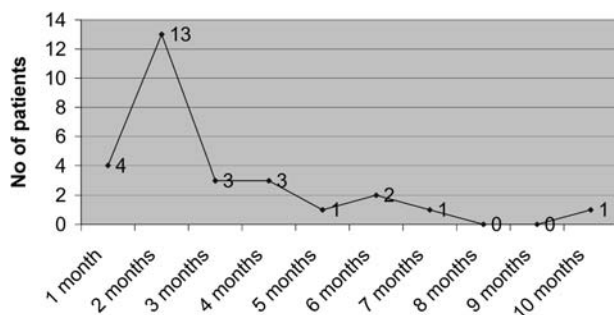


Figure Time for sputum conversion in patients treated for MDR-TB, Dominican Republic 2006–2007.

Conclusion: Most patients (61%) converted during or before the first 2 months of treatment. Duration of the first phase was very prolonged in 4 (14.3%) converters during or after the sixth months.

PS-82014-19 Management of MDR-TB at ambulatory care sector in Tomsk Oblast, Russia

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Aim: To evaluate effectiveness MDR-TB treatment at ambulatory settings.

Materials and methods: Treatment outcomes of 128 MDR-TB out of three Tomsk cohorts who started and completed the whole course of DOTS-Plus chemotherapy at ambulatory care settings between 01/2001 and 07/2006 patients were analyzed. Majority of male patients (98) at age of 15–68 were of poor health and social status: unemployed (66.4%); alcohol abuse (31.3%); drug addiction (17.2%); HIV+ (1.6%). DOT provided during whole course at all urban and rural settings: Day Care TB Hospital, Medical Out-patient Room; Home Patronage by health worker; Primary Healthcare; Red Cross Treatment points; Shelter for homeless; City AIDS Clinic; Rural TB rooms and Feldsher's Points. To improve adherence all patients received incentives and enablers during whole treatment (food baskets, hygiene sets, transportation reimbursement). Since 2006 new subprograms were developed to improve adherence to treatment: Council on Defaulters; subprogram medical and psychological patronage for patients severely abandoning treatment; and alcohol dependence reduction subprogram.

Results: Average length of treatment was 19 months, with 8 months of intensive phase. Regimen contained minimum of 6 active TB drugs BID. Treatment outcomes defined according to WHO recommendations: 86 (67.2%) cured; 12 (9.4%) failure; 24 (18.7%) defaulted; 6 (4.7%) died of non-TB.

Conclusion: Ambulatory treatment of MDR-TB, even in patients with poor adherence status, is possible using the comprehensive approach of adequate DOT, social support and program management.

POLICY AND PROGRAMME IMPLEMENTATION: DOTS EXPANSION-II

PS-81693-19 Quality of microscopy services in the tuberculosis laboratory network in Pakistan

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Introduction: In 2007, WHO recommends the number of specimens to be examined for screening of TB cases can be reduced from three to two, in places where a well-functioning external quality assurance (EQA) system exists, where the workload is very high and human resources are limited. It is expected that microscopic analysis of two sputum smear samples will improve case findings through enhanced quality of service, decreased time for diagnosis and initiation of treatment and decreased number of patients dropping out of the diagnostic pathway. However, the reduction of the number of specimens examined for screening TB patients from three to two specimens should only be recommended in settings with a well-established laboratory network, a fully functional EQA programme for smear microscopy including on-site evaluation with the feed-back mechanism and where the workload is very high and human resources are limited.

Aim: To study trend of laboratory performance indicators and workload to assess whether NTP Pakistan should adopt new policy.

Design: Retrospective analysis.

Methods: Laboratory performance and QA Data from January 2005–December 2007 will be analyzed. For regular lab performance activities, district level report is generated manually during quarterly surveillance meeting by consolidation of individual diagnostic centre reports. The district reports are submitted to provincial reference laboratories where it is entered electronically.

Similarly blinded rechecking reports are consolidated by district lab supervisors and submitted to provincial reference laboratory to be entered online electronically.

Results: Trend of positivity rate in suspect, followup smears, number of smears examined per suspect and average workload, agreement rate and types of major error will be presented.

Conclusion: Situation of laboratory performance, EQA system and workload indicates in favour/against adopting new WHO policy in Pakistan.

PS-81716-19 Reasons for default among TB patients during DOTS

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Aim: Directly Observed Treatment Short course (DOTS) has been successfully implemented in many countries achieving high success rates. Revised National TB Control Programme (RNTCP) with DOTS was started in the study area in Bihar state, India (seven TB Units with 4 million population) during the years 2005 to 2007. Intermittent regimen (thrice a week) was used. The cure rate was 79%. Defaulter rate was high (8.6%). Main objective is to determine the major reasons for default so that corrective measures could be formulated.

Design: Retrospective analysis.

Methods: List of defaulters in seven TB Units in Bihar was prepared from TB registers. Team of supervisory staff contacted them at home and interviewed.

Results: Among 3794 TB patients registered, 294 (8.6%) defaulted from treatment. In this study 271 (92%) defaulters were interviewed. It was observed that majority (49.7%) was related to drug side effects. Other major reasons were non-trust in government health system and alcoholism (26.5%).

Conclusion: Major reasons for default found in this study were of easily manageable nature in programme conditions. Good counselling at starting treatment and support from health facility will be very useful in preparing the TB patients to cope with common minor side effects. Health workers may need guidance. Probably adjusting dose of drugs based on body weight could be tried to minimise side effects and hence defaulting.

PS-81721-19 DOTS expansion in academic institutes in Dhaka city: BRAC experience

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Introduction: BRAC initiated TB control program in 1984 and it expanded DOTS services to academic institutes in collaboration with National TB Control Program since 2004.

Objective: To establish referral linkage and to involve professionals with National TB Control Program.

Strategy: DOTS Corners established in 12 academic institutes in Dhaka city and trained laboratory technicians were deployed. Faculty heads and doctors were oriented on national guidelines on DOTS. Suspects were referred from outpatients department and indoor for sputum examination. Diagnosed patients were referred to DOTS corner for registration or referral to their nearest DOTS center.

Results: Total 5442 suspects were examined their sputum in 2007 and 753 were new positive. A total of 4582 TB cases were diagnosed in 2007. Of them 753 (16%) new positive, 25 (1%) relapse, 1034 (23%) smear negative and 2770 (60%) extra pulmonary cases. Among them, 219 patients were registered in the DOTS corners and 4363 patients were referred to

peripheral DOTS centers. The treatment success of the smear positive new cases was 90% among the patient registered in academic institutes in 2006.

Conclusions: DOTS expansion in academic institutes encouraged professionals to follow the NTP guidelines. Due to the presence of trained doctors and diagnostic facilities, the smear negative and extra pulmonary case detection was higher in these institutes than peripheral DOTS centers. DOTS corner acting as one stop service center for TB patients from where they can get diagnostic, treatment and referral services.

PS-81734-19 Efficacy of DOTS in Taiwan

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Background: The National health insurance program covers over 98% of population in Taiwan since 1997. Medical care for tuberculosis (TB) cases was free. The strategy of Directly Observed Treatment Short Course (DOTS) was implemented since 2002, July but full time observers were not engaged until 2006, April.

Methods: Implementation rate of DOTS program engaged by full time observers and treatment outcomes of smear-positive cases notified in 2006 were gathered via web-based TB notifying system to evaluate how DOTS program engaged by full time observers worked.

Results: In 2006, 5564 smear-positive cases were notified and 377 observers were hired by local public health authorities to conduct DOTS program. Among these cases, 65% received DOTS during their treatment course. As to treatment outcomes, treatment success rate was 75.1% for cases receiving DOTS and 51.6% for cases not receiving DOTS ($P < 0.001$). Default rate was 3.5% for cases receiving DOTS and 5% for cases not receiving DOTS ($P < 0.001$). Overall, treatment success rate for smear-positive cases was 63.9% in 2005 and increased to 66.8% in 2006 ($P < 0.001$). Twelve months after the program was implemented, the coverage rate of DOTS for smear-positive cases has risen to over 85%.

	2005		2006		99% CI
Case number	5537		5478		
Treatment success	3537	63.9%	3658	66.8%	0.8~5.0**
Died	1350	24.4%	1213	22.1%	-0.4~-4.1*

* Result of 12 month cohort; *** $P < 0.001$.

Conclusions: This analysis provided a strong evidence of efficacy of DOTS program engaged by full time observers. The commitment of government on DOTS program, can improve treatment outcomes significantly, even in a country covered by universal national health insurance program.

PS-81741-19 Tuberculosis control in Bangladesh: response of NGOs towards health system strengthening

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Introduction: Bangladesh is a developing country with high burden of TB. According to WHO estimate it has 102 incidence of new smear positive cases and 406 prevalence of all cases per 100 000 population. NGOs came forward to support NTP to reduce the TB burden in early 1990s.

Strategy: Following WHO declaration of global emergency on TB in 1993, the country adopted DOTS strategy. BRAC together with 28 NGOs are working with government. Joint planning and programme implementation helped to mobilize additional resources. Laboratory and treatment network expanded to sub-district and below levels, established in government and NGO facility. NGO providers and volunteers are involved along with public providers. Capacity of health providers and MIS strengthened.

Results: Total 703 health facilities involved in DOTS till June 2007. DOTS coverage increased to 99% in 2004 from 41% in 1994. The case detection rates of smear-positive new cases were 71% in 2006 and treatment success of patients treated in 2005 was 92%. Among 541 laboratories in BRAC supported area, 276 are below subdistrict level, established in government and BRAC facility. 3525 health providers and managers, and 9637 community-based DOTS providers of NGOs were trained between July 2006 to June 2007. 68 000 community health volunteers of BRAC are involved.

Conclusion: Successes achieved to be sustained through partnership approach. Resource mobilization, capacity building, human resource is crucial to maintain this success. To combat new threats, MDR management, TB-HIV collaborative activities initiated in limited scale and need to scale up.

PS-81799-19 Rapid expansion of EQA nationwide in Afghanistan under post conflict

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Introduction: In 2007, NTP has rapidly expanded External Quality Assessment (EQA) for sputum smear microscopy nationwide within one year.

Method: To expand EQA nationwide, the following points were modified from IUATLD guideline according to lessons and learns through the pilot: 1) to conduct Quarterly Laboratory staff Meeting (QLM) in place for sampling, 2) to fix the number of sample slides basically consisted of 15 negative and 5 positive slides, 3) to simplify the assessment report and evalu-

ation for smearing, and the sheet is given to each laboratory technicians at QLM or during individual urgent supervision. As other provision for nationwide expansion, the EQA centers were established in 5 regions and all involving persons were trained in National Reference Laboratory, and it was initiated to collaborate with NGOs.

Results: The percentage of participation in each quarter in 2007 was 42.8% (206/441), 88.0% (327/481), 47.9% (235/490) and 93.2% (480/515) respectively. The percentage of poor performance laboratory was 22.4%, 22.0%, 7.2% and later presence respectively. Individual urgent supervision has been conducted 14 (10.4%) poor performance laboratories in 2007.

Discussion: 1) The modifications were effective for rapid nationwide expansion. 2) To adopt QLM in place of slide collection contributed to solve inaccessibility due to security problem and geographical difficulty. 3) The budgetary constraint was more obstacles to expand nationwide than technical aspects.

Conclusion: The modification/simplification is needed to expand EQA nationwide in the countries where have various difficulties, and financial supports are prerequisite condition.

PS-81896-19 Improving capacity of the peripheral TB-laboratories in Cambodia

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Aim: To describe the impact of strengthening the capacity of laboratory technicians (LT) and non-laboratory technicians (NLTs) on the quality of smear preparation at health center (HC) level.

Methods: Data were collected from routine project information, comparing the baseline with the results after the intervention.

Period of study: October–December 2007. 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 16 277 smear-slides prepared 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 increased from 53.4% to 62.5% and about the quality of smear-slides: adequate thickness increased from 36.5% to 43.4%, correct size increased from 39.2%

to 63.3% and appropriate evenness increased from 32.1% to 41.6% respectively.

Conclusion: Although the project improved the quality of smear preparation at HC level, the impact is still 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 done before recommending the expansion of the activities to other provinces.

PS-81909-19 Improving tuberculosis control in a rural setting in Bolivia through an improvement collaborative approach

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Setting: Bolivia has one of the highest TB incidence rates in America. Successful treatment decreased from 82% in 2001 to 78% in 2005, but these numbers hide local variations. An assessment of 16 municipalities showed cure rates as low as 47%, abandonment rates of 21% and no directly observed treatment. MDR is emerging. The Programme is managed from central MOH, with very weak involvement of facilities and communities.

Objectives: Reduce abandonment to 2%; increase detection of respiratory suspects to 85%, diagnosis of pulmonary TB to 85% and DOT and cure rate to 85%. **Methods:** A facility-based Quality Improvement (CQI) Collaborative approach was put in place by the HCI Project and GCS (USAID funded). Thirty-two CQI teams in 110 facilities periodically monitored compliance with evidence-based quality standards. Quality gaps were identified and locally generated improvement ideas were implemented through rapid improvement cycles. Mobilization of community organizations and behaviour change activities were included. Teams met every three months to share indicators and improvement experiences. Technical competence was strengthened through a self-instructional CD-Rom developed by our Project. Laboratories' specific deficiencies were addressed.

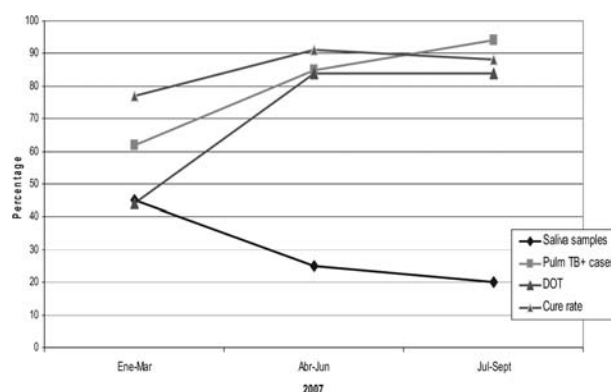


Figure Cure rates, detection of pulmonary TB cases, cases under DOT and saliva samples, percentages. TB Improvement Collaborative, HCI. Bolivia, 2007.

Results: Over one year, detection of respiratory suspects increased two-fold; saliva samples were reduced from 45% to 20%; pulmonary TB cases detected increased from 62% to 94%; DOT increased from 44% to 84%; cure rates increased from 77% to 88%. Based on this experience, an expansion to larger portions of Bolivia is planned.

Conclusion: Innovative locally generated solutions are needed to overcome local obstacles that impede application of well designed national norms. Effective solutions to common problems can be scaled up to larger portions of a country. The Improvement Collaborative approach, as adapted by the HCI Project, is effective to achieve these objectives in developing countries.

PS-81913-19 Evaluation of quarterly surveillance meetings for TB data management: a success story in Pakistan

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Background: Pakistan adopted the DOTS Strategy recommended by WHO in year 2000. At the onset of implementation; TB data was available from the districts implementing DOTS but like all other programs in the initial phases the data was received on and off. For effective implementation of DOTS, and maintaining the quality of services monitoring and supervision, NTP Pakistan has developed a unique system of Monitoring and supervision. In order to facilitate the data flow mechanism from the periphery (i.e. Diagnostic centres, Basic Medical Units where sputum microscopy is performed by trained technicians and TB patients registered for treatment), to the Districts, Provinces and finally to the Central level. A system of quarterly surveillance meetings was introduced in the beginning of 2004. The meetings are arranged in a cascade fashion starting from the District, Province, and to the National level. The objectives of these meetings are to ensure timely submission of data, checking the data for any discrepancies and completeness so that corrected data is submitted to NTP. This system has greatly improved the data management and quality.

Objectives: To share the improvement in data management through retrospective analysis of quality TB data.

Methodology: Retrospective analysis of TB Data before and after the introduction of quarterly surveillance meetings.

Results: The comparative analysis of data before and after the introduction of quarterly surveillance meetings showed remarkable improvement in data quality. The timeliness has improved from 30% to 90% by the end of 2007. The number of inconsistent reports has also decreased by 34% and completeness of report has improved by almost from 30% to 90% by the end of 2007.

Conclusion: The comparison over time, in timeliness, completeness and percentage of discrepancies in pre and post intervention period highlights the importance of the quarterly surveillance meetings—a success which has to be continued.

PS-81919-19 Childhood tuberculosis management in Pakistan: systemic development and implementation

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Introduction: After achieving country-wide target of 100% DOTS coverage in 2005, NTP is expanding its scope of activities including standardized care to the children suffering from TB in Pakistan. A systematic approach of development and implementation would help to increase case finding and better outcomes among children with TB.

Aim: To analyze the situation and to develop and operationalize case management desk-guide and tools for enabling the public sector hospitals to effectively implement and monitor childhood TB care.

Methods: A context analysis and retrospective analysis of a cohort of children with TB indicating diagnosis and treatment outcome before and after the introduction of NTP technical guidelines to manage childhood TB. The operational strategies were developed through workgroup process. The development includes; case management desk-guide for childhood TB and monitoring tools. The guideline and tools is currently being implemented in selected district and sub-district hospitals in a district to assess its feasibility and usefulness.

Results: The preliminary findings of context analysis and retrospective analysis have shown very low case detection and outcome and also variations in managing children with probable TB. The implementation of childhood TB intervention would increase the case finding and outcomes.

Conclusion: The intervention will be further refined for scaling-up in other districts of Pakistan.

PS-81937-19 Barriers to accessing tuberculosis care: worldview of informal health-care providers in rural Bangladesh

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Objective: To evaluate healthcare providers' perception of existing barriers that patients mostly confront in accessing to existing tuberculosis services in rural areas of Bangladesh.

Methodology: Open-ended structured questionnaire was applied to explore barriers from 120 rural informal healthcare providers from Dhaka Division. Data were organized thematically in a matrix for interpretation.

Results: The barriers we found are lack of knowledge about the symptom of TB disease, stop treatment when patient feel better and tendency to hide disease because of shame. These conditions predict non-adherence behaviour to TB care. Stigmatizing nature of TB patient influences access to healthcare. Patients postponed seeking care due to fear of finding out their TB status by providers and social rejection as a consequence. Worsening socioeconomic conditions is seen as one of the major obstacles to access to care. In healthcare system, unavailability of doctors at public facilities (government hospital) in emergency situation, misbehaviour of doctors, lack of attentiveness of staff, unskilled/traditional healers, and unavailability of diagnostic center in local areas were identified as underlying problems resulting in a decreased care-seeking.

Conclusion: Barriers to access to care were identified in interconnected areas: 1) barriers associated with patient's personal characteristics and behaviour, 2) socio-cultural barriers, 3) economical barriers and 4) barriers in public and private healthcare system that patients mostly confront in accessing to treatment services and these barriers must be taken into account in the decision of intervention to improve case findings and patients' adherence to treatment.

PS-81948-19 Effects of EQA implementation on eight districts of Punjab, Pakistan

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Introduction: Direct sputum smear microscopy still remains the most cost-effective diagnostic tool for diagnosis of patients with tuberculosis as well as for their monitoring. EQA implementation with DOTS was undertaken as a project so as to improve the reliability of TB laboratory services by introducing it in microscopy centers all over Pakistan. The EQA implementation was accomplished by the year 2005 in eight districts of Punjab public sector with a functioning blinded rechecking program.

Objective: To assess the effects of implemented EQA on performance indicators like Agreement percentages, false positive and false negative rates in year 2006–2007.

Methods: Data analysis of 117 diagnostic centers from 8 districts of Punjab was carried out. Analysis showed that there has been a considerable increase in the agreement percentages, and reduction in the false positive and false negative rates.

Results: The agreement percentages increased from 95 to 97 in year 2006–2007 respectively, reduction in the false positive rate was from 9 to 6 in year 2006–2007 respectively, and false negative rates was from 3 to 1.75 in year 2006–2007 respectively.

Conclusions: Keeping in view the aforementioned improving indicators, it is vital to phase wise include all the laboratories in the EQA implementation program so as to improve the public sector laboratory reliability and make DOTS more effective.

PS-81967-19 Development of a logistics management information system in Kazakhstan

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Aim: To ensure availability of adequate drug stocks in all facilities involved in the TB control program.

Design: Kazakhstan has been implementing the DOTS strategy since 1994. Despite availability of all first line drugs in adequate quantities at central level, shortages and expired anti-TB drugs were still reported from peripheral levels. Drugs were distributed in quantities based on numbers of patients expected rather than on actual consumption.

Methods: A Logistics Management Information System (LMIS) was developed with support of Project HOPE/JSI and USAID. The LMIS has been designed in such a way that information on drug stocks and drug consumption flows from the periphery to the center, in response the center supplies drugs to the periphery in the quantities required. The system was piloted in 6 districts of Almaty Oblast from October 2006 till April 2007. A manual has been developed.

Results: Pilot testing was successful, no shortages or expiry of drugs were reported from the pilot sites. These results were presented at a Republican Seminar in Almaty and the system was officially endorsed.

Conclusion: To ensure availability of adequate stocks of anti-TB drugs at all levels of the national TB program, it is essential to have a logistics management information system in place that is based consumption and stock level data from the peripheral units.

PS-81988-19 Does a national level Stop TB Partnership make any difference?

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The Uganda Stop TB Partnership (USTP) that was launched 4 years ago grew out of the need to address the shortage of qualified human resources for responding to an unusual opportunity to access additional resources for TB control in Uganda. The failure to secure adequate qualified personnel in key positions at that time was seen as a major barrier to DOTS expansion and the achievement of WHO and National Tuberculosis and Leprosy Programme (NTLP) targets. Through mediation of USTP, several partners contributed human resource support to district level TB

control supplementing their own funds with those obtained from other sources for that purpose. Although national level impact was hard to demonstrate, possibly because of several overlapping factors, it is possible to show at district level, definite gains resulting from partners' interventions. This presentation will highlight and summarise those partners' achievements as well as lessons learnt out of their experiences. It will illustrate the challenges associated with measurement of the added value of partner support to NTLP and at the same time demonstrate how significant gains made through district level interventions might be masked by referring to routine national level indicators.

PS-82011-19 Analysis of FIDELIS project on TB control in three-gorge areas of Chongqing municipality, China

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Background: The project covered 21 counties (among which 9 are enlisted as poor counties at the national level and 2 at the municipal level) and 17.7 million population, accounting for 58% of the total population in Chongqing. To reduce the TB epidemic situation, it is emphasis to explore a new way how to increase TB case detection. The tenet of FIDELIS project is to innovate DOTS expansion through local initiatives to stop TB.

Methods: 1) According to local real conditions, municipal level set the plan of FIDELIS project. Such activities were carried out as training township/village doctors level by level to communicate with the villagers to improve their awareness of TB and recommend TB suspects to TB dispensaries or vicinal sputum examining points, putting out leaflets about TB knowledge and investigation cards of TB suspects in students, implementing incentive policy. 2) Putting the FIDELIS project into the whole municipality, programming, accepting unified management. To improve quality of project implementation work, municipal level would supervise and check the work of each project counties. Each project county also supervised periodically townships work. 3) The data from May 2006 to April 2007 were analyzed.

Results: From May 2006 to April 2007, there were 71 995 TB suspects, 17 202 cases diagnosed active, of which 8607 were new sputum smear positive patients. The registration rate of NSSP was 48.0/100 000. The NSSP were increased by 16.3%, comparing with that of the same phase last year. The case detection rate of NSSP is 77.2% in project areas where only 64.2% in non-project areas. The cure rate of NSSP is 94% in project areas, which arrived at project target.

Conclusions: The one of basic strategies of putting the sustainable control development of tuberculosis into practice were importing project and carrying out

the funds safeguard. Conducting FIDELIS project in Three-Gorge Areas has made great progress.

PS-82023-19 National Tuberculosis Programme of Myanmar reached the World Health Assembly/Stop TB Partnership 70/85 targets

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Setting: Myanmar ranks 21st among the 22 TB high-burden countries. In November 2003, DOTS was implemented in all 325 townships.

Objective: To measure progress towards 70/85 targets. **Methods:** Epidemiological analysis by NTP/WHO experts and cohort analysis on case finding and treatment outcomes.

Findings: Political commitment towards sound TB control is high. The Minister for Health chairs the multi-sectoral Country Coordinating Body which overlooks the national response against AIDS, TB, malaria. Technical Strategy Group TB developed the Five Year Strategic Plan (2006–2010) and National Operational Plan (2006–2009) in line with the global Stop TB Strategy. Case detection and treatment success rate among new smear positive patients increased from 62% and 81% (2001) to 86% and 85% (2006) respectively. Case notification rate for new sputum smear-positive patients increased from 21 161 (2001) to 40 241 (2006). TBHIV sentinel surveillance in 2006 reported 10% co-infection. With support of new three Diseases Fund, NTP is now targeting 30 low performing townships not reaching the 70/85 targets. A second national drug resistance survey is being completed. Global Drug Facility finishes its support by end 2009.

Conclusion: NTP Myanmar now reached the 70/85 targets thanks to high political commitment, external technical assistance and pooled resource mobilization. TB drug sources need to be identified urgently to keep the momentum gained by the NTP and partners.

PS-82038-19 Reaching the unreached in Sagaing Division, Myanmar, through the FIDELIS project

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Setting: Sagaing with 5 358 576 people, sharing vast border with India, extremely hard to reach due to transportation, communication and language barriers, geographical and climatic conditions, with many ethnic minorities and indigenous groups.

Objective: To reach one of the most remote population groups in Myanmar by pilot testing, monitoring and evaluating innovative community-based TB case detection and treatment strategies.

Design: 1110 volunteers or traditional healers (average 1 per village tract) over 37 townships and 126 trained medical officers (MOs) were trained to identify each about 45 TB suspects or 56 280 TB suspects in total and to identify an anticipated 5628 new sputum smear positive patients. Other components included: enhancing commitment of local authorities and partners, improving community awareness through school programme, increasing supervisory visits, providing motivation and incentives for additional infectious cases detected, additional microscopy centers and sputum collection points.

Results: (1.1–31.12.2007): TB suspects and new sputum smear-positive patients increased from 21 837 and 2356 (2006) to 38 167 and 3638. 1080 volunteers, 120 MOs and 37 laboratory technicians trained. 75 sputum collection points and 10 additional microscopy centers established and 10 new microscopists assigned. 97% of townships covered by advocacy meetings. Essay competition for TB in schools in all 37 townships.

Conclusion: Although FIDELIS project doesn't meet its target, great achievement was obtained that leads to FIDELIS approaches being practical and replicable for targeted community.

PS-82040-19 DOTS expansion through franchising and networking with private practitioners

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Aim: According to a number of research studies around 70% population seeks health care from private sector in Pakistan. Expansion of DOTS through private practitioners was planned and implemented under Global Fund round 3 grant.

Design: It was a PPM model where NTP is providing technical support, monitoring and evaluation, while Greenstar Social Marketing, a non-profit organization and the largest health intermediary in the country worked as catalyst, ensuring project implementation through franchised network of private practitioners in five major cities in all four provinces. The project was launched under the brand GoodLife to attract people and avoid stigma.

Methods: More than 1000 practitioners were included in the network and their facilities were branded with logo boards, linked with contracted private labs for sputum microscopy and dedicated project staff. All team players were trained on national guidelines with especial emphasis on their respective roles. Patients were tapped through contacts screening besides passive and active case finding through regular clinical evaluations and special chest camps organized in the potential communities nearby the facilities. Social

marketing techniques were used to generate demand for the services. Highly sophisticated on line data management system was developed to ensure transparency and improve quality.

Results: Total 21 423 TB patients were registered by the end of Dec 2007 including 13 086 new sputum smear positive cases, contributing 30% to 50% in the case detection rates of the individual project districts with a rising trend of treatment success (84% for 2006) with a peak of 87% for 3rd quarter cohort.

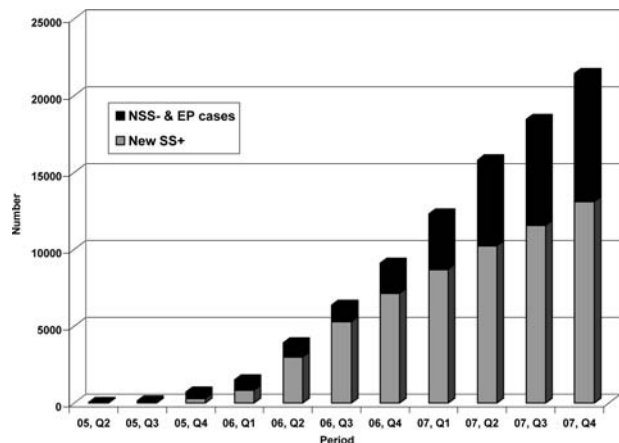


Figure Cumulative registration of TB cases.

Conclusion: Project data analysis and independent evaluations reveal the innovative intervention as a highly successful model having great potential for scaling up for significant contribution in reducing the national disease burden.

POLICY AND PROGRAMME IMPLEMENTATION: OTHER-II

PS-81604-19 Analysis of tuberculosis case management models in Taiwan hospitals

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Objectives: To investigate the current state of tuberculosis patient management in Taiwan's hospitals. Furthermore, the impact of hospital characteristics on the inclusion of various tuberculosis case management model components was analyzed.

Methods: Using the 2001–2004 hospital accreditation data, the study population comprised 492 district hospitals or above in Taiwan. People who were in charge of tuberculosis patient management in those hospitals were explicitly asked to respond to the survey. In early March 2006, self-administered questionnaires were mailed out to those identified hospitals. In the end, there were 388 questionnaires returned by late May,

representing a 78.9% response rate. Among those questionnaires, there were 244 hospitals (62.9%) engaging in treating tuberculosis patients; however, four of them declined to participate in this survey further. As a result, the final effective sample size was 240.

Results: The results showed that sample hospitals' tuberculosis case management model components could be classified as: manpower allocation, admission management, data buildup, treatment management, nursing instruction, revisit management, and referral management. Inferential statistics results indicated that if participating in the pay-for-quality demonstration program for tuberculosis patients and hospital level did exert impact on the inclusion of various tuberculosis case management model components by hospitals.

Conclusion: According to research findings, six policy recommendations were proposed.

PS-81607-19 Audit: adherence to WHO guidelines in the diagnosis of smear negative pulmonary tuberculosis

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Aim:

- 1 To determine whether WHO guidelines for the diagnosis of smear negative pulmonary tuberculosis (PTB) are adhered to at QECH (cough >3 weeks duration; negative sputum direct microscopy, failure of response to adequate antibiotics for LRTI and CXR that is consistent with PTB).
- 2 To compare these figures to a similar audit performed nationally by Harries and colleagues in 2000.

Patient selection: Ambulant patients registering at QECH TB office with smear negative PTB during August 2007.

Methods:

- 1 Scrutiny of health passport
- 2 Interview of patient
- 3 Examination of CXR

Results: Of 81 patients, 98.8% of patients had a cough; this had been present for >3 weeks in 81.5% and was productive in 74.1%. This compares with 96% of patients presenting with cough in the Harries series (93% >3 weeks and 81% productive.) 90.1% of our patients received an adequate trial of antibiotics; none were given in 1%, and low dose cotrimoxazole in 8.9%. This compares to 95% of patients who received adequate antibiotics in 2000. Sputum had been submitted for direct microscopy in 91.4% of cases, which is similar to the 92% in the Harries audit. All patients in our study had had a chest radiograph carried out.

Conclusion: We have improved in the number of chest radiographs performed, maintained the level of sputum submission from 7 years ago, and have a greater number of patients presenting with prolonged cough. However, the use of adequate antibiotics appears lower than 7 years ago, largely due to misunderstanding of what drugs are considered adequate. This area can be targeted by the increased education of the involved clinicians, and repeat audit should show improvement. Audit is a useful tool in this setting with improvements being made from the previous audit, however to get most benefit, the authors believe it should be performed regularly to ensure adherence to local protocols with the aim of improving patient care and clinician education.

PS-81633-19 Pilot implementation of Practical Approach to Lung Health project in Nepal

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Introduction: In order to strengthen the health system, Practical Approach to Lung Health (PAL) Nepal NTP is implementing pilot project in 24 DOTS Clinics of two districts since July 2007. Respiratory cases >5 years are managed using PAL guidelines and referred using standardized referral system.

Objective: To assess impact of Practical Approach to Lung Health project on management of respiratory cases within PHC/DOTS in Nepal.

Methods: PAL guidelines and training material were developed, 134 health workers of different cadres from Primary Health Care system were trained. Management of respiratory cases >5 years according to sign, symptoms and severity of disease were main focus of the training. Regular supervision and monitoring started from December 2007.

Results: Health institutions in pilot sites started focusing on diagnosis and management of respiratory cases also taking in to account smoking status. According to the initial data collected from 4 health facilities after 4 weeks of implementation of PAL respiratory cases increases from 6.1% to 10%. Reported proportion of smokers was 59% among respiratory cases. Only 22% smokers are given smoking cessation counselling. Status of referral and use of antibiotic will be reported at six months completion of the PAL project in June 2008.

Conclusion: Implementation of PAL within the context of NTP and PHC is possible with training and supervision of concerned staff. Patients with respiratory symptoms are referred using standardized channels. Status of referral and use of antibiotic will be reported at six months completion of the PAL project in June 2008.

PS-81640-19 Strengthening the TB laboratory network in Serbia, 2005–2008

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Effective control of tuberculosis (TB) is greatly dependent on a network of laboratories that provides accurate and reliable services for diagnosis, treatment and monitoring. Over the period 2005–2008, strategy for the development and strengthening of existing laboratory services was implemented. The TB laboratory network in Serbia currently comprises 51 laboratories, out of which 10 laboratories perform acid fast microscopy only, 32 culture, and 9 drug susceptibility testing (DST). All laboratories were equipped with high quality microscopes, and 25 laboratories performing culture and DST were supplied with biological safety cabinets, provided by National TB Control Program and Global Fund. The diagnostics procedures were standardized in accordance with newly published National Guidelines for Microbiological Diagnostics of Tuberculosis. NRL, in cooperation with Supranational Reference Laboratory in Borstel, Germany, conducts external quality assurance program of all laboratories for smear microscopy and DST. Another significant improvement was introduction of computerized system for data collection in 30 laboratories. Improvements related to laboratory network resulted in increased rate of culture confirmed TB cases from 52% in 2005 to 72% in 2007, and decreased incidence rate of TB from 32/100 000 in 2005 to 29/100 000 in 2006.

PS-81831-19 Addressing escalating HIV/AIDS infection at community level increases the uptake of voluntary counselling

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Introduction: Voluntary counseling and testing is the principal entry point to care and support for people who test and find that their sero-status is reactive. Their making of this informed decision is key factor in determining of ones Adherence to ART and care and support.

This paper examines the perceived risky behaviors of community members in the in Two of the highly populated compounds in Lusaka Zambia.

Objectives: To investigate to what extent the communities of Chipata and Marapodi compounds which are densely populated shanty compounds value HIV voluntary counselling and testing as a prevention strategy. The specific objectives were:

- To explore the perceptions of communities towards HIV voluntary counselling and testing
- To identify the potential factors that would influence utilization of integrated VCT services in the setting.

Conclusion: VCT is regarded as an important prevention tool and an entry point to access treatment, there is evidence that integrated services are feasible, locating VCT centres at existing health centres is more realistic, VCT requires committed leadership for mobilization and coordination.

Recommendations: Well trained counselors are a requirement, change of attitudes of health personnel, training of community volunteers for on going support in the rural areas, avail services in reach of people, quality determines the intake, include drug supplies to clients and design appropriate training for the adolescents, involvement of local leaders in awareness raising and mobilization.

PS-81973-19 WHO IMAI approach: lessons learned in post-training mentoring in two high HIV prevalence districts in India

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Issue: The WHO Integrated Management of Adults and Adolescent Illness (IMAI) approach was pilot tested in two high prevalence districts of Karur, Tamil Nadu and Davangere, Karnataka. 159 doctors and 448 paramedical staff were trained with the IMAI approach. Post-training mentoring visits were made to one-third of the total district healthcare facilities.

Description: The mentoring team comprised of a senior clinician, nurse or counselor and district administration officer. Individual, group and team mentoring occurred at each visit focusing on core competencies to improve provision of essential care for HIV including cotrimoxazole prophylaxis, rational injection practices, appropriate screening and referral, risk reduction counseling, STI treatment and TB-HIV linkages. Team mentoring consisted of facilitating problem solving and finding local solutions, while the administrative officer looked into other administrative and supply issues. Short-term goals were assigned to the team to complete for the next mentoring visit.

Lessons learned: A variety of technical and administrative issues limits the practice of knowledge and skills learnt during training. Mentoring visits reinforce technical learnings, and support iterative improvement of skills acquired. Use of the local district administrative officers as mentors improves the feedback to programme managers while enabling on-site problem solving. Examples of local troubleshooting include ensuring availability of occupational safety equipment, drugs and supplies as well as facilitating better fund use at the primary healthcare facilities.

Next steps: To ensure sustainability of mentoring, local district clinicians will be trained to become mentors. Apart from mentoring visits, continued medical education (CME) sessions during monthly review meetings of health care providers will be conducted by the district health office.

PS-81982-19 Economic evaluation of MTBDRplus Assay for rapid detection of MDR-TB in high burden resource-poor settings

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With the emergence of extensively drug-resistant tuberculosis (XDR-TB), *Mycobacterium tuberculosis* isolates resistant to isoniazid and rifapicin (MDR-TB), a fluoroquinolone, and at least one of the injectable second-line drugs, cost-effective implementation of new innovative diagnostic systems to promptly detect, identify and test susceptibility of MDR-TB from clinical specimens is essential in today's fight against TB in high burden under-resourced countries. As part of a FIND demonstration study in South Africa, economic costing using an 'ingredients' approach was performed on MGIT culture and drug susceptibility testing methods (MGIT or 7H11) and Genotype® MDR-TBplus (Hain Lifescience) rapid molecular assay for MDR-TB testing. Cost per sputum specimen tested was calculated based on detailed in-laboratory observations, expenditure records, interviews and annualized capital costs over the estimated life-time. Preliminary cost analysis, using FIND-negotiated prices, revealed an average unit cost between 16 and 18 USD for the MDR-TBplus as compared to 24 (7H11 DST) and 35 USD (MGIT DST) for culture +DST, but does not include cost of implementation of new systems. This preliminary result indicates potential cost-effectiveness for the MDR-TBplus assay but complete cost-effectiveness analysis is currently being assessed to obtain a comprehensive understanding the overall impact on health with the introduction of the MDR-TBplus assay.

PS-81987-19 Diagnostic and programmatic delays in the management of drug resistant tuberculosis

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Setting: The Tropical Disease Foundation (TDF) with the National TB Control Program has been managing multidrug-resistant tuberculosis (MDR-TB) since 1999 through Green Light Committee program.

Design and Objective: A descriptive study on the process of diagnosis (dx) and treatment (tx) of MDR-TB patients to determine time from sputum collection (SC) to tx start.

Results: This report describes the process of initiating tx in 84 patients using either conventional solid medium (SM) for culture and DST in 74, and liquid culture (LC) and DST in 10 starting with SC, smear

result (res.), culture res., and drug susceptibility test (DST) res. The number of days from collection to DST is the diagnostic delay (DD). After bacteriologic dx, the case is presented to an internal consilium (IC) which decides on tx regimen following WHO guidelines. Household contact tracing and socio-economic assessment are done to enhance tx adherence. Comparing the conventional solid vs the liquid methods, time from SC to smear res. was 4.7 vs. 4.6 days (d); smear to culture res. 82 (2.5 months) vs. 15 d; culture to DST is 49.7 (1.7 mos) vs. 10 d. A total DD of 136.4 (4.5 mos) vs. 29.6 (1 mo), a difference of 106.8 days (3.6 mos). From DST res. to IC, it took 41.4 (1.4 mos) vs. 26.4 d; from IC to tx is 16.5 vs. 10 d. This is programmatic delay (PD), total 57.9 (1.9 mos) vs. 36.4 (1.2 mos), a difference of 21.5 days (0.7 mo). The total waiting time for solid culture/DST system was 194 (6.4 mos) as compared to liquid system of 66.3 (2.2 mos), an overall difference of 127.7 days (4.2 mos).

Steps in the diagnosis and initiation of treatment of MDR-TB	Solid culture/ DST system days (months) (n = 74)	Liquid culture/ DST system days (months) (n = 10)	Difference between liquid and solid culture/ DST system
1 Sputum collection to smear result	4.7	4.6	0.1
2 Smear result to culture result	82.0	15.0	67.0
3 Culture result to DST result	49.7	10.0	39.7
Total diagnostic delay	136.4 (4.5)	29.6 (1)	106.8 (3.6)
4 DST result to consilium presentation	41.4	26.4	15.0
5 Consilium presentation to start of treatment	16.5	10.0	6.5
Total programmatic delay	57.9 (1.9)	36.4 (1.2)	21.5 (0.7)
Total of diagnostic and programmatic delays	194 (6.4)	66.3 (2.2)	127.7 (4.2)

Conclusion: Since diagnostic delay is longer than program delay, rapid diagnostic methods using liquid media (MGIT and BACTEC) significantly hastens the tx start. Likewise, reducing PD after dx significantly benefits both patient through prompt therapy, and the community by diminishing the days of exposure. Process review such as this could point out areas of potential improvement of the PMDT implementation.

PS-82052-19 Turn-around time: a tool for monitoring sputum smear microscopy

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Introduction: A short turn-around time (TAT) for smear results (the duration of time from the taking of a sample from the patient to the receiving of smear results at the point of care) is essential to ensure timely initiation of treatment of TB patients. This has been used in improving mycobacterial cultures in many industrialized countries but has not been extensively investigated for smear microscopy services in high-burden countries.

Aim: To demonstrate that TAT can be used as a tool to identify poor performance.

Setting: Nine Primary Health Care (PHC) facilities (6 in the Metropole; 3 Regional/rural) in the Western Cape (RSA).

Methods: TAT was documented in the facilities. Samples collected between 1 July 2006–31 December 2007 with a collection date, a smear result date and a TAT ≥ 0 days and ≤ 100 days were included. The results were tabulated by facility in percent of samples returned by day and percent with long delays ($>20\%$ samples with TAT >3 days).

Results: Results of 32 455 samples were received of which 29 955 were included in analysis (92.3%). Four of the 9 PHCs had long delays. The remaining 5 had a higher percentage of samples returned within 24 hours.

Conclusion: TAT is a useful tool that can be used to monitor performance of smear microscopy and to identify locations that require further investigation.

PS-82061-19 A one vs. two-day protocol for smear-positive TB diagnosis: non-inferiority analysis

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Setting: The requirement for tuberculosis suspects to provide two specimens for diagnosis, including one early morning specimen on the day after initial presentation, puts a burden on patients and the diagnostic centre. In several centres, there is a high primary default rate during diagnosis, resulting in missed diagnoses.

Methods: We compared case detection using a one-day diagnostic protocol based on examining a single instructed spot specimen with the current two-day WHO protocol. Sputum-smear microscopy results from

3055 new TB suspects were retrospectively analysed. A one-sided non-inferiority analysis was undertaken.

Results: Smear-positive case detection using the two-day WHO protocol and the one-day protocol was 11% and 13% respectively. The point estimate and 95%CI of the difference in percentage case detection between the two-day and one-day diagnostic protocols was -2% (-4% to 0.3%).

Conclusion: Our results therefore indicate that a one-day diagnostic strategy based on testing a single instructed spot specimen can be as effective for case finding as the current WHO protocol, under operational conditions. Particularly in high burden urban diagnostic centres, moving to a one-day diagnostic strategy could have several time and cost saving advantages for patients and laboratories, without lowering case detection rates.

PS-82089-19 A counselling system for TB and MDR-TB via phone and e-mail in a low-income setting

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Introduction: Infosalud is a public system in Peru aimed at giving general health counselling to the public via phone and/or e-mail. Beginning in June of 2005, a unit specializing in TB and MDR-TB was created within Infosalud as another way to reach out and provide counselling to people going through anti-TB treatment or any user wanting more information on the disease (including treatment options). This team consists of trained nurses with experience in TB and MDR-TB care.

Aim: Evaluate the types of counselling given for TB and MDR-TB provided through Infosalud and describe the mechanisms by which patients' requests are evaluated and reported to the NTP offices and finally addressed by the personnel.

Results: Calls are received by a trained nurse with experience in TB and MDR-TB care. The calls are subsequently grouped into one of these categories: a) caller in need of or requesting counselling; b) caller wanting to file a complaint related to TB or MDR-TB care; c) caller is requesting social or economic support for a person going through treatment. Any and all complaints are reported via email to the National MDR-TB Unit, where a nurse begins the necessary actions to resolve the complaint and/or deliver the support requested by the caller. From the program's inception in June 2005 to December 2007, there were a total of 3169 calls attended to by the team of TB specialists and the number of calls increased in the 2.5 year span. In the first six months of the program 345 calls were attended, increasing to 1269 in 2006 and 1555 in 2007. Between 6 and 9% of the callers reported a complaint. The percentage of complaints that have

been resolved has increased from 90% in 2005 to 97% in 2007.

Conclusion: In a low-income setting like Peru, a toll-free phone line has become an important tool to reach out to the general population as well as patients and has proved an efficient way to address patients' questions, concerns and complaints.

PS-82093-19 The effect of diagnostic delays on the drop-out rate and the total delay to diagnosis of tuberculosis

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Aim: We present an analysis of the factors that contribute to the overall delay in TB diagnosis and treatment, in a resource-poor setting.

Design: A micro-simulation model was constructed in order to obtain the distribution of diagnostic delay times under various conditions.

Methods: Typical scenarios found in various settings were used to set conditions for producing diagnostic delay time distributions. In particular, the effect of different diagnostic test sensitivities were studied.

Results: The sensitivity of the diagnostic method was found to be the most significant factor in determining the total delay to diagnosis. A linear relationship was found between the sensitivity of the test and the predicted mean delay time, with an increase in test sensitivity resulting in a reduced mean delay time and a reduction in the drop-out rate.

Conclusion: The results show that in a developing country a number of delay factors, particularly the low sensitivity of the initial sputum smear microscopy test, potentially increase total diagnostic delay times and the drop-out rate experienced by TB patients significantly. The results reinforce the urgent need for novel diagnostic methods.

PS-82106-19 Strengthening hospital DOTS linkage system between public hospitals and health facilities by PPM DOTS

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Setting: In 2007, Public-Public Mix DOTS (PPM DOTS) was initiated in Myanmar with 3 Diseases Fund support. The PPM project aims to strengthen the link between Public Hospitals and Township Health Departments within the framework of DOTS strategy.

Objectives:

- 1 Integration of public hospitals into NTP through incorporation of DOTS components
- 2 To integrate hospital laboratories into the NTP Quality Control network
- 3 Creation of a TB control network by establishing a referral link between public hospital and township health department/township TB team and to recommend a set of guidelines.

Process: Public-Public Mix DOTS project has been implemented in four tertiary public general hospitals in Yangon as a pilot project. All four hospitals are implementing one of the following schemes: a) to diagnose TB cases, start DOT in hospital, followed by referral to Township Health Department after discharge or b) full TB treatment (DOT) at the hospital for patients residing in near by townships.

Results: In New Yangon General Hospital patients enrolled on treatment increased by 27.2% in 6 months time (from 125 in year 2006 to 159 in 2007). In East Yangon General Hospital number of TB cases admitted to the hospital increased by 83% in 7 months period compared with same period in 2006 (166 to 307). In Thingangyun Sanpya Hospital a total of 426 patients started treatment, and then referred to their respective townships for continuation of their treatment. The hospital received feed back from 92% of the referred patients—while no such data were available before project implementation. Quality control under the NTP is now established in all 4 Hospitals.

Conclusion: The Public-Public Mix DOTS pilot projects showed preliminary good results. Increased supervision and standardization of indicators is necessary for further improvement.

PS-82127-19 Air travel related tuberculosis incidents in England and Wales

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Background: Tuberculosis associated with air travel has recently received increasing attention. We reviewed all air travel related tuberculosis incidents reported between January 2007 and February 2008 in England and Wales and investigated the effectiveness of contact investigation.

Methods: Incidents reported to the Health Protection Agency—Centre for Infections involving air travel were defined according to WHO guidelines on TB and Air travel. Where a decision was made by the public health officer to undertake a contact investigation data on characteristics of the index case, duration of flight, amount of contact information available from the airlines and the outcome of screening where available were collected.

Results: We identified 24 incidents (involving 39 flights). The median flight duration was 8.9 hours

(IQR 8 to 11.7). Most flights (92.3%) involved a high burden country and 79% of the incidents reported had a smear positive index case. Two index cases had MDR-TB. In 19 incidents no further investigation was undertaken due to the lack of passenger information. In the remaining five incidents (11 flights), variable quality of contact information was obtained. The results of screening for tuberculosis infection were only available on four individuals (including two household contacts) all of whom had a negative Mantoux test. The median time to notification was 41 days (IQR 21–61) with no association between this duration and the availability of information from airlines ($P = 0.23$).

Conclusion: This study suggests that the process of investigating passenger contacts of an airline TB case is very complicated and usually unsuccessful without dedicated resources and availability of good quality contact information from the airlines. Further research into the effectiveness of these measures in this setting is needed.

PS-82168-19 Treatment after default: a group at highest risk of unfavourable outcomes when receiving MDR-TB treatment

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Aim: To identify the group of patients at highest risk of unfavourable outcomes among those who received treatment for multidrug-resistant tuberculosis (MDR-TB) in the projects approved by the Green Light Committee (GLC) from 2000 to 2005.

Methods: Aggregated notification and treatment outcome data of all MDR-TB patients enrolled for treatment in the GLC-approved projects from 2000 to 2005 were analysed using WHO definitions of variables and treatment outcomes. Patients still on treatment were excluded from the analysis.

Results: Of the total 5705 patients recorded in the given period, 17% were classified as newly diagnosed, 17% relapse, 3% treatment after default, 17% treatment after failure, 1% extrapulmonary, and 45% other cases. Unfavourable outcomes (defined as death, failure, default, or transferred out) were 66% among patients registered as treatment after default at enrolment. This proportion was significantly higher ($P < 0.001$) than that of any other group of patients. Patients registered as treatment after default at enrolment have also the highest default rate (27%) among all those who received treatment for MDR-TB.

Discussion: Patients enrolled in an MDR-TB treatment programme after having defaulted from a previous TB treatment regimen constitute a small proportion (3%) of all those enrolled in GLC-approved

projects but have very high risk of unfavourable outcomes and in particular of defaulting again. Treatment programmes should put additional efforts to assist this category of patients by ensuring direct observation of treatment through a patient-centred approach.

PS-82184-19 Potential implications of self-management programmes for the COPD population

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Aim: Chronic disease self-management (CDSM) is becoming the dominant approach for improving health for persons living with long-term conditions and these initiatives are rapidly increasing in the COPD community. The purpose of this study is to better understand the potential for the self-management process to improve the health of the COPD population over the longer term by exploring how the assumptions in CDSM programs relate to the daily contexts of people living with COPD. CDSM is defined as the behaviours and tasks people use to manage the symptoms, treatments, and physical and psychosocial impacts inherent in living with a chronic illness in order to live an enjoyable life.

Design and Methods: Major CDSM programs (generic and COPD) currently used in Canada were collected using an environmental scan of current initiatives and programs. As an initial pilot study, a critical discourse and gendered analysis of a generic CDSM program and a COPD specific program was conducted with the support of NVivo 7.0 software.

Results and Conclusion: CDSM programs make numerous assumptions about an individual's capacity to engage in particular behaviours and to have control over their daily lives. Assumptions such as taking responsibility for health, and having access and control over social supports and resources, fail to consider the social and gendered complexities inherent in the lives of people living with COPD. Although CDSM programs can be considered a means of helping persons to feel in control of their lives and to have more autonomy in how they live with their illness, the long term potential of these initiatives to improve the health of the COPD population is hampered by the gap between the assumptions and daily reality of life with COPD. More consideration needs to be given to the sociocultural determinants of self-management behaviours in the future evolution of these programs if they are to play a significant role in improving the health of the COPD population.

TOBACCO

PS-81350-19 The report of evaluation of first 'quitline' in Iran during 2007

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Introduction: There are about 10 million smokers in Iran and smoking related deaths are about 70 000 annually. Like other countries there are different methods to quit smoking in Iran. Prominent recent development in tobacco control is the worldwide proliferation of telephone based tobacco cessation programs, commonly referred to as quitlines.

Aims and Objectives: This study has been done for the 1st time in Iran. Since we didn't have quitline in our country, we decided to establish it.

Methods: This service was including a phone-line, a smoking cessation trained counselor and was based on 1st-come, 1st-served pattern. At the beginning, we gave several announcements on Nov. 2006. Our program was consisting of 5 sessions with 1 week interval. Our questionnaires were based on WHO and Union questionnaires. Nicotine dependency was evaluated by Fagerström test. According to the self report of them, they were not smoking since the 3rd session. This claim confirmed by the expiratory carbon-monoxide rate.

Results: 307 subjects made contact. 80% were male. The mean age was 38.54 years. 71% were married. 72.7% were educated and 50% had Fagerström test >6. The mean time of whole consulting for each one was 24.50 minutes. 81 of 307 subjects were entered in our programs and 69 cases (85.2%) had successful cessation. The abstinence rates on the 6 and 12 months after quit day were respectively 60.7% and 50%.

Conclusions: It seems that this is an appropriate and accessible method which can be used in smoking cessation.

PS-81540-19 The range and availability of smoking cessation services in Ireland

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Background: Tobacco related mortality accounts for 7000 deaths per annum in Ireland, 1500 of which are due to lung cancer. While measures have been implemented in Ireland to discourage people from starting to smoke, attention must also be paid to smoking cessation in order to achieve an appreciable reduction in smoking related mortality. Ireland is currently ranked second in Europe for treatment of smokers on the

Tobacco Control Scale; however, much more could be done to support smoking cessation among Irish smokers.

Objectives: To assess the range and availability of smoking cessation services in Ireland with emphasis on the type and intensity of intervention and service distribution relative to need.

Methods: A survey of all known smoking cessation service providers in Ireland was conducted ($n = 80$).

Results: 85% response rate was achieved (68/80). Service providers are all employing evidence-based interventions. The most common form of support is individual counselling with initial sessions averaging 40 minutes and weekly follow-up sessions 20 minutes in length. NICE guidelines suggest services should aim to treat 5% of smokers; however conservative estimates suggest that Ireland is not achieving this minimum treatment quota and there appears to be regional differences in resource allocation with the HSE Southern Area underserved [Table].

Health service executive (HSE) area	Population	Smoking prevalence (%)	Estimated number of smokers	Hours/week of service	Service providers in full time equivalents	Proportion of total smoking cessation services by hours
HSE Dublin North East	926 315	24.51	227 039.8	339.5	9.7	33.1
HSE Dublin Mid Leinster	1 216 848	22.78	277 198.0	214.0	6.1	20.9
HSE West	1 013 622	23.17	234 856.2	285.0	8.1	27.8
HSE South	1 081 968	23.61	255 452.6	152.5	4.4	14.9

Conclusions: While smoking cessation services are available in all four HSE Areas, it would appear that there is little uniformity or consistency countrywide in the scope and structure of these services. While regional differences in population and its distribution necessitate local planning of responsive smoking cessation services, national best practice guidance, consistent systematic data collection and coordination at the HSE level would create a common framework for service providers to work within, while enabling objective evaluation and more efficient service planning.

PS-81788-19 Evaluation of smoking relapse in Tehran 2007, a three-year follow-up

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Introduction: Smoking is considering as the first preventable cause of mortality worldwide. One of recommended methods to quit smoking is going to smoking cessation clinics in which there are provided a combination of educating methods, behavioral therapy and

pharmaco therapy. One year abstinence and success rate in these clinics are about 20%.

Methods: This is a cross-sectional study. Data gathering has been done through questioning smokers coming to Tehran smoking cessation clinic during 2001–2002. The smokers have participated in educational-therapy courses. The evaluation of abstinence was based on declaration of participants that, they were not smoking since the third session and confirmed by expiratory carbon-monoxide test. Afterwards, follow-ups have been arranged on the 1, 3, 6, 12, 24, 36 months after quit date.

Results: There were 990 samples in the study among which 786 persons (79.6%) were males. 226 persons (32.5%) passed the courses by using educational method and behavioral therapy with no help of medicine. 470 persons (67.5%) passed the courses by using educational method, behavioral therapy and NRT method. 272 persons (27.6%) missed the courses. 643 persons (65.2) successfully quit smoking (non-smoking even one puff after third session). 75 persons (7.6%) reduced their daily smoking. After diminishing the missing group, the rate of success in cessation was 89.6%. Among 643 successful persons, the abstinence rates on the six months, one year, two years and three years after quit day were respectively 358 persons (55.7%), 255 persons (39.4%), 215 persons (33.4%) and 128 persons (19.9%). There were no significant relationship between the type of therapy and cessation result and abstinence.

Discussion: The results of this study are better than similar foreign studies. It seems that some factors such as interest of physicians, motivation of participants and doing follow-ups were effective on these results.

PS-81507-19 Tobacco use among women in rural Pakistan: trends between 1994 and 2007

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Objective: To determine trends in the prevalence of tobacco use between 1994 and 2007 and correlates of tobacco use among women in North Pakistan.

Methods: A cross-sectional survey was conducted in 1994 and 2007 taking a random sample of 1000 women (aged 18 years and over), selected by stratified random sampling from 16 villages in North Pakistan. Trained female interviewers obtained information about cigarette smoking, exposure to secondhand smoking and snuff use and socio-demographic variables.

Results: There was no significant change in reported use of cigarette (6.0% in 1994 vs. 6.2% in 2007). Use of smokeless tobacco (snuff) decreased from 14% in 1994 to 8.0% in 2007. This difference was significant (P value < 0.005). A high proportion (47%) of women

exposed to secondhand tobacco as a result of male member of household smoking cigarette. In 2007, women were less likely to smoke with secondary (adjusted odds ratio (AOR) 0.35, 95%CI 0.12–1.04) or college level education (AOR = 0.25, 95%CI 0.07–0.86) compared to their counterparts who had no schooling. Women were also less likely to smoke with monthly household income of US\$200 and above (AOR = 0.49, 95%CI 0.26–0.92).

Conclusion: Although cigarette smoking has not increased in the study population over 13 years but substantial women are exposed to secondhand smoking in this high mountain community of Pakistan. A comprehensive tobacco control effort, incorporated into the existing community-based health infrastructure, is needed with a focus on secondhand tobacco exposure.

PS-81508-19 Tobacco expenses of Moroccan smokers: data from IUATLD Marta survey

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Aim: To investigate the relationship between socio-demographic and economic characteristics (SDEC) and tobacco expenses of Moroccan current smokers.

Design: Cross sectional study (the IUATLD Marta study 2006).

Methods: 9195 subjects aged 15 and over drawn from households based on a multi-stage national random sample from seven administrative regions. The data collection was conducted by interviewing selected households using anonymous questionnaire. It included data about smoking status and description of socio-demographic characteristics; education level, occupation and household monthly income. The association between SDEC, smoking status and tobacco expenses was tested by a multivariate analysis (logistic and linear regression).

Results: In this representative sample of Moroccan population, overall 28.5% of the men and 2.8% of all women were current smokers. Proportion of current smokers was significantly higher in upper educational level (22.1%), in blue collar workers (28.5%) and in subjects whose household monthly income was >6000 MAD (22.7%). Monthly income was significantly associated with tobacco status. Odds of current smoking was 2.66 times greater in the blue collar workers. Tobacco expenses increased with monthly family income, but tobacco proportion of monthly income was inversely associated with amount of it. Subjects whose monthly income was <1000 MAD spent 47.5% of it while those with monthly income >6000 MAD spent 12.2% of it.

Conclusion: This results show the strong association

between tobacco expenses and SDEC; proportion of monthly income devoted to tobacco is higher among poor people than in the rich ones.

PS-81534-19 Evaluation of tobacco smoking pattern—cigarette, hookah (Ghalyan)—in Tehran, 2006

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Introduction: Nowadays smoking causes 5.2 million deaths annually in the world of which 70% occurs in developing countries. Hookah smoking is increasing around the world especially in Eastern Mediterranean region including Arabian countries, Turkey and Iran. This study has been done to evaluate tobacco smoking patterns in both forms of cigarette and hookah smoking and the prevalence of these kinds of smoking.

Methods: A cross-sectional study was performed among a random population sample of 2053 subjects in Tehran in 2006. It has been established via non-probability sampling by giving them questionnaires which were designed and adapted according to WHO and IUATLD questionnaires.

Results: 46% of the population had the experience of hookah smoking (50% of male and 36.8% of female). Occasional hookah smoking prevalence during a year was 45%, while 10% of the participants consumed hookah at least once a week, 17.9% at least once a month and 17.1% at least once a year ($P = 0.0000$). 47.2% of the participants had the experience of cigarette smoking. Current cigarette smoking prevalence was 22.7% (29.7% of male and 7% of female) ($P = 0.0000$). Also given the prevalence of cigarette and hookah smoking simultaneously, 22.7% of the current smokers and 25.01% of the non-smokers consumed hookah at least once a week ($P = 0.0000$).

Conclusion: In this study, cigarette smoking prevalence seems to be higher than other similar studies in this realm. Hookah smoking prevalence among the smokers and non-smokers is very similar. Considering the cigarette and hookah smoking prevalence in the society, there is a clear need for more studies and comprehensive evaluation of effective factors on the knowledge, attitude and practice of people towards this issue.

PS-81660-19 Tabagisme chez les jeunes en milieu scolaire au Togo, 2007

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En vue de disposer des informations complètes et actualisées devant servir de base pour des actions anti-

tabac chez les jeunes en milieu scolaire, une enquête a été faite en 2002. La présente étude a pour but de suivre l'évolution de ce fléau parmi cette population. Il s'agit d'une enquête transversale menée en mars 2007 dans 50 collèges du Togo à l'aide d'un questionnaire anonyme auprès des élèves sans aucune distinction. Le taux de participation des écoles et des classes a été de 100%. Celui des élèves est de 91,5%. Les élèves ayant entre 13 et 15 ans représentaient 45,7%. 6,2% des élèves fument régulièrement la cigarette. 10,4% utilisent d'autres produits de tabac que la cigarette. Au cours de la semaine précédant l'enquête, 20,2% d'entre eux ont été exposés à domicile à la fumée de tabac alors que 41,6% l'ont été dans les lieux publics. 86,2% sont favorables à l'abolition de fumer dans les lieux publics. 24,8% ont déjà possédé un objet sur lequel est inscrit le logo d'une marque de cigarette. On note une régression du taux de prévalence de 5% par rapport à l'enquête de 2002. Ces données témoignent de la prise de conscience du danger que constitue le tabac pour les jeunes élèves.

PS-81709-19 Profile of tobacco consumption among lung cancer patients at tertiary level cancer hospital in Bangladesh

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Aim: To observe the relationship between tobacco use and lung cancer among the patients attending NICRH from 2005 to 2006.

Design: Retrospective study.

Methods: Record review of hospital record for tobacco use including smoking profile and other associated variables of 1965 lung cancer patients was performed.

Results: Male has significant prevalence over female (85.8: 14.2.5). 55.7% of the patients were literate and highest number of them were agriculturist as a single profession (26.2%), only 1.5% were industrial workers. Majority of them were smokers (76.8%) of whom more than half were current smoker (55.4%). In addition, the majority had chewing tobacco habit (53.1%). Among smokers 48.1% belonged to working age group 20–59 years and 48% was among the senior age group of above 60 years. Maximum number of cases were diagnosed by tissue diagnosis (86.4%). Squamous cell carcinoma variety was the most prevalent one (52.2%) and the second most common type was adenocarcinoma (17.7%). Only 17.2% of the patients presented with the history of any definitive previous anti mitotic treatment.

Conclusion: The majority of the lung cancer patients had a history of smoking and significant percentage of them had additional habit of chewing tobacco. Most prevalent histological type is squamous cell type fol-

lowed by adenocarcinoma, both of which are already proven outcome of cigarette smoking. Bangladesh with its inadequate treatment facilities available for cancer patients must ensure effective implementation of existing anti-tobacco act to reduce the burden of lung cancer, which will contribute to address 15–20% of the total cancer burden of the country.

PS-81779-19 Association between adolescent tobacco use and mental health status

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Introduction: Tobacco use is significantly higher among people with mental health problems than among the general population.

Objective: To investigate whether adolescent tobacco use is associated with their mental health status.

Methods: In a cross-sectional study a representative sample of 4599 students in 3rd grade (age 17 to 19 years) was selected from high schools in Tehran using a stratified cluster random sampling method. A self-administered questionnaire was used consisting of demographic and tobacco use questions, as well as a 12-item General Health Questionnaire (GHQ-12). The chosen cut-off point was a score of 7 because of the high mean score within the population. Association between adolescent GHQ score and tobacco use was assessed using bivariate and multivariate analyses, adjusting for age, gender, number of smoking family members, and smoking of best friends.

Results: Of the students, 1057 (23.2%) achieved a GHQ-12 score above the threshold. Significantly more girls (27.2%) than boys (18.5%) had GHQ-12 scores indicating some psychiatric morbidity. On average, the 19-year-old adolescents reported significantly the most mental health problems of all ($P < 0.001$). After adjusting for confounders, adolescent GHQ scores above 7 were significantly associated with tobacco use (OR = 1.36, 95%CI 1.15–1.61). Smoking among best friends and number of family smoking members were significantly associated with adolescent GHQ scores above 7 (OR = 1.31, 95%CI 5–9 and OR = 1.41 and 1.88, 95%CI 1.17–1.70 and 1.53–2.31 for 1 or 2 smoking members, respectively).

Conclusion: Based on the relationship found between adolescent tobacco use and mental health status, this group is considered vulnerable to psychological disorders and special attention must be given to them, with a focus on females. Targeting mental

health consultation both for students at schools and family members is recommended.

PS-81813-19 Evaluation of the effectiveness of various factors on motivation to quit smoking

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Introduction: Nowadays smoking causes 5.2 million deaths annually in the world of which 70% occurs in developing countries. There are about 10 million smokers in Iran. Motivation to quit smoking is an important factor to predict smoking cessation programs outcomes.

Aims and Objectives: To determine effectiveness of various factors on motivation to quit smoking.

Methods: In a cross-sectional study, data collected amongst a random population sample of 589 smokers in Tehran, in 2006. Our questionnaires were based on WHO and IUATLD questionnaires. The subjects were asked about demographic factors, pack/year, patterns and types of smoking, and motivation to quit smoking.

Results: In this study, 589 smokers participated. 90.2% were male. The mean age of all participants was 38.54 years (SD = ± 15.288). The most frequent age-group was 20–30 year-old. 85.1% of subjects were educated (high school diploma or higher). 58.7% of subjects have had experience of hookah smoking, and 33.6% of them had a regular pattern of hookah smoking. The most common pattern was monthly (28.0%) and 198 cases (33.6%) wanted to quit smoking. The mean of cigarette smoking per day was 17.63 (Min = 1, Max = 45). The mean year of smoking cigarette was 13.51 years (Min = 1, Max = 50). Of all, 349 participants were motivated to quit smoking (59.3%).

Conclusions: Considering the results, we must focus more seriously our tobacco control programs in younger population. They will be more receptive of these efforts.

PS-82027-19 Smoking habit among TB patients

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Introduction: Smoking and tuberculosis are frequently associated; both smoking as well as TB are main causes of the respiratory morbidity in Romania.

Aim: To evaluate TB patient's smoking status, nicotine addiction and knowledge about smoking habits.

Methods: Standard questionnaires were distributed to 100 patients with pulmonary tuberculosis at two months of DOTS; 72 questionnaires were valid; female/male ratio: 33.34% (24)/66.66% (48); average age:

41 years (18 to 57); living area: 61.11% (44) urban, 38.89 (28) rural.

Results: 55.56% (40) smokers, 27.78% (20) non-smokers and 16.66% (12) exsmokers; nicotine addiction: very high 12.6%, high 31%, moderate 42%, low 14.4%; 52% of smoker TB patients had smoker parents, only 33% of nonsmoker patients had smoker parents. 80% of smoker TB patients had a smoking company. All smokers were advised to quit smoking; mostly by the chest physician but 81% of them had tried to quit smoking by themselves. 81.3 of TB patients believe that the tobacco is a drug.

Conclusion: None of the smokers hasn't quit smoking within the first two months of DOTS; all TB patients in our study group know that smoking may increase the risk for lung cancer; 61% of them appreciate as positive the idea of smoking prohibition in pubs, trains and other public places.

PS-82029-19 Prevalence and effects of active and passive smoking exposure on bronchitis symptoms in Irish school children

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Objectives: We examined the effects of smoking (active and passive) on bronchitis symptoms (cough with phlegm) among non-asthmatic Irish children aged 13–15 years, and also estimated prevalence of bronchitis symptoms since 1995 across four independent smoking categories: 1) ever-smokers (current and former smokers) only 2) exposed to second-hand-smoke (SHS) at homes only, 3) exposed to SHS and being ever-smokers, and 4) not exposed at all.

Methods: We used the International Study of Asthma and Allergies in Childhood (ISAAC) protocol. Non-asthmatic children aged 13–15 years were included: 2671 (in 1995), 2168 (in 1998), 2417 (in 2003), and 2423 (in 2007). ISAAC is a cross-sectional self-administered questionnaire survey. 30 representative and randomly selected schools from Ireland took part in all 4 surveys. We merged all 4 surveys into one to examine the association employing multivariable logistic regression modeling, and simultaneously controlling for gender and the year of survey.

Results: Children who smoke and are also exposed to SHS at homes are four and a half times more likely to suffer from bronchitis symptoms (odds ratio [OR], with 95%CI 4.48 [3.62–5.54]); children ever smoking were two-and-half times more likely to suffer (OR: 2.47 [1.94–3.15]); and non smokers exposed to SHS at homes had almost two-fold increased risk of bronchitis symptoms (OR: 1.89 [1.48–2.42]) compared to those who had no exposure. Prevalence (%) of bron-

chitis symptoms for each of the smoking categories are shown in the Table. No significant trends were observed ($P > 0.05$).

Prevalence (%) of bronchitis symptoms

Exposure status	Ever smokers + SHS (%)	Ever smokers only (%)	SHS only (%)	Not exposed (%)
1995	14.9	10.0	6.2	3.5
1998	11.6	7.3	5.7	3.5
2003	16.7	8.1	7.6	4.1
2007	17.7	9.3	8.2	4.4
<i>P</i> trend	<i>P</i> = 0.35	<i>P</i> = 0.86	<i>P</i> = 0.13	<i>P</i> = 0.053

Conclusions: This is the first study in Ireland quantifying the effects of smoking on bronchitis symptoms in a nationally representative non-asthmatic Irish children aged 13–15 years across a 12-year period sample ($n = 9679$). In addition to comprehensive national tobacco control policies, smoke-free policies even at homes should significantly reduce bronchitis symptoms among young Irish school children.

PS-82043-19 Study regarding the evaluation of bronchopulmonary cancer incidence at a pneumology department of M. Nasta Institute

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Setting: Bronchopulmonary cancer is still situated at high levels of incidence in Romania, the mortality concerning males taking the first place.

Aim: The incidence of different histopatological forms of the bronchopulmonar cancer and the presence of smoking in these cases.

Materials and Methods: A retrospective studying on 396 people with bronchopulmonar cancer hospitalized at the Pneumoftiziologie Department of M Nasta Institute in Bucharest between 01.03.2007–01.03.2008.

Results: Most of the cases were males (84%), 61% living in the rural environment. The most of them have between 50–60 years old (42%) and between 60–70 years old (38%). In what concerns the hospitalizing level, the prevalent ones are the IIIB level (39%) and the IV level (33%), being more frequent on the right side. Smoking represents the cause for 75% individuals. The histopatological confirmation was for 35% of the cases 90% of them being confirmed through bronchiatis biopsy prevalent being the epidermoide form 64% and the adenocarcinoma form 27%.

Conclusion: The high frequency concerning the males, the fact that the disease is discovered most of the time pretty late and the association with smoking lead to a high level of mortality.

PS-82300-19 Knowledge of the smoking related risk in a rural Moroccan population

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There is a few data on knowledge of the smoking in rural area despite the fact that smoking prevalence in this area is no longer weak. We aim to study knowledge on smoking risks in a sample of Moroccan population living in rural areas in order to set up the most efficient strategies for the control of tobacco. A cross-sectional study has been performed in a random sample of Moroccan adult individuals stratified by sex, age and residence areas (seven regions of Morocco). Data has been collected in 2005–2006 using a pre-tested questionnaire. Among the 3434 subjects living in rural areas, 16.9% were current smokers and 71.3% were never smokers. In overall 95.9% answered that smoking is harmful to the health (97.3% among never smoker and 89.0% among the current smokers), 90.5% think that the tobacco addiction affects the health of their setting (90.7% among never smoker and 89.1% among the current smokers), 81.7% know the risk of respiratory diseases associated to the tobacco addiction (82.3% among never smoker and 77.4% among the current smokers). In contrast, lower numbers know that smoking is related to other diseases: 69.4% for cardiac diseases (71.0% among never smoker and 63.1% among the current smokers) and 60.6% for cancer (59.7% among never smoker and 62.1% among the current smokers). Although many people partly understand the risks of smoking, they do not have a clear knowledge of the risks of diseases besides respiratory diseases. Education about the risks of smoking is required.

PS-81379-19 A study on tobacco use among youths in Dar es Salaam Region in Tanzania

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Aim: To assess the magnitude of tobacco use among young adults in Dar es Salaam Region, to enable designing of effective tobacco control measures.

Design: The study was carried out using a structured questionnaire survey.

Methods: Three districts of Dar es Salaam Region namely, Ilala, Konondoni and Temeke were surveyed involving 183 young adults.

Results: Out of 183 interviewees, 104 (56.9%) were active smokers, 59 (32.2%) non-smokers and 20 (10.9%) ex-smokers. Smoking rates varied from 52% to 64% in boys and 10% to 32% in girls. Fifty one

percent of all youths started smoking between 15 and 19 years of age and, the youngest take off age was five years (1.1%). Peer pressure (72.6%) was reported to be the most important reason for starting to smoke. Of all interviewees, 77.7% believed that, tobacco advertisement had an influence on youths picking up smoking. Mass media, both print and electronic, was considered the most important channel (24.5%) through which youths knew the hazards of smoking. Seventy seven percent of all interviewees believed that, smoking among youths will increase with time, if serious measures are not taken now.

Conclusion: Education through peer groups and enforcement of the Tobacco Products (Regulation) Act 2003 (TPRA 2003), to enable a total ban on tobacco promotion and advertisement, could help reduce tobacco use among youths in Dar es Salaam Region.

PS-81240-19 Contribution des associations féminines (tontines) dans la prévention du tabagisme au sein des communautés

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Cadre : Le Cameroun qui produit et transforme le tabac a ratifié la Convention Cadre de l'OMS pour la lutte anti tabac qui prévoit un rôle important des associations en matière de prévention. Au Cameroun, le tabagisme concerne 37% de la population globale avec 44,82% de jeunes. L'Association Health Promotion Watch, ayant observé que les femmes camerounaises étaient au centre des décisions en matière de santé des familles a choisi pour partenaire dans le cadre de ce projet pilote, le réseau d'associations féminines (tontines) de la commune de Yaoundé 5 au Cameroun.

Objectif : La réduction de la morbidité et de la mortalité due au tabagisme par l'éducation et la communication.

Méthodologie : Après une analyse situationnelle à travers une enquête et des discussions de groupe, les femmes leaders des associations ont été formées à la connaissance du tabac, aux problèmes associés au tabagisme, aux agissements des cigaretteurs, ainsi qu'aux méthodes de prévention efficaces applicables à leur environnement. Ainsi capacitée, elles jouent le rôle de relais communautaires et pérennisent l'activité de prévention.

Principaux résultats : Les conséquences de l'utilisation du tabac sont peu connues. Il existe un mode de consommation particulier réservé aux femmes, qui introduisent des feuilles de tabac fraîches dans leur vagin pour augmenter le plaisir sexuel masculin.

Conclusions : L'éducation des femmes doit s'intensifier pour les emmener à abandonner les pratiques traditionnelles néfastes à la santé et à adopter des comportements sains comme le refus de la consommation du tabac sous toutes ses formes.

PS-81555-19 High school students' opinion on efforts to control tobacco epidemic

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Background: In Indonesia, prevalence of smoker has increased since the last ten years, although public educations have been done to increase awareness of community about smoking harmful effect. To investigate which tobacco controlling efforts could be effectively and efficiently implemented is needed.

Method: A survey was conducted in four districts in East Java. Ten high schools were selected randomly in each district and as many as 1631 students were recruited as sample. They participated voluntarily in the study.

Results: Prevalence of ever smoked among senior high school students was 32% in both sexes, 36.3% in male students and 27.1% in female students. About 50% students who ever smoked agreed that smoking at public places against the law. Among students who ever smoked as many as 45.3% students agreed to banning cigarettes advertisements and sponsorship. Then, almost 80% (76.6%) students agreed to provide separately smoking and non-smoking area at public places. And, it's about 70% students agreed to opinion about utilization cigarette tax for anti smoking campaign. Furthermore, nearly 72% students agreed to prohibit selling or buying cigarettes for persons under 17 years old.

Conclusion: The most important measure for controlling tobacco epidemic is to conduct immediately a comprehensive tobacco control program, such as providing smoke free area, banning to cigarette advertisements and sponsorship, and utilization cigarette tax for anti smoking campaign.

PS-81506-19 Out of the ashes: a pilot study addressing smoking in a hospital

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Background: The Hutt Valley District Health Board (HVDHB) agreed to a pilot study to examine the merit of applying Systems First, a brief intervention model, to address smoking in a hospital. The pilot study focused on implementing brief smokefree interventions, with a view to seeing if this step was supported in the wards. Two wards agreed to participate in the pilot.

Method: Surveys of the nursing staff were conducted before and after a three-month trial period. Nurses were asked to document smoking status for all patients and provide advice to those who smoke. A patient satisfaction audit was carried out in Ward 1 for one month during the pilot study.

Results: Nurses agreed smoking was an important health issue, the hospital was an appropriate place to discuss smoking and they were mostly confident to discuss smoking with patients. There was no significant change in their attitude after the pilot. However, there was some difficulty getting full participation for the process of documenting all patients for smoking. Forty-two percent of admissions were recorded in Ward 1 and eighteen percent of admissions in Ward 2. Patients in Ward 1 reacted favourably to being asked about smoking and ninety-two percent reported they had been asked.

Conclusion: Four questions arose from the findings.

- Is it appropriate for parents in high stress situations (Ward 2) to be asked about smoking?
- Is it reasonable to generalise evidence from 'patients' to parents?
- Is the requirement to record smoking status a barrier and unrealistic?
- Are we better off asking clinicians to treat smokers rather than asking them to be health promoters?

The usual barriers to brief intervention were apparent. Namely: 'workloads', 'time', 'education' and 'it's not my role'. However, it may be possible to quickly move clinicians into 'treating' smokers. Smokers need to be treated for nicotine withdrawal and must avoid complicating other treatment by continuing to smoke.

PS-81768-19 Leadership development and empowerment in the success of Union-supported BI to reduce tobacco use in China

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Background: Smoking is a significant public health problem in China. 1 in 3 smokers globally is Chinese. Over 50% of the population is exposed to second-hand smoke. 1.2 million die prematurely from tobacco use every year. To support building smoke-free public places and smoke-free Olympic Games, the Union supported 5 round one BI projects in Beijing, Hunan and Zhejiang respectively from July 2007. That is support to revise Beijing Regulations on Banning Smoking in Public Place, mass media campaign, smoke-free environments in Olympic cities, promoting smoke-free TB center and family, and building advocacy capacity among public health workforce.

Methods: Political commitment is enhanced by strengthening leadership development and empowerment. Ban smoking in public place in Beijing has received support from leaders in Legal Office, Mayor's Office, Health Bureau and Patriotic Health Campaign Committee. A leading group was established for the project in Hunan with involvement of the provincial health Bureau. Leading groups in the Olympic cities, such as Tianjin, Shenyang and Qinhuangdao with

multi-sector participation have had regular coordination meetings. The 3 Olympic related projects have a taskforce with frequent meetings to review progress. Leaders in Ministry of Health attached great attention to smoke-free hospital initiative.

Results: Opinion poll showed over 70% support ban smoking in public place. To revise the Regulations on Banning Smoking in Public Place is on the agenda of Beijing Legal Office. It will be effective by the next People's Congress in February 2009. An interim legislation as 'Mayor's Order' will be issued within and effective from 31 May 2008. Mass media campaign launched in Beijing bus TV. 800 hospitals nationwide have been smoke-free hospital. Ban smoking in public places have been much more facilitated.

Conclusions: Leadership development and empowerment is crucial in the success of BI to reduce tobacco use in China.

PS-81775-19 Smoke-free regulation in university and workplace in Central Java, Indonesia: when and how should it be started

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Background: Indonesia is the 6th highest tobacco consumption in the world, with around 138 billion cigarettes consumption annually (ITCN, 2007). Willingness to smoke has been increasing higher in youth population than it in older population. Such youth groups often have less access to health care and other resources. The result is a health disparity or a disproportionate occurrence of tobacco-related death and disease.

Objectives: This paper reports on findings from a recent study undertaken among youth urban Central Java. The study seeks to identify factors needed for derive practical policy in order to establish youth health services and smoke-free regulation in campuses and workplaces.

Methods: Involving a total 2000 sample derived from youth population aged 18–24 years old. 1000 samples were each randomly selected from working youth factory employers and university students. Social learning and health system theories were applied to underlying the conceptual framework of the study.

Results: Study found that smoking prevalence among youth 18–24 years old is 18.6%, whereas prevalence rate among male is higher (54.6%) than female (2.6%). Variables such as locus of control, religiosity, general lifestyle, self esteem and parental monitoring are strongly correlated with smoking behavior among youth ($P < 0.05$). Future policy formulation should address regulation and provision of services for youth in order to improve their life skill capacity to prevent

them start smoking and protecting them from being as 2nd hand smokers.

PS-81952-19 Investigation and analysis of smoking and awareness of TB service providers and TB patient in China

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Setting: China is one of 22 tuberculosis high burden countries in the world. China is also the largest tobacco consumer in the world. However, health education and intervention of the tobacco control have not yet closely integrated into the TB control and prevention system in China. We will involve the smoking control strategy to TB centers and families by the project of the Bloomberg Global Initiative to Reduce Tobacco Use.

Aim: To learn the smoking status and awareness on smoking of health staff and TB patients, to implement interventions in order to reduce tobacco use and improve lung health.

Methods: The project has been implemented in 7 prefecture and 75 county TB control institutes with 32 million population in Hunan province. The project investigated the smoking status and awareness on smoking of the health staff, TB suspects/cases and family members, implemented face-to-face health education and promotion activities, including pasting tobacco control sign, training health staff at each level.

Results: Among 2353 health staff investigated, 1357 (57.7%) did not smoke, 497 (21.1%) seldom smoked, 373 (15.8%) often smoked and 126 (5.3%) stopped smoking; 2287 (97.2%) knew active and passive smoking is harmful. Among 2969 TB suspects, cases and family members surveyed, 1347 (45.36%) did not smoke, 1116 (37.6%) smoked, 506 (1.9%) stopped smoking; 2434 (81.9%) knew active and passive smoking is harmful.

Conclusion: Smoking status and awareness on smoking of health staff and TB cases have been acquired. The awareness of smoking is harmful in health staff is higher than that in TB patients, the stop smoking rate of health staff is higher than the TB patients through intervention activities. The tobacco control activities of health staff and TB cases can be improved actively by developing project objective, training relevant staff and implementing health promotion activities abroad.

PS-82488-19 Analyse de la consommation tabagique au sein de la population Algérienne âgée de 35 à 70 ans

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Le projet Tahina : Transition épidémiologique et impact sur la santé en Afrique du Nord est un projet de recherche financé par l'union Européenne dans le cadre du programme 'INCO', volet Incomed. Afin d'asseoir la ou les stratégies d'interventions contre les maladies non transmissibles et les facteurs de risque de ces maladies, une enquête transversale auprès d'un échantillon représentatif de la population Algérienne a été réalisée en 2005 et comporte dans sa partie facteurs de risque, les habitudes tabagiques. Pour cet aspect l'analyse a porté sur les données recueillies par interview de 4818 personnes âgées de 35 à 70 ans. Sont abordées les consommations actuelles et passées du tabac fumée et du tabac sans fumée.

La fréquence du tabagisme est la suivante :

- Tabac fumé : 11,22% en consomment actuellement, avec prédominance masculine nette (26,4% vs 0,43%). Prédominance dans la tranche d'âge 40-44 ans (13,61%). Pas de différence de consommation selon le milieu (11,55% en milieu rural vs 10,64 en milieu urbain). Différence notable selon les régions. Dans 94,81% des cas, la consommation est quotidienne. L'âge moyen de début est 19,13 ans. La consommation moyenne est 14,77 cigarettes par jour. L'âge moyen au sevrage est 36,32 ans.
- Tabac sans fumée : représenté essentiellement par le tabac à chiquer. 9,48% en consomment actuellement avec prédominance masculine nette (21,44% vs 1,08%). La consommation augmente avec l'âge et plus importante en milieu rural qu'en milieu urbain. La consommation est quotidienne dans 95,85% des cas.

Cette analyse montre que même dans cette tranche d'âge où d'habitude les personnes arrêtent de fumer nous notons une fréquence importante aussi bien pour le tabac fumé que sans fumée.

Dans les stratégies de lutte contre les maladies non transmissibles l'un des points les plus importants à envisager est la prévention primaire portant sur le changement comportemental et la lutte anti-tabagique en constitue l'un des axes primordiaux.

CLINICAL RESEARCH, TREATMENT AND CARE: OTHER

PS-81724-19 Enhancing quality in diagnosing smear-negative pulmonary TB cases: the tuberculosis diagnosis committee

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Introduction: To improve quality of diagnosis of smear-negative PTB cases, a TBDC was established at the provincial or city level. The TBDC is chaired by the National Tuberculosis Program (NTP) Medical Coordinator with the following as members: radiologist, clinician or internists or pulmonologist and the NTP nurse coordinator as the Secretariat. The task is to review all smear (-) TB cases with shadows suggestive of TB on x-ray to reduce the level of over-diagnosis and over-treatment and ensure that active cases of smear (-) PTB are detected and are provided appropriate anti-TB treatment.

Objectives: Determine the proportion classified as having active TB and recommended for treatment among smear (-) PTB cases with shadows suggestive of TB referred for review.

Methodology: Data from 15 TBDCs for 2007 were collected and analyzed as to the total number of patients with shadows suggestive of TB reviewed, the number with active TB recommended for treatment and the number classified as having other lung disease.

Results: Of the total of 4189 patients referred to the TBDC for review, 63.2% were classified as active TB and were recommended for TB treatment, 22.3% inactive TB and 14.5% with other lung disease. The percentage classified as active TB ranged from 33.6% to 86.6% with a standard deviation of 12.3%. Recommended for treatment was 60-69% for 9 of the 15 TBDCs and 70% and above for 2 TBDCs.

Conclusion: The TBDC is an effective mechanism to ensure quality in the diagnosis of smear (-) TB cases.

PS-81819-19 Assessment of tuberculosis research trends by bibliometric analysis

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Introduction: To examine the quantity and quality of research produced in the area of tuberculosis around the world by the bibliometric analysis.

Methods: Documents were based on the database of the SCI retrieved from the ISI Web of Science, Philadelphia, PA, US. All publications listed in this database from 1991 to 2006 that had 'tuberculosis' in title, abstract, and keywords were downloaded. Names of

authors, contact address, title, author keywords, keyword plus, year of publication, and name of journal publishing the article were analyzed.

Results: A total of 39 489 publications met the criteria of selection. Fifteen document types were found. The article was the most frequently used document type comprising 75% (29 618) of the total production. The predominant language for journal articles was English (94%) followed distantly by French (3%). The number of articles increased from 918 in 1991 to 2909 in 2006. There were totally 2493 journals listed in the 167 subject category. The publication quantities in microbiology, biochemistry and molecular biology had a significant growth in the period of 1991–2006. On the contrary, a decrease of publications appeared in the general and internal medicine category. Of all the 29 404 articles with author address information, 23 220 (79%) articles were independent publications and 6184 (21%) were international collaborative publications, with most articles originating from US (9501, 32%), UK (3700, 19%), France (2168, 7.4%), and India (2050, 7.0%).

Conclusions: This bibliometric method can help relevant researchers realize the panorama of global tuberculosis research, and establish the further research direction.

PS-81853-19 Tuberculosis symptom screening in young children in a TB vaccine trial setting in South Africa

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Background: Symptom screening is common practice in TB prevalence studies. However, this tool requires validation in the setting of infant TB vaccine trials.

Objective: To determine the predictive value of a TB symptom screening questionnaire in the diagnosis of pulmonary TB in children younger than 2 years old.

Methods: A prospective study to determine the impact of surveillance method on TB incidence amongst BCG-vaccinated newborns in Worcester is being conducted. Children randomized to the active surveillance group are visited 3 monthly by trained community healthcare workers for follow-up and the care-givers are interviewed about the children's health status. Children who had at least one possible TB symptom were admitted to a case-verification ward for investigation of TB. The diagnosis is based on finding a positive mycobacterial culture in gastric washings or in-

duced sputum; or on CXR abnormalities consistent with TB in combination with suggestive symptoms, positive Mantoux or an AFB positive smear. The association between TB diagnosis and the components of the questionnaire was determined.

Results: Of the cohort of 2393 participants 388 were admitted to the case verification ward but 15 were excluded because of incomplete data. 158 of the eligible 373 children (42%) were diagnosed with TB. The calculated positive predictive values of screening symptoms were as follows: persistent cough of at least 2 weeks duration 43%, fever 54%, loss of weight 51%, night sweats 40%, loss of appetite 58%, positive contact 43%. The combination of positive contact and cough had a positive predictive value of 43%. Other combinations of symptoms had lower predictive values. No participants had all screening symptoms present.

Conclusion: As a screening instrument, the TB screening questionnaire has a good positive predictive value in this population and setting.

PS-81865-19 Significance of the antigen-specific of IFN- γ response in vitro for treatment monitoring of TB adolescents

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Setting: It is known that interferon-gamma (IFN- γ) is essential for protective immunity to tuberculosis (TB).

Objectives and methods: We used in house developed assay, which measures IFN- γ cell response to *M. tuberculosis* antigens (tuberculin PPD and specific early secretory protein ESAT-6) in whole blood samples to study it in different groups of adolescent TB patients and to evaluate IFN- γ response during the treatment in patients with severe pulmonary tuberculosis.

In two groups of adolescent patients with advanced pulmonary tuberculosis (39 patients with *M. tuberculosis* positive sputum samples, Group A; 22 patients with TB limited to one segment of lung with negative *M. tuberculosis* sputum, Group B), IFN- γ responses to TB antigens (PPD and ESAT-6) in vitro have been studied.

Results: In Group A, IFN- γ response to PPD and ESAT-6 in whole blood was significantly lower than in Group B ($P < 0.01$). Among 29 TB patients from Group A with lower IFN- γ response, 19 patients clinically improved after 2 months of treatment, and this was associated with significantly increase in IFN- γ response to both TB antigens, $P < 0.01$. However, in 10 residuary patients from this group with no clinical improvement after 2 months of treatment, increase in IFN- γ response to PPD was lesser marked ($P < 0.05$), and no reliable increase of IFN- γ response to ESAT-6 was observed.

Conclusion: We conclude that IFN- γ response to TB antigens decreases during severe pulmonary TB and the positive clinical dynamics is accompanied by increase in IFN- γ response to TB antigens. It may be used for monitoring of TB treatment.

PS-81897-19 Profile of patients with lymphocytic predominant exudative pleural effusion at Philippine General Hospital

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Background: The Philippines ranks 9th among 22 high tuberculosis burden countries. In this high TB burden setting, is lymphocytic predominant exudative pleural effusion be secondary to tuberculosis? This study aims to determine the demographic data and etiologies of lymphocytic predominant pleural effusion among patients admitted at the Philippine General Hospital (PGH).

Methods: A retrospective, descriptive study was carried out at the Philippine General Hospital from March 2007 to February 2008. Medical Records of patients admitted with pleural effusion and were referred to the Section of Pulmonary Medicine were reviewed. Patients with lymphocytic exudative effusion were included in the study.

Measurements and Results: A total of 40 patients with lymphocytic predominant exudative effusion was included in the study with mean age (\pm SD) of 55.8 (\pm 16.8) years, 21 (53%) were males and 19 (48%) were females. Majority of patients was more than 50 years old ($n = 24$; 60%). The effusion was located on the right in ($n = 21$) 53% of patients, on the left side in ($n = 18$) 45% of patients, and bilateral in ($n = 1$) 2% of patients. Malignancy was the most frequent cause of pleural effusion ($n = 28$; 70%), while tuberculous pleurisy was the cause of pleural effusion in ($n = 12$; 30%) of our patients.

Conclusion: Our results demonstrate that malignancy is the most frequent cause of lymphocytic pleural exudate in our setting, an area with high incidence of tuberculosis.

PS-81899-19 Comparing Costa's criteria and Light's criteria in separating pleural effusion into exudate and transudate

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Aim: The criteria established by Light and colleague in separating pleural fluid into transudate and exudate has been widely used for more than three decades. This study aims to compare the sensitivity and specificity

of the Costa's criteria and Light's criteria in separating pleural fluid into transudate and exudate.

Design: This is a prospective study involving thirty six adult patients referred to the Section of Pulmonary Medicine, University of the Philippines, Philippine General Hospital for diagnostic or therapeutic thoracentesis.

Methods: Pleural fluid was submitted for total protein, lactate dehydrogenase, and cholesterol. Simultaneous blood extraction for serum total protein and lactate dehydrogenase was also done. The pleural fluid was labeled exudate if it satisfied at least one of the Light's criteria. It was considered exudate with Costa's criteria if pleural fluid cholesterol is >45 mg/dL and lactate dehydrogenase >200 IU/L.

Results: The sensitivity of Costa's criteria is 73% while its specificity is 100% as compared to the Light's criteria in identifying pleural fluid as exudate or transudate as shown in the table below.

Analysis 1 of 1		TARGET DISORDER		95% Confidence Intervals
		LIGHT'S		
		Present	Absent	
TEST	Positive	22	0	
		a	b	
COSTA'S	Negative	8	6	
		c	d	
SENSITIVITY		a / (a+c)		73 %
SPECIFICITY		d / (b+d)		100 %
Pre-test Probability ("Prevalence")		(a+c)/(a+b+c+d)		83 %
Positive Predictive Value:		a / (a+b)		100 %
Negative Predictive Value:		d / (c+d)		43 %
LIKELIHOOD RATIO +		sens / (1 - spec)		
LIKELIHOOD RATIO -		(1 - sens) / spec		0.27
				0.15 to 0.48

Conclusion: Costa's criteria, although less sensitive, it is equally specific with Light's criteria in separating pleural fluid into exudate or transudate.

PS-81998-19 Self-reported COPD: spirometric validation in a resource-limited country

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Background: In Pakistan the standard of care often provided to patients is largely determined by their ability to pay for the medical services. Frequently patients are given clinical diagnosis without confirmatory testing due to financial constraints.

Objectives: To validate self-reported diagnosis of Chronic Obstructive Pulmonary Disease using spirometric criteria among the local population.

Methods: Patients referred to our pulmonary function laboratory were asked about the presence of any known lung disease prior to undergoing pulmonary function testing. Our laboratory operates an open access policy for all physicians, and thus receives referrals from a variety of sources. Forced spirometry was performed according to ERS/ATS guidelines. Presence of airflow obstruction was defined as pre-bronchodilator FEV₁/FVC ratio ≤ 70 .

PS-82008-19 Rapid growing mycobacteria involved in outbreaks in Brazil: molecular and drug susceptibility investigation

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Rapidly growing mycobacteria (RGM) can cause a wide spectrum of disseminated or localized diseases, especially pulmonary and soft tissue infections. In last years infections due to contaminated materials and invasive procedures have been also increasingly reported. A recent outbreak of infections affecting more than 1100 patients submitted to different invasive procedures in Brazil underscores this issue. Of the RGM, members of the *M. abscessus* group are the most pathogenic and antimicrobial resistant. Even with multiple drug combinations, multiresistant RGM infections may be difficult to cure. In this study we describe the molecular identification, typing and in vitro susceptibilities to antimicrobial agents of RGM involved in recent infections in Brazil. The study was carried out in two groups of isolates: One group recovered from patients involved in recent outbreaks (statistically representative samples) and a second group recovered from patients associated to sporadic infections. *hsp65* and *rpoB* gene sequencing was used for discrimination between species of *M. abscessus* group. All isolates from surgical patients presented highest similarities with the corresponding sequences of *M. massiliense*. Eight mesotherapy and 7 pulmonary associated infections were in the same way identified as *M. bolletii* and *M. abscessus*. Molecular typing by PFGE grouped all surgical isolates, while mesotherapy and pulmonary isolates presented different PFGE patterns. Broth microdilution MICs of 13 antimicrobial agents were determined for these clinical isolates. Our results showed that the isolates drug resistance differed markedly by PFGE pattern. The resistance rates of these isolates to the currently available agents were remarkably high. Clarithromycin was active against nearly all RGM. The majority of *M. massiliense* isolates were susceptible to moxifloxacin, gatifloxacin and minocycline (>90%) and moderately sensitive to linezolid.

PS-82030-19 Diagnostic delay for new extra-pulmonary tuberculosis cases in the Russian Federation

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Background: The process of diagnosis of extra-pulmonary TB (EPTB) is problematic in the Russian Federation due to an insufficient number of specialists and a lack of comprehensive guidelines, and can result in diagnostic delay (DD).

Methods: Uni- and multivariable analysis of adult (>17 years) new TB cases, including 17 324 EPTB cases (9.3%) in comparison with 169 217 PTB cases. We examined 2001–2005 national TB data, covering all new TB cases notified in 29 regions, representing all Russian geographic areas. Diagnostic delay (DD) was defined as the time period between a case's first visit to any medical facility and the date of diagnosis confirmed by the TB service. The proportion of new EPTB cases with a DD >1 month was defined as a specific indicator (DD1M).

Results: DD1M for EPTB cases was higher than for PTB (64.6% vs 51.8%; OR = 1.7; 95%CI 1.6–1.8). The median DD for EPTB exceeded 42 days (25–75% quartile 19–80) for TB pleurisy, 49 days (17–104) for bone and joints, 52 days (23–105) for urogenital TB, and 61 days (30–98) for ocular TB, in comparison with 31 days (10–73) for PTB. DD1M for EPTB did not differ by age and gender groups, social/occupation status, and classification as homeless or alcohol abuser; however, DD1M was higher for cases from urban locales (OR = 1.2; 95%CI 1.1–1.3) and less for cases with a prison history (OR = 0.7; 95%CI 0.6–0.9). DD1M was less likely for EPTB cases detected in Primary Health Care (PHC) facilities (OR = 0.8; 95%CI 0.7–0.9) and more likely for EPTB cases detected in the TB service and PHC hospitals (OR = 1.2; 95%CI 1.1–1.3). These findings reflect that a confirmation of diagnosis in more qualified TB service facilities often concludes a long diagnostic process in less qualified PHC institutions.

Conclusion: DD for EPTB is influenced more by organization and diagnostic capacity of TB control activities than by TB patients' characteristics. The influences of all of these factors should be studied separately.

PS-82034-19 Analysis of active TB detection based on case-finding data from Orel oblast, Russia

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Background: Effectiveness and efficiency of TB detection depends not only on the proper use of active detection and passive detection approaches, but also on comprehensive definitions and correct recording and reporting. Being a resource-intensive activity, active detection in particular needs evaluation in these regards.

Objectives: To evaluate: 1) the number of patients having one or more of 9 clinical symptoms suggesting TB at the time of detection by radiology methods (fluorography, digital fluorography, conventional roentgenography), compared with the number of patients passively detected; 2) the number of new TB patients registered as actively detected who were self-referred or hospitalized in a primary care facility with or without TB-related symptoms, and thus could be considered as actually having been passively detected.

Methods: In- and out-patient cards of 100 actively detected (cases) and 106 passively detected (controls) TB patients from Orel oblast were analyzed. The enrolled subjects represent 54% of the new pulmonary TB cases detected in the region in 2005.

Results: The two categories of TB patients (cases and controls) had 1–3 TB related symptoms in 39.1% and 32.1% of subjects ($P > 0.01$); 1–5 symptoms in 55% and 67% of subjects ($P < 0.05$); and at least 1 symptom in 50.0% and 98.1% of subjects ($P < 0.001$), respectively. As many as 42.5% (95%CI 31.7%–54.0%) of cases possessed signs of passive detection; among them, 26.5% were hospitalized (95%CI 13.5%–44.7%) and 73.5% were self-referred (55.3%–86.5%).

Conclusions: A substantial fraction of subjects included in analysis and registered as actively detected had symptoms suggesting TB at the time of detection, thus presenting the possibility of actually having been detected passively, provided that primary care services are accessible and capable of detecting TB. The study also questions the accuracy of registration of active detection and presents the need to specify its definition in Russia.

PS-82054-19 Active TB disease among smear negative TB suspects presented to TB diagnostic committee

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Background and objective: This is a descriptive study on the occurrence of active TB disease among SM– TB suspects that were presented in TBDC. TBDC is

composed of radiologist, internist, infectious disease, pulmonologist and nurse. Each patient was comprehensively reviewed by the committee with the discussion, reviewing of treatment history, physical assessment, evaluation, symptoms consideration, and using comparative radiographic study. These were patients screened from January 2007–December 2007 in the Programmatic Management of DR-TB Project at the Makati Medical Center DOTS Clinic, Philippines.

Methodology: Of 1147 TB suspects who underwent symptom screening, chest X-ray and sputum examination, 664 (58%) were SM–. 387 (58%) were presented to TBDC and after meticulous deliberation, patients were diagnosed to have active TB disease and recommended to undergo anti-tuberculosis treatment.

Results: 226 (34%) among SM– TB suspects were new patients and 438 (66%) had a history of TB treatment. Among new TB suspects, 117 (52%) of them was presented to TBDC. 78 (64.5%) considered to have active TB disease but only 2 (2.6%) among with treatment recommendation turned out to be culture positive (TBC+). Among those with a history of TB treatment, 270 (62%) of them was presented to TBDC. 59 (15%) were considered to have active TB disease but only 5 (8.5%) of them turned out to be TBC+. Also, there is 3 (5.1%) become TBC+ among inactive (2) and undetermined activity (1).

	Smear negative	Smear negative	Culture negative	Culture negative	Culture positive	Culture positive	Culture pending	Culture pending
	No treatment history	With treatment history	No treatment history	With treatment history	No treatment history	With treatment history	No treatment history	With treatment history
Radiographic findings/treatment recommendation								
Active TB (recommended for treatment)	78 (56.9%)	59 (43.1%)	73 (93.6%)	52 (88.1%)	2 (2.6%)	5 (8.5%)	3 (3.8%)	2 (3.4%)
Normal, inactive, undetermined activity (no treatment recommendation)	39 (15.6%)	211 (84.4%)	34 (87.2%)	203 (96.2%)	0 (0%)	3 (1.4%)	5 (12.8%)	5 (2.4%)

Conclusion: Overall, anti-tuberculosis treatment was recommended in 137 (35.4%) SM– TB suspects with or without previous anti-tuberculosis treatment and there is 7 (5.1%) turned out to be TBC+ among the cases. There is 3 (1.4%) among TB susp diagnosed having inactive TB disease found to be TBC+. Truly SM– results of course, do not preclude TB disease, but there are still occurrence of active TB disease among SM– TB suspects as supported with radiographic findings. It is substantial to evaluate and treat active TB cases with SM– results. This will help to avoid the adverse consequences that might result from withholding treatment in patients with the disease or introducing treatment in patients without disease.

PS-82059-19 Requirements for multi-based data management systems for research

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Introduction: A well designed and managed database is essential in clinical research and therefore thorough database planning and design is required.

Aim and Methods: To investigate and document the challenges for a data team during planning of clinical research studies.

Results: The main challenges identified were:

- a) Data team is not included during the planning of the proposal resulting in:
 - i) Scope of study not clearly defined and database requirements changing
 - ii) Database development resources (human and equipment) not catered for
 - iii) Ethical aspects for database development unclear.
- b) The decision to develop a data system vs a study management tool is not clearly defined, resulting in:
 - i) Database requirements change during the study
 - ii) Data forms do not cater for the management of the study.
- c) Not enough time allocated to develop a Data Management Plan resulting in:
 - i) Recruitment in longitudinal studies starts before preparations for follow-up visits are in place
 - ii) Management processes to trigger follow up visits and process reports are not kept separate from the data required for outcome analysis.

Recommendation:

- a) More time should be allocated to develop the database and data management plan including process management which will lead to the collection of standard, secure and complete data with a management system.
- b) Scope of the project and documentation to be used for data collection should be approved by the principle investigators before development begins in order to eliminate misunderstanding between the clinical team and the data team.

PS-82119-19 Rehabilitation programme and quality of life in COPD patients

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Setting: The main goals of pulmonary rehabilitation in COPD are to maximize the functions of daily living and the learning of skills, which can be used to control the physical situation, to enhance quality of life (QoL).

Aim: To compare outcomes between a home-based

rehabilitation program and a clinically based physical and kinetic therapy program.

Subjects: 96 subjects with COPD were randomly assigned to a clinic treatment group ($n = 46$; 61% male, 39% female; mean age [\pm SD] = 47 ± 10 years) or a home exercise group ($n = 48$, 71% male, 29% female; mean age [\pm SD] = 52 ± 9 years).

Methods: Subjects in the clinic treatment group received supervised exercise and a home exercise program over a 6-week period. Subjects in the home exercise group received the same home exercise program initially, reinforced at a clinic visit 2 weeks later. Measured outcomes were the distance walked in 6 minutes (6MWD) and the generic QoL scale SF-MOS (Short Form Medical Outcomes Study). Differences parameter values between groups were tested by Kruskal-Wallis, ANOVA and χ^2 tests.

Results: Both groups showed clinically and statistically significant improvements in 6-minute walk distances and SF-MOS scores at 6 weeks; improvements were still evident in both groups at 8 weeks. By 6 weeks, SF-MOS scores had improved by 48% in the clinic treatment group and by 23% in the home exercise group. 6 MWD had improved about 27% in both groups. At 3 months, both groups were substantially and about equally improved over baseline measurements.

Conclusions: Although both groups improved by 6 weeks, subjects in the clinic treatment group achieved about twice as much improvement in SF-MOS scores than subjects who performed similar unsupervised exercises at home. The results indicate that a home exercise program for patients with COPD provides important benefits. Subjects in the clinic treatment group were more satisfied with the overall outcome compared with subjects in the home exercise group.

PS-82206-19 Availability of DST results to clinicians between paper and the e-Chasqui laboratory information system

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Background: Communicating test results between TB laboratories and multiple health establishments can be complicated; technologies can facilitate timely transfer to improve patient care. In Peru acutely ill TB patients are taken to hospitals where first-line drug susceptibility tests (DSTs) may be ordered. Most patients are discharged with referral to a health center (HC) before results arrive at the hospital. These results are rarely forwarded to the treating HC.

Objective: To compare the number of hospital-ordered DSTs that are received at the patient's treating HC with the current paper system and the e-Chasqui laboratory information system.

Methods: A query was performed in e-Chasqui for all DST results ordered at one of four public hospitals in Lima between July 1, 2005 and Dec. 31, 2006 where the patient had a second test request from a HC. 328 DSTs were found in e-Chasqui and of those 269 were for patients who attended HCs, 185 for HCs using e-Chasqui (Intervention) and 84 for HCs without e-Chasqui (Control). All HCs that had a patient with a hospital-ordered DST were visited. The clinical staff was asked if the patient was being treated at the HC and the patient's chart was reviewed for the presence of the paper DST result. For electronic access, the user logs of e-Chasqui were queried to determine which DST results were viewed by the HC personnel and the District Director who had electronic access in both intervention and control HCs.

Results: For paper DST results, control and intervention HCs received less than 47% (39/84) of hospital-ordered DSTs for patients attending their HC. In e-Chasqui, however, 94% (174/185) of DST results were viewed by the intervention HCs. The district director accessed the control and intervention HCs' DSTs approximately the same amount.

	Intervention HCs (<i>n</i> = 185)	Control HCs (<i>n</i> = 84)
Paper DST found at HC	40.5% (75)	46.4% (39)
DST accessed by HC in e-Chasqui	94.1% (174)	N/A
DST accessed by District Director in e-Chasqui	27.0% (50)	25.0% (21)

Conclusions: A web-based laboratory information system can provide key clinical data to decision makers otherwise unavailable in a paper system.

PS-82268-19 A comparative skin test study using Russian and Danish PPD RT23 tuberculin

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Settings: The Central Tuberculosis Dispensary and Dispensary no. 1, St. Petersburg, Russia.

Objectives: To compare induration and rubor (erythema) for Russian and Danish PPD RT23 tuberculin in a pilot study.

Study subjects and methods: Healthcare workers (47, females) were tested comparatively by double-blind skin test with Russian and Danish PPD RT23 tuberculin. The tuberculin was injected simultaneously on the right and left arm. Induration and rubor were

measured after 72 h by 3 qualified persons independently. Non-parametric, Kruskal-Wallis test was used for comparison between the tuberculin. Additionally, the results were analysed for each arm separately for detection of possible differences between right and left arm.

Results: There were no significant differences between Danish and Russian tuberculin in induration nor rubor on either the left arm (*P* value = 0.89 and 0.65 respectively) or the right arm (*P* value = 0.10 and 0.12). However significant differences were found between the left and right arm for induration and rubor (*P* = 0.01 and 0.05) using the Russian tuberculin and for the induration (*P* = 0.02) when using the Danish tuberculin. The larger indurations were on the left arm. The mean induration was 13.5 mm and 9.6 mm (left/right arm) in those tested with the Russian tuberculin and 20 mm and 17.7 mm (left/right arm) in those tested with the Danish tuberculin. There were significant differences between physicians, nurses and other healthcare workers. Nurses had the largest indurations (mean value 15.7 mm and 14.3 mm with the Russian and Danish tuberculin, respectively).

Conclusion: There were no significant differences for induration nor rubor between Danish and Russian tuberculin. The largest indurations were observed on the left arm and in nurses compared with other healthcare professionals.

PS-82331-19 TB data standards can aid in the acceleration of TB drug development

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Aim: Improving the efficiency of Tuberculosis (TB) healthcare and drug development is essential to the fight against TB. The ability to easily aggregate clinical data across research projects, and reuse healthcare and surveillance data is a global priority as new strains of TB become ever more resistant to existing treatments.

Design: To develop and implement a methodology to develop a process for consensus to create TB data standards that would reduce duplication and improve efficiencies in data collection and sharing.

Methods: We followed the ANSI standards development process that promotes the engagement of key expert stakeholders to develop the clinical content standards. Contributing organizations include: Aeras Global TB Vaccine Foundation, CDC, CDISC, Duke University, FIND Diagnostics, Global Alliance for TB Drug Development, HL7, National Institutes of Health (NCI, NHLBI, NIAID), Otsuka, Sequella, Tibotec, and others.

Results: A number of artifacts have been developed that describe and document the TB domain including

91 data elements and over 300 permissible values vetted via public comment.

Conclusion: The contributions of global TB clinicians, researcher and surveillance communities have led to the success in testing the methodology to create TB data standards. The stakeholders now need to examine critical questions surrounding issues regarding long term maintenance of the data standards, governance, and stewardship. We are developing a strategy to sustain the products so they will be useful in coming years during which the need to accelerate research is crucial to the fight against TB.

PS-82433-19 Smear conversion of sputum samples from patients with pulmonary TB

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Introduction: The TB programme aims to identify 80% of people who have TB and to cure them at the first attempt. Despite concerted efforts, control of tuberculosis poses a major challenge.

Aim: The aim of this study was to establish the percentage of smear conversion of sputum samples submitted for microscopy at the NHLS, Mycobacterium Referral Laboratory, Braamfontein, South Africa and to establish the effectiveness of the South African TB programme.

Method: This is a retrospective study taken from a sample of 1000 sputum specimen submitted for microscopy in 2007. Auramine fluorescent staining was the method used for staining.

Results: Of the specimen received there were 80 patients positive for acid fast bacilli by microscopy. 26 of these (32.5%) converted to smear negative. 24 of which converted within two months while the other two only converted after 5 months. 8 of the 80 patients (10%) remained smear positive. Of these 3 patients sputa were submitted for TB culture and susceptibility. 2 were found to be multidrug resistant and 1 was susceptible to INH and rifampicin. 46 of the smear positive patients (57.5%) had no follow up specimen.

Conclusion: A major challenge for the South African National TB Programme is the follow up and tracing of defaulting patients. A second important factor is to submit specimen from persistently smear positive patients for culture and susceptibility testing.

PS-82474-19 Steps to initiate action research for integrated HIV care for PLHIV with tuberculosis in Harare, Zimbabwe

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Aims:

- To reduce the burden of TB and HIV for individuals and communities.

- To strengthen integration of holistic care for PLHIVs into general health services.
- To assess the feasibility of delivering integrated HIV care for TB patients living with HIV/AIDS.
- To implement and continuously evaluate IHC (learning by doing) in the local authority governed health setup.

Design: The IHC in Zimbabwe was designed in 2005 and activities were started in September 2007 with a preparation phase of six months during which i) a pilot site was identified, ii) a coordinator and support personnel were recruited, iii) procurement of initial equipment, drugs and laboratory consumables was finalised, iv) national HIV counselling and testing policy were reviewed to ensure coherence with IHC approach and v) a contract between the collaborating parties was negotiated and signed.

Methods: Despite the national policy on collaborative TB-HIV services, as enunciated in the NTP manual of 2006, the health system in Harare, and generally in Zimbabwe, has continued to manage HIV positive patients with tuberculosis in a non integrated fashion. At the Ministry of Health and Child Welfare level, NTP and NACP have one Director but at the operational level, where the programs are presumed to function in a comprehensive primary health care setting, middle level managers that coordinate the programmes and services do not operate in a coordinated manner. The City Health Department of Harare launched Integrated HIV Care (IHC) for Tuberculosis Patients with HIV with The Union.

Conclusion: The experiences gathered during the early phase of the activity have shown that a lead time of approximately eight months from anticipation of availability of funding to supply of essential consumables and starting of patient recruitment was required. The steps required to start collaborative TB-HIV activities will be described and lessons learned explored.

ABSTRACT PRESENTATIONS MONDAY 20 OCTOBER 2008

THEMATIC SLIDE PRESENTATIONS

EPIDEMIOLOGY AND PROGRAMME EVALUATION

TS-81223-20 Projection of the number of tuberculosis cases in The Netherlands in 2030

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Aim: To estimate the number of tuberculosis (TB) cases in 2030 with the purpose of planning future TB control.

Design: Statistical modeling for 5-years groups up to 2030.

Methods: The number of Dutch TB cases infected by a Dutch source was estimated using a survival model. The number of non-Dutch patients was estimated by calculating the proportion of culture-positive patients among first-generation immigrants in 2005 and to project this proportion on the estimated non-Dutch populations. We assumed that every non-Dutch TB patient would cause one infection in the Dutch population.

Results: The number of TB cases was 1264 in 1995 and may decline to 877 in 2030. After 2010 there is a limited decrease in the number of TB patients because of an increase of non-Dutch TB cases. This increase superseded the decrease of Dutch TB patients infected by a Dutch source. In 2030, 85% of all TB cases are expected to be non-Dutch. In the 4 largest counties and the rest of The Netherlands, this will be 89% and 76%, respectively.

Conclusion: The decrease in TB-incidence observed since many years may halt from 2010 onwards because of an increase of non-Dutch patients. Interventions to reduce TB-infection in first-generation immigrants will contribute to a further decrease in TB incidence in The Netherlands. These interventions might include strengthening of TB-control in the country of origin, and new diagnostics to assess TB-infection in new immigrants with subsequent treatment. Future TB-control efforts in The Netherlands must be organized in a flexible way to be able to incorporate changing epidemiological situations.

TS-81964-20 Health systems in sub-Saharan Africa: an impediment to quality tuberculosis control services

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Aim: To improve the quality of care using standard quality improvement frameworks.

Design: Interventional, descriptive, exploratory and quasi-experimental studies were conducted in Kenya, Malawi, Uganda and Zambia over a period of three years.

Methods: Mainly based on the Performance Improvement Approach (PIA) and the Plan, Do, Study Act (PDSA) of the Quality Assurance triangle; Evaluation of activities used record reviews, observations, in-depth interviews and focus group discussions.

Results: Countries demonstrated tangible improvements in performance in intervention districts. Examples: Kenya: reduced defaulter rate from 11% to 6% and increased diagnostic testing and counseling from 30% to 75%; Uganda testing of TB patients for HIV rose from 30% to 70% in six months; Malawi increased counseling and testing of TB patients for HIV from 0 to 96% in 12 months; Zambia: reduced defaulter rate from 15% to 8%; increased level of adherence from 6.6% to 53.3%; and health worker knowledge from 20% to 53%. The full results will be discussed in the main paper, but success in all the countries was critically limited by weaknesses in the general health care systems notably the finance, human resource, management, logistics and supervisory systems. A learning environment was particularly missing.

Conclusion: Quality improvement initiatives will not achieve their full potential unless health systems improve substantially in sub-Saharan Africa.

TS-82087-20 Mortality among tuberculosis patients in the Netherlands, 1993–2006

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Aim: To estimate excess mortality among tuberculosis (TB) patients in the Netherlands, to observe time trends and to identify risk-factors for TB associated mortality.

Method: Data on TB patients with a known treatment outcome registered in the Netherlands Tuberculosis Register from 1993 to 2006 were analyzed. Excess mortality in TB cases was determined by comparison with national mortality rates. Risk factors were identified and adjustment for confounders was carried out using Cox's proportional hazard analysis.

Results: Out of 18 293 notified patients, 17 013 were alive at diagnosis, 117 patients died before diagnosis due to TB and 139 patients died due to other causes, but were post mortem diagnosed with active TB. In total 254 patients who were alive at diagnosis died due to TB and 758 patients died due to other causes. The Kaplan-Meier survival probabilities were 97.6% after the first month of treatment, 95.1% after 6 months and 90.8% after 1 year. TB patients had a standardized mortality ratio of 8.8 over the total period, 9.3 from 1993–2000 and 7.9 from 2001–2005. Independent risk factors for death within 12 months after TB diagnosis were gender, age, localization of disease, type of medical officer having made the diagnosis, addiction to alcohol or drugs, presence of malignancy or HIV infection, and whether TB was detected through active or passive case finding.

Conclusions: Risk of death associated with TB declined slightly from 2001–2005 compared with 1993–2000. Important risk factors for TB mortality were age, co-morbidity, diagnosing physician and passive case finding.

TS-82147-20 Franchised private medical doctors' role in improving quality of TB case management and treatment adherence

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Aim: Involve the private sector in early detection of TB cases and assuring treatment compliance using social marketing strategies in 5 larger cities of Pakistan.

Design: A network of 1200 medical doctors incorporated in a franchised network work in early detection of TB cases to assure proper clinical management and follow-up for improving treatment compliance.

Methods: 1200 private doctors trained with the National TB control program of Pakistan for early case detection and quality management of the TB cases. The network was supported by a field interpersonal communications team to assure active case finding and follow-up for compliance. Program supported by a network of managers and an online management information system.

Results: More than 19 000 cases were identified and registered in the online database. More than 55% were smear positive. Cured rate of more than 95% and default of less than 3%. Private laboratories supported the sputum diagnosis under the quality control of the National TB Control Program. Compliance for treatment was assured with more than 19 000 volunteers Treatment Supporters identified for each case under treatment. Online MIS provided excellent update information of each case and the total caseload generating information for program management and for reporting to the National and provincial TB program.

Case detection rate increase substantially (35–55%) in each city where the program was based.

Conclusion: Involvement of the private medical sector can improve the early detection of smear positive cases when supported by a managerial structure like the one provided by Greenstar Social Marketing. Case detection using interpersonal communications not only assure early detection but close follow-up after diagnosis.

TS-82262-20 T-cell based assays for the diagnosis of latent tuberculosis infection: updated meta-analysis

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Aim: Interferon-gamma release assays (IGRAs) are alternatives to the tuberculin skin test (TST). A recent meta-analysis showed IGRAs have high specificity, even in BCG-vaccinated populations. Sensitivity was suboptimal for TST and IGRAs. We updated the meta-analysis to incorporate new evidence.

Methods: We searched PubMed (updated as of March 2008) and reviewed all original articles, guidelines and reviews for studies published in English. Studies had evaluated the QuantiFERON-TB Gold or Gold In-Tube (QFT-G or QFT-GIT) [Cellestis Limited, Victoria, Australia], and the T-SPOT.TB [Oxford Immunotec, Oxford, UK] or its pre-commercial version. For assessing sensitivity, the study sample had to have microbiologically confirmed active TB. For assessing specificity, the population had to be healthy, low-risk individuals without known exposure to TB. A fixed-effects meta-analysis (with correction for overdispersion) was done to pool data, within pre-specified subgroups.

Results: The pooled sensitivity of QFT-G was 78% (95%CI 73–82), and 70% (95%CI 63–78) for QFT-GIT. The pooled sensitivity of T-SPOT.TB was 90% (95%CI 86–93), significantly higher than both QFT-G and QFT-GIT. The pooled specificity for QuantiFERON among BCG non-vaccinated populations was 99% (95%CI 98–100), and 96% (95%CI 94–98) among BCG vaccinated populations. The pooled specificity of T-SPOT.TB was 93% (95%CI 86–100). TST results were heterogeneous, but specificity in BCG non-vaccinated populations was consistently high (97%, 95%CI 95–99). Most studies were small and had limitations.

Conclusion: IGRAs have excellent specificity that is unaffected by BCG vaccination. TST specificity is high in BCG non-vaccinated, but low and variable in BCG vaccinated populations. Sensitivity of IGRAs and TST is not consistent across the tests and populations, but the overall trend suggests that T-SPOT.TB is more sensitive than QuantiFERON and TST.

TS-82266-20 Infectiousness of drug-resistant TB patients then and now: Riley revisited

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Aim: 50 years ago Riley et al. measured the infectiousness of air exhausted from a 6-bed experimental TB ward, reporting an average 5.7 of 156 exposed guinea pigs per month with a tuberculin skin test ≥ 6 mm, whereas no unexposed animals reacted > 5 mm. Among 22 guinea pig isolates linked to their human infectious sources, 21 were drug resistant, suggesting that treatment effectively stopped transmission from patients with drug susceptible TB on the ward.

Methods: In an updated experimental 6-bed TB ward in South Africa, we measured the infectiousness for guinea pigs of MDR-TB patients on standardized MDR treatment, half of whom were HIV co-infected. Knowing the building ventilation rate, the air sampling rate of the guinea pigs, their infection rate, and the exposure time, we calculated the average rate of infectious doses of TB generated per patient on the ward.

Results: In the first month of an experiment in which 6 MDR-TB patients exposed 360 guinea pigs, 92 animals had skin test reactions ≥ 6 mm. The average treated patient on our ward generated 241 infectious doses per day compared to 8 infectious doses per day generated on Riley's ward.

Conclusion: The analysis assumes uniform air mixing, constant exposure conditions and 6 infectious sources at all times. In Baltimore in the late 50's, Riley reported: 'the number of sputum positive patients occupying the ward during 1 month varied between 3.5 and 6,' and HIV was unknown. This is sadly not the case in sub-Saharan Africa today. While experimental differences may account for some of the discrepancy, a generation rate of 241 is plausible. Based on human skin test conversions in a contact investigation, Nardell reported a generation rate of 312 per day for an untreated office worker, and much higher generation rates are in the outbreak literature. MDR-TB patients on therapy remain highly infectious for guinea pigs and, presumably, for highly susceptible people as well.

TS-82267-20 Incident pulmonary tuberculosis after HAART initiation in the Themba Lethu Clinical Cohort, South Africa

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Background: HAART reduces the risk of tuberculosis (TB) by 60 to 80%. The incidence rates and risk factors for pulmonary TB remain poorly characterized.

Methods: We analyzed prospective data from the Themba Lethu Clinic, Johannesburg, South Africa. Risk factors, rates and incidence rate ratios (IRR) for incident TB were analyzed using Poisson models. Models were controlled for history of TB, baseline age, gender, pregnancy, CD4 count, body mass index (BMI), hemoglobin, history of ART, and initial HAART regimen. Individuals with TB at initiation of HAART were excluded.

Results: Between 1 April 2004 and 31 March 2007, 6317 adults who initiated first-line HAART were eligible for analysis. 324 individuals developed pulmonary TB (PTB) during follow up, of which 189 (58%) developed PTB during the first 120 days of HAART. The overall crude incidence rate of PTB was 4.9 per 100 person-years. The crude incidence of PTB during the first 120 days of HAART was 11.0 cases per 100 person-years (95% CI 9.6–12.6). Individuals who developed PTB during follow-up were more likely to have a CD4 count < 100 (68.3% vs. 51.8%, $P < 0.0001$) and to be in WHO stage III or IV at HAART initiation (41.0% vs. 31.7%, $P < 0.001$). In multivariate Poisson regression, risk of developing PTB under HAART was slightly higher among males (IRR = 1.25, 95% CI 0.97–1.6), those with baseline CD4 count < 100 (IRR 1.64, 95% CI 1.26–2.13), those with BMI < 18.5 (IRR 1.33, 95% CI 1.00–1.77) and those with low baseline hemoglobin (IRR 1.97, 95% CI 1.52–2.55). Risk factors for incident TB in the first 120 days of HAART were similar.

Conclusions: Incidence rates of PTB remained high in individuals receiving HAART at an urban public HIV clinic in South Africa. Careful screening for the development of TB, with special attention to the first months of HAART and those individuals with key baseline risk factors, including low CD4 count, BMI, and hemoglobin, may help improve control of TB among people living with HIV.

TS-82318-20 Speaking the same language: making MDR-TB/XDR-TB treatment outcomes analysis more accessible

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Objectives: The paper by the same title, published in IJTLD in 2005, represents the first attempt to standardize outcomes definitions for patients treated for drug-resistant TB, in order to ensure comparability between programs. We present programming algorithms that address the complications of coding for such standardization.

Methodology: The derivation of the bacteriologically defined endpoints from real data can be challenging to compute. In one such example, the outcome of 'cured' is defined as 5 consecutive negative cultures with ≤ 1 positive cultures, from sputum samples collected at least 30 days apart, in the last 12 months of treatment. A straightforward algorithm is sufficient to program this if the cultures are taken at least thirty days apart—and yet it is precisely in this dimension (time) that coding can become quite tricky. If the cultures are not spaced evenly, then we must evaluate only those cultures that meet the time criteria. However, if there is a positive culture, it should be 'dominant' during any 30-day period. We must then begin counting the days between that positive culture and the subsequent cultures. Other considerations affecting the outcome definitions likewise need to be addressed.

Example: As illustrated in the table attached, >90% of clinician-defined outcomes in two different treatment sites were concordant with the calculated outcomes. Although there were likely substantial differences in outcome attribution by clinicians in each site, these subjective differences can successfully be overcome by application of the standardized definitions.

Table Outcomes from two different treatment sites (in Peru and Russia), standardized using algorithms for the consensus definitions.

Clinically recorded outcome	Calculated outcome	Percent of all cases
Cured	Failed	0.73%
Cured	Treatment completed	3.40%
Failed	Cured	0.08%
Defaulted*	Cured	0.24%
Defaulted	Failed	0.24%
Unknown	Failed	0.08%
Cured	Unknown	0.08%
	Concordant	95.15%
	Discrepant	4.85%

*Default not included in Peru data, as a calculated definition of default could not be applied.

Tools: We will present algorithms for programming several components of the consensus definitions, and provide related, portable code for use in: SAS, STATA, and Microsoft Access/Epi Info. These tools will simplify and accelerate analysis of MDR-TB/XDR-TB treatment outcomes and ensure greater comparability among reports produced by NTPs and research institution.

POSTER DISCUSSION SESSIONS

PATIENT AND COMMUNITY INITIATIVES TO ADDRESS TB AND HIV

PC-81406-20 Visual impairment and HIV more than a double burden: a case of Zambia

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Introduction: Much ground in the area of HIV/AIDS in recent years can be said to have covered the country, this effort unfortunately, has not been all-inclusive. Much of the work has been directed at the able-bodied—leaving out those living with visual impairments. This paper discusses the third burden to blindness and HIV in Zambia. Objectives of the study were to assess and analyse access to care, treatment and HIV/AIDS prevention among the visually impaired.

Methods: A qualitative sociological study consisted of 97 in-depth interviews with the blind that are HIV-positive and negative. The sample sites were two (2) of nine (9) provinces (southern and Copper belt), that are home to 70% of facilities, and projects providing HIV/AIDS care and support, treatment and prevention.

Results: Analysis reveals that despite residing in areas providing 60% of HIV/AIDS care, treatment and prevention programs in the country, 79% of the blind had no access to care, treatment and HIV/AIDS prevention. Some of the associated factors are lack of training in communication skills for care and support personnel. Stigma and discrimination at the core of non-interaction between the blind and the seeing. Analysis further reveals that the entire visual impaired do not only lack access to care, but are also far removed from being able to identify, plan and manage HIV/AIDS and other health issues on their own, facilitating the risk of acquiring and transmitting HIV/AIDS.

Conclusion: With exposure to rape and sexual abuse, these vulnerable groups can only rely on external help of the sighted to facilitate their access to care. By virtual of their impairments, these marginalized communities have no models to refer to when it comes to appreciating the extent of the devastating effects of HIV/AIDS. They have heard but not seen. Indeed, blindness and HIV is more than a double burden.

PC-81486-20 Mobilising civil society organisations to take action in TB control efforts

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Aim: Civil society's organizations have a great role to play when it comes to contributing to TB control. In Kenya, communities have been greatly affected by the TB epidemic and thus the need to take up action in order to help reverse the problem.

Design: To be able to stir up action through mobilizing communities to play a role in identifying TB cases and ensuring that treatment is completed and adhered to by patients diagnosed with TB. And most importantly be able to have positive treatment outcomes and in the process avert emergencies like MDR-TB and XDR-TB which have put a great strain on health systems.

Methods: Approaches employed included holding civil society forums; organizing patients support groups, engaging in media programmes and engaging in focus group discussions with in the communities in Nairobi, Mombasa and Nakuru district.

Results: This resulted in complete treatment outcomes for the 60 patients, who were on treatment, establishment of patient support groups, increased community awareness issues around TB prevention, treatment, care and support and most importantly interest by the community organizations to be able to include TB advocacy activities with in their day to day activities.

Conclusion: Empowering communities to take action in TB control plays a critical role in enhancing treatment and by and large reversing outbreaks of MDR-TB and XDR-TB that have largely resulted from poor investment in TB control and inaction by civil society organizations.

PC-81620-20 Can cured patients be advocates and treatment supporters in the community of Gujarat, Pakistan?

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Setting: District Gujrat in Pakistan has already achieved global targets regarding case detection rate, default rate and cure rate. Advocacy for optimum communication and social mobilization are the key strategy to sustain DOTS program.

Objectives: To involve the cured patients to DOTS programme and to build the awareness of TB disease in the community in Gujrat Pakistan.

Methods: The cured TB patients under DOTS program were gathered for advocacy seminars after obtaining consent from three diagnostic center which have low case detection rate (38~67%) in Gujrat. Descriptive cross sectional study and in-depth interview were conducted during advocacy seminars. The education regarding TB using flip card to the cured patients were provided. Then, the reference cards stating TB disease, name and phone number of diagnostic center were distributed them in order to be given to the TB suspects in their respective community.

Results: The source of information about TB before diagnosis was from Lady Health Worker (LHW) (29%) and TV (13.6%) while 42.1% of them did not have any information. Regarding knowledge of TB, 95.7% of patients did not know the cause of TB. More than half of respondents feel that most people in their community reject TB patients or are friendly but they generally try to avoid TB patient. 79.3% of respondents feel compassion and desire to help people with TB. Almost all of respondents feel community people could

get more information about TB. In depth-interview, most of patients satisfied with supports from LHW. Some of respondents tried to hide their disease because they were afraid to proposal rejection or dismissal from their job.

Conclusion: To enhance the awareness in community, involvement of the cured TB patients could be precious resource. As further investigation, the number of reference cards taken to diagnostic center will be counted and case notification rate in those areas will be monitored.

PC-81742-20 Special social mobilisation campaign on TB in Bangladesh

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Introduction: BRAC together 28 NGOs are implementing TB control in Bangladesh in collaboration with NTP. ACSM activity have major role to reach the people. Special social mobilization campaign on TB was conducted from March to June 2007.

Objective: To reach higher number of people with basic TB messages and to increase awareness level and thus to increase case detection and treatment success.

Method: Campaign activities included meeting with different stakeholders e.g. teachers, community leaders, local government representatives, and religious leaders, organizing popular theatres, folk songs, miking, student rallies and display of ACSM materials. A pre campaign study was conducted to assess the awareness level in community. Special sputum collection centre was organized below sub district level.

Result: During this period 169 800 community leaders and local government representatives were oriented on TB. A total of 3883 events of miking were arranged in local markets, streets and mosques. 11 310 student rallies, 2379 folk songs and 598 popular theatre events were performed. National case detection rate increased by 3.9%–4% in BRAC supported area during campaign period.

Conclusion: Beside routine communication activities with this special campaign is effective for awareness creation. Special sputum collection center had also a positive role. Beside special campaign, sustained ACSM activity is much needed throughout the year to maintain similar level of case detection. To measure the impact of the campaign, awareness level of the community need to be explored after campaign.

PC-81938-20 KAP of general adult population regarding tuberculosis in a peri-urban area in Kabul, Afghanistan

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Objective: To assess the knowledge, attitude and practice of general adult population regarding TB.

Methodology: This study is mainly cross-sectional survey, to get state from both rural and urban, peri-urban were selected. Three villages selected randomly from the two selected districts, Paghman and Shakardara. A random sample of 192 subjects (95%CI), 18 and older were interviewed, with a structured questionnaire. Four sputum smear positive patients were selected for in-depth interview.

Finding: Generally sufficient knowledge on TB among the sample was very low (11.5%), it was significant difference between primary (0%) and post primary education (22%) ($P < 0.014$). Knowledge regarding cough as main symptoms for TB and mode of transmission was significantly different; these were high in male than female ($P < 0.0001$). Magnitude of TB in the society was responded as a big health problem, by three quarter of the subjects. Dissatisfaction of health workers behavior and multiple health seeking practices, despite awareness of free TB service in public health facility were found from their practice.

Discussion: NTP can target to raise the level of knowledge regarding TB by developing a clear policy and implementation strategy for a nation wide IEC campaign program. It should target more; those are more vulnerable groups like female and uneducated people.

PC-82007-20 Innovative community participation approach towards TB control: a project experience

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Aim: To enhance community capacities regarding TB through Health Forums.

Design: Krishna Community Health Interventions Programme (KRISCHIP), a 3 year project (2004–2007) of TB Alert India jointly implemented with Lepa Society and Vasavya Malhila Mandali (VMM) formed 583 Health Forums in 580 villages and 130 slums in Krishna District, Andhra Pradesh State, India. Health forums were initially informal groupings of to discuss health issues and devise strategies to bring attention to government.

Methods: The project worked closely with Community Stakeholders in referral and follow up services for TB programme. Over the 3 years of period project sensitised 1018 Volunteers, 1231 Stakeholders, 418 Women Leaders, 678 Private Health Providers and 814 DOT Providers. After community capacity building activities project supported development of regular Forums for local community group leaders to discuss any problems encountered, any local solutions and suggestions to improve project impact for necessary

action. These 583 (520 villages and 63 slums) forums could meet once in two months.

Results: A total of 2309 meetings initiated by Forums during which women (57.5% of all participants) were involved. A total of 1814 issues were addressed out of 2310 issues raised in Health Forum meetings. The issues could include are issues like referring the TB suspects, identifying DOT Providers, sanitation drives and education campaigns on health and hygiene, stagnant water, mosquito problems, chicken guinea, TB-HIV co-infection, immunization, treatment for dog and snake bites, street lightings, cleanliness of water tanks etc. By end of three years Health Forums referred 15 207 TB suspects (8287 by community groups & 6918 by Private Health Providers).

Conclusion: Health Forums are found better at community level as nodal point for dissemination of health information and acting as referral units.

PC-82018-20 Improving early TB detection through peer education in prisons, Moldova

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Setting: A minority of patients were detected by passive case finding towards 2007, as most prisoners were checked for TB on entry and every 6 months, as well as providing systematic screening of contacts of TB detected cases.

Aim: To improve passive TB detection using peer (prisoners) education.

Methods: Peer-driven intervention in 7 colonies (4500 inmates—50% of total prison population) covered in the second half of 2007. Sputum collection cabins installed and access to smear labs for general colonies nearby civil labs ensured. TOT in interactive learning of TB prevention for 15 persons/medical staff including 7 coordinators from prisons organised. A module for peer educators (prisoners) developed. 60 peer educators trained (231 hours of mini-training provided) and IEC materials distributed to colonies' population through peers. Motivation packages offered to peer educators.

Results: 817 symptomatic persons addressed the doctors. 2444 samples of sputum examined by civil labs. 46 smear positive cases detected, which means 60% from total number of smear positive cases detected in the second half of year.

Conclusion: Microscopic detection bases established in prisons. Community involvement is efficient in early TB detection. Scale up to all penitentiary institutions has to be provided.

PC-82073-20 The impact of socio-economic status on patients' access to antiretroviral therapy in Malawi

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The provision of health services in Malawi has generally been classified as poor. These conditions are worse for people living in rural areas and the geographically remote. A country heavily affected by HIV/AIDS, the situation would be worse for patients on antiretroviral therapy whereby costs and long distances are highlighted as some of the barriers to adherence on treatment. The study therefore aimed at assessing the socio-economic profiles of patients on ART and assess the effect of socio-economic status in accessing antiretroviral therapy. Data was collected in two districts in Malawi, Lilongwe and Rumphi. A total of 947 ART patients were interviewed using a structured questionnaire. The Principal Component Analysis (PCA) was used to obtain asset indexes and wealth quintiles to establish socio-economic differences among ART patients. Data was analysed using STATA version 8.2. 74% were located in the rural areas while 26% were from the urban. Based on the wealth quintiles, there were wide differences between the two extreme wealth quintiles—the poorest 20% and the richest 20%. The poorest 20% travel a longer distance to get to the facility as compared to the richest 20%; mean distance of 22 km and 14 km respectively. Furthermore, the poorest 20% incur higher transport costs as compared to the richest 20% with a mean transport cost of US\$4.00 and US\$1.50 respectively. The results indicate that the current ARV treatment is inequitable. It is therefore imperative that the government should devise new treatment mechanisms that the poor and other vulnerable groups access treatment.

PC-82097-20 Citizen journalism and issue-based reporting on TB and TB-HIV issues from the frontlines

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Objective: Documentation of key TB and TB-HIV co-infection from the perspective of affected communities is virtually absent from local, regional and global discussions. HDN's Key Correspondent (KC) Team are a group of in-country writers who work in TB and HIV as well as people who are affected by and living with TB-HIV. KCs help document local TB-HIV realities, making sure that people who wouldn't ordinarily be able to 'speak their world' can tell their stories and

have a way to be heard. KCs contribute to developing clear national advocacy frameworks, highlight key issues, monitoring developments in each country's response to TB-HIV and generate articles for print and electronic media.

Methods: KCs consistently write on issues relating to TB and TB-HIV co-infection, creating valuable dialogue within affected communities as well as providing these to a broader mainstream audience at the country, regional, and global levels. In November 2007, HDN facilitated an onsite KC team, from African countries, at the 38th Union Conference in South Africa to document six key themes: TB and children, home-based care vs DOTS, infection control, drug-resistant TB, research gap and resource gap. The onsite KC team wrote more than 30 in-depth articles during the conference which were disseminated on TB and HIV electronic forums at all levels. These articles were published on the front page of the Stop TB Partnership website. A short video was also produced featuring the experience of a person co-infected with TB-HIV, which was highlighted on the Stop TB Partnership and KC websites.

Results/Conclusion: HDN's KC Team has increased the representation, voices and perceptions of people with active TB, cured of TB and TB-HIV co-infected. KCs ensure that these voices are documented and inform advocacy and TB policy and decision-making on national, regional and global levels.

PC-82193-20 Knowledge, attitudes and practices of the community on tuberculosis in the south region of the Dominican Republic

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Introduction: The social mobilization and communication for the TB control are new process in the country, integrating communities and enabling health promoters to make activities of this component, supported by Global Fund.

Aim: To evaluate knowledge, attitudes and practices of the community on the tuberculosis.

Design and Methods: Descriptive study between May 2006–June 2007, 396 people of the communities in four provinces of the south of Dominican Republic were interviewed, supported by Global Fund. Knowledge on transmission, diagnosis, treatment, prevention and activities for the TB control were evaluated; the attitude towards the patients, perception on the work of public health and the best media for IEC activities.

Results: 70.3% female, age average 23 years, 51% average education, 89.2% has listened about TB, 60% received information of the health staff, 90.7% knows that TB is cured, 89.2% knows the difference with

HIV, 66.3% how is transmitted, 64.2% says stigma and discrimination exists, 76.7% perceives that Public Health faces the problem of the TB. Favorite mass media: 66% talks, 27% TV, 13% radio.

Conclusions: Community has information on TB, receiving this information from doctors, nurses and promoters. Use more this means for activities of ACMS, as well as television and radio.

TB DIAGNOSIS MICROSCOPY, CULTURE AND CHARACTERISATION

PC-81664-20 Comparing visual screening and microscopic criteria in judging specimen acceptability for TB diagnosis

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Aim: Microscopy of respiratory specimens remains the most important diagnostic method for controlling tuberculosis. However, shortages in human resources mean that in order to maximise efficiency, many laboratories only examine samples that are considered to be sputum. The optimal specimen screening method will reject the smallest proportion of specimens that contain acid-fast bacilli (AFB), while still reducing laboratory work-load by excluding poor quality specimens. Several microscopic sputum quality assessment criteria have been developed, but their applicability in selecting specimens for AFB microscopy is questionable. We investigated whether visual assessment or microscopic grading of the cellular composition of specimens is a better strategy to screen specimens for TB diagnosis.

Methods: 2643 specimens were collected from TB suspects at the Federal TB centre in Pakistan. Specimens were classified as sputum or saliva visually and microscopically using the criteria proposed by McCarter and Robinson, Van Scoy, Geckler et al, Murray and Washington and Bartlett. The AFB-positivity of specimens was also assessed.

Results: As well as being the least time consuming, visual assessment rejected the lowest proportion of AFB-positive specimens (0.3%). Most microscopic grading criteria, particularly those that considered the squamous epithelial cell count, rejected a large proportion of specimens (30–66%), of which a sizeable fraction contained AFB (6–12%).

Conclusion: Our results indicate that visual assessment by trained technicians is more effective and suitable than microscopic grading for screening specimens for the diagnosis of TB. TB control resources would be better allocated to optimising visual screen-

ing than investing in more 'strict', microscopic grading tools.

PC-81688-20 Lymphoproliferative responses to mycobacterial antigens predict risk of subsequent HIV-associated tuberculosis

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Introduction: We show for the first time in a large prospective double-blinded trial with rigorous case definitions that an immunological assay for TB, the lymphocyte proliferation assay (LPA), predicts future HIV-associated tuberculosis (TB).

Methods: HIV-infected subjects with bacille Calmette Guérin (BCG) scars and CD4 counts ≥ 200 cells/mm³ entering the DarDar TB vaccine trial in Tanzania had baseline tuberculin skin tests (TST) and LPA. Assay antigens were early secreted antigenic target 6 (ESAT-6), antigen 85 (Ag85), and TB whole cell lysate (WCL). During longitudinal clinical follow up over an average of 3 years, subjects were diagnosed with TB if they met a study definition of definite or probable TB by consensus of a 3 person expert panel assessing clinical, radiographic and microbiological findings.

Results: 170 of 1855 subjects were diagnosed with TB during follow up. Subjects with TB were older, had more advanced HIV, were less likely on antiretroviral therapy, and more likely to have a positive TST (50.3 vs. 33.3%, $P < 0.0001$). Baseline LPA responses to mycobacterial antigens were more common in subjects diagnosed with TB during subsequent follow up: ESAT-6, 15.3 vs. 7.5%, $P = 0.0004$; Ag85, 17.6 vs. 7.9, $P < 0.0001$; and WCL, 40.0 vs. 25.7%, $P = 0.0001$. LPA responses to ESAT-6 and WCL correlated more strongly with future TB in subjects with CD4 count < 350 cells/mm³. LPA responses to mycobacterial antigens were more common in subjects diagnosed with TB who had a TST ≥ 5 mm, but not in subjects with a negative TST. After adjusting for age, CD4 count, HIV viral load, and antiretroviral therapy in a multivariate logistic regression model, only LPA responses to WCL correlated with the odds of subsequent TB: OR 2.0, $P = 0.003$.

Conclusions: In this large prospective double-blinded clinical trial in BCG-immunized and HIV-infected subjects with CD4 counts ≥ 200 cells/mm³, detectable LPA responses to WCL predict future TB.

PC-81797-20 Morphological evaluation of diagnostic value of bronchoscopic method with biopsy implemented for TB patients

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Method of bronchoscopy with biopsy of the bronchial mucus has a great significance in conducting differential diagnostics of lung diseases. Morphological material from bronchoscopy of 56 cases during 2007 treated in clinics of the National TB Center was investigated. By nosology bronchobioptats were classified as: bronchial neoplasms constituted 19 (33.9%) cases, chronic non-specific bronchitis 14 (25%), bronchial TB 7 (12.5%) cases, and material had no informative value or there were present non-specific changes in term of sclerosis or old focal hemorrhages or layers of ciliated epithelium, etc. in 16 cases (26.8%). Bronchial TB was characterized mainly by presence of epithelioid giant cells granulomas with caseous necrotic focus or without it. Thus, bronchoscopy with biopsy for patients with lung pathology in 73.2% of cases allowed to evaluate morphologically and diagnose the nosological disease form, while in 26.8% of cases it had no the informative value. This is depending on experience of a bronchologist on the one hand and presence of appropriated bronchoscopic equipment on the other hand.

PC-81798-20 Histological verification of morphological forms of pulmonary tuberculosis by forensic medical experts

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Pulmonary TB was and is up till now the topical problem in Kazakhstan. Morphological diagnostics of clinical and morphological pulmonary TB forms is difficult especially for forensic medical experts which don't have the available clinical and laboratory conditions or bacteriological and X-ray data. In connection with this, we decided to analyze the autopsy materials of persons died out of medical institutions. Retrospective analysis of forensic and histological unit during 6 months of 2007 showed that pulmonary TB was revealed in 13 cases. Histologically destructive expanded TB forms which led to the lethal outcome as a result of caseous pneumonia with perifocal zone of fibrinous purulent pneumonia (7 cases), fibro-cavernous TB in the stage of progressing with acidose and nodous foci of casenous pneumonia (3 cases) were found out in 10 cases. Hematogenic TB with prevalent lung injury in term of exudate and production of miliary granulomas was diagnosed in 3 cases. Histological verification of morphological forms of pulmonary TB

has its properties: an expert histologist has to investigate the material taken by an expert tanatologist and that why histologist is not be able to see all the macroscopic picture of TB process in lungs that made difficult to diagnose the pulmonary TB forms. But knowledge of the pathomorphological manifestations and differential diagnostics signs of various pulmonary TB forms allows to the experts histologists to diagnose the tuberculosis inflammation.

PC-81843-20 Evaluation of a new commercially manufactured LED fluorescence microscope Primo Star iLED for detection of TB

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Background: The sensitivity of light microscopy (LM) for the detection of tuberculosis (TB) can be improved by the use of fluorescent staining. Fluorescence microscopy (FM), however, has not been widely implemented due to high equipment costs, short bulb life and cost, need for a darkroom and continuous electric power supply. A new instrument for FM was jointly developed by FIND and Carl Zeiss. The Primo Star iLED (iLED) was engineered with LED light sources (blue and white light), with a life-span over 10 000 h, rechargeable battery power, and a similar capital cost of conventional LM. The study aim was to evaluate the performance and ease of use of the iLED.

Methods: A blinded multicenter study was carried out at 4 reference laboratory sites experienced in FM. Sputum specimens from untreated TB patients were examined with standard FM (mercury vapor bulbs in darkroom) and iLED (ambient light). 140 slide sets from direct and concentrated sputum samples stained with AuramineO/KMnO₄ were evaluated per site. LJ culture was used as the reference standard.

Results: The overall sensitivity and specificity at all 4 sites are shown in the Table. The iLED prototype per-

Microscope	Method	Sensitivity (%)	Specificity (%)
Standard FM	direct	67.4	96.1
Primostar iLED	direct	71.6 (<i>P</i> = 0.1025)	96.4
Standard FM	concentrated	66.6	99.2
Primostar iLED	concentrated	72.4 (<i>P</i> = 0.0073)	98.8

formance was equivalent to standard FM. Time saved using the iLED was equivalent to standard FM and 45–75% compared to LM. Furthermore, the iLED

performed similarly when using alternative staining types (Auramine/Rhodamine and either Methylene blue or KMnO₄ as counterstain). The sensitivity of detection was not diminished by use outside a darkroom. Lab technicians scored contrast, resolution, depth of focus, signal-to-noise ratio and homogeneity of illumination of iLED as superior overall to standard FM in use.

Conclusions: This study confirms the equivalent performance of iLED and removes all common obstacles to the routine use of FM for TB detection.

PC-81844-20 Risk of TB disease among household contacts of TB patients in a suburb in Istanbul

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Aim: Household contacts of infectious tuberculosis cases are under risk for tuberculosis development. The objective of this study is to determine the incidence of tuberculosis and associated risk factors among household contacts of tuberculosis cases in two years of follow-up.

Design: The study was designed as a prospective cohort among 642 healthy contacts of 160 tuberculosis cases formed the study population.

Methods: Close contacts of smear positive or smear negative/culture positive patients of the Umraniye TB dispensary were followed up two years between August 2004 and November 2005. Control examinations were performed to all household contacts in every 3 month for three times. Follow-up interviews were carried by telephone callings at 12th, 18th and 24th months. We assessed the importance of different factors in the appearance of tuberculosis disease in contacts using χ^2 and multivariate logistic regression analyses.

Results: Among 642 contacts, 19 developed tuberculosis at the end of two years which yielded an incidence rate of 3.0%. The majority (94.7%) developed the disease within 12 months. The risk of developing tuberculosis increased significantly among BCG unvaccinated contacts (risk ratio [RR] 2.4; 95%CI 1.1–7.0), among 15–34 years age group (RR 4.7; 95%CI 1.1–20.6) and among normal weight group when overweight contacts was taken as the reference category (RR 4.7, 95%CI 1.0–20.9) Multivariate analysis revealed a significant relationship between the detection of secondary cases and the following variables; TST positive contacts (odds ratio [OR] 11.31; 95%CI 2.99–42.66), living in a rented house (OR, 4.41; 95%CI 1.25–15.55).

Conclusion: Smear positive tuberculosis cases potentially more contagious for their household contacts and BCG has a protective effect in our setting. TST

positivity and living conditions are found as independent factors for disease in the study population.

PC-81933-20 Successful starting of external quality assessment of the AFB microscopy laboratory network in Mali

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Setting: Microscopy laboratory network and National Tuberculosis Program in Mali.

Aim: To evaluate technical quality and results of smear microscopy in peripheral health care facilities in Mali by blinded rechecking and panel testing in two consecutive years.

Method: Random blinded rechecking using Lot Quality Assurance Sampling method and on-site supervisions were performed following international guidelines. Ratio of detection relative to controllers (DRC), and positive predictive values (PPV) obtained in two consecutive years (2006 and 2007) were analysed. Panel testing was performed following international guidelines.

Results: 65 centres in 2006 and 66 in 2007 were controlled by blinded rechecking. The overall DRC increased from 0.89 in 2006 to 0.96 in 2007 and the PPV remained stable at 95% during the two years. The percent of centres having DRC ratio more than 0.84 increased from 69% in 2006 to 83% in 2007. The number of centres doing unsatisfactory below 0.85 decreased from 22 to 10. Nine centres with a good performance in 2006 showed unacceptable DRC in 2007. On site investigations revealed that the improvement in the detection was due to a gain of motivation and the decrease of performance to the recruitment of new technicians. In panel testing 85.4% of the technicians had acceptable scores (>80%) in 2006 and 90.4% in 2007. This increase of scores may be attributable to an improvement of technician motivation. Technicians usually did better when they were evaluated with a panel sent by the central level than during the routine work.

Conclusion: External Quality Assessment by regular blinded rechecking and supervision succeeded in improving the quality of AFB-microscopy in Mali.

PC-82086-20 Genetic diversity of the MIRU locus 26 in *Mycobacterium tuberculosis* in Taiwan

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Setting: *Mycobacterium tuberculosis* isolated from a medical center in northern Taiwan between 2005 and 2007.

Objectives: To evaluate the genetic diversity of the Mycobacterial Interspersed Repetitive Unit (MIRU) Locus 26 in *M. tuberculosis* in Taiwan.

Methods: We have evaluated MIRU locus 26 for their abilities to differentiate the Beijing and non-Beijing genotype families of *M. tuberculosis*. A total of 311 *M. tuberculosis* isolates whose Beijing status was confirmed by spoligotyping were subjected to MIRU typing to assess genetic diversity of the MIRU locus 26. The amplicons were analyzed by agarose gel electrophoresis to determine the copy number at MIRU locus 26.

Results: Of 311 isolates, 145 (46.6%) isolates were Beijing family genotypes and consisted of 129 characteristic Beijing genotypes; and 16 Beijing-like genotypes. The 129 Beijing strains were subdivided into 9 MIRU types based on the copy number and a major type with 7 copies was found in 91 (70.5%) of Beijing strains while only 4 (2.5%) in the non-Beijing strains. Of 163 non-Beijing genotypes, 90 (55.2%) isolates have 5 copies at the MIRU locus 26.

Conclusion: The study highlighted the Beijing strains stably carry seven copies at MIRU locus 26 appears to be suitable for diagnostic and epidemiological screening on a routine basis in Taiwan where Beijing family genotype strains are prevalent. The test can also be adopted for direct application on clinical samples to save time on culturing bacilli for genotyping.

PC-82092-20 High MGIT contamination rates of sputum specimens from a tuberculosis prevalence survey in Western Kenya, 2007

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Setting: A rural study area in Western Kenya and Centre for Respiratory Diseases Research Laboratory, KEMRI.

Objective: To determine the rates and possible causes of contamination in MGIT cultures of sputum specimens collected from a TB prevalence survey.

Methods: Sputum was collected outside, in the rural study area, transported in a cool box to Nairobi by road within 4 days, and processed within 2 days. Contamination rates were calculated for all specimens cultured between Jan–Dec 2007. MGIT positivity was

confirmed by Ziehl-Neelsen (ZN) microscopy. Between March and May 2007 further investigations for causative agents were done on 227 contaminated MGIT tubes.

Results: Monthly MGIT contamination rates ranged between 31/464 (6%) in June and 288/454 (63%) in September, with 37% average, and for LJ between 0/744 (0%) in May and 56/760 (7%) in July with 4% average. For both media contamination rates were lowest during the cold/wet months. Of the 804 specimens collected between March–May 2007, 227 (28%) were contaminated on MGIT, 13/227 (6%) were contaminated on LJ media while 6 (3%) had growth for *M. tuberculosis* on LJ. 51 (23%) of the MGIT contaminants were *Bacillus anthracoides* and 49 (22%) were *Streptomyces*, indicating possible environmental contamination. LJ contaminants were not identified further. No fungi were isolated. Increased decontamination time and strict adherence to aseptic procedures during specimen processing did not alter the rate of contamination.

Conclusion: Inexplicably high MGIT contamination rates from field specimens may have arisen from the sputum collection stage. Specific geographical settings planning to implement MGIT need to review the MGIT protocols, and possibly modify antimicrobial combinations added to the media, and aseptic sputum collection procedures.

PC-82213-20 Added value of bleach sedimentation microscopy for diagnosis of tuberculosis: a cost-effectiveness study

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Setting and Objectives: Overnight bleach sedimentation is an effective and simple method to improve the performance of smear microscopy for the diagnostic of tuberculosis (TB). We compared the relative cost effectiveness of several combinations of bleach smear (BS) and direct smear (DS) microscopy on the 1st on spot and 2nd morning sputum specimens of TB suspects.

Method: We measured the incremental cost per smear-positive case detected. A smear positive case was a case with at least 1 positive smear (≥ 1 acid fast bacilli/100 fields). Direct costs included human resources and materials based on a microcosting evaluation. Data were obtained from a prospective field evaluation of BS compared to DS microscopy in 644 TB suspects in an urban health clinic in Nairobi.¹ Ten microscopy combinations were evaluated.

Results: All BS-based combinations detected significantly more cases (between 23.3 and 25.9% for BS on

1st and BS on 1st and 2nd specimens, respectively) than DS of 2 specimens (21.0%). The cost per smear positive detected case ranged between 1.8€ and 3.8€ for BS of 1st specimen and combination of BS on 1st and BS + DS on 2nd specimen, respectively. Approaches based on BS on 1st specimen; BS on 1st and 2nd specimens and DS on 1st and BS on 2nd specimens were the most cost-effective.

Conclusion: Due to its low cost, the BS on the 1st specimen was the best cost effective approach. Nevertheless, the increase of detected cases but also the indirect patients' cost and the cost of missed diagnosed cases (limitations of our evaluation) should also be considered in the choice of the most appropriate diagnostic approach.

Reference

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TB TRANSMISSION AND SPECIAL POPULATIONS

PC-81463-20 Prevention of silicosis and tuberculosis in sandstone mines of Rajasthan, India

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In India, state of Rajasthan is second biggest resource in mineral wealth after Bihar with large numbers of mines in the state. An estimate suggests that nearly 2 million people are engaged in mining in the state. For the drought-impacted state of Rajasthan, mining is a major livelihood option. In the sandstone mines, caused by consistent inhalation of airborne dust particles, mineworkers suffer with Occupational Lung Diseases, particularly with silicosis and silico-tuberculosis. Prevalence of tuberculosis is high among malnourished mineworkers with low immunity. A large number of mineworkers suffer with these and die at premature ages causing great losses to families. The prevalence of silicosis is extremely high among mineworkers in Rajasthan. A sample survey of mineworkers found that 60% suffer from respiratory problems, out of which 28% were silicosis patients. The survey also suggested that over 60% of mineworkers, who have worked in mines for over 10 years, get silicosis. One of the major causes of prevalence of women and child labor in sandstone mines of Rajasthan is silicosis. GRAVIS, an NGO, has been working for the community development in this region for last 25 years and focuses on health safety of mineworkers. The organization has been organizing activities focusing on health education among mineworkers and screening and treatment of patients suffering with silicosis and TB.

It also advocates with government authorities on safety arrangements for workers in the mines. GRAVIS efforts have resulted into an estimated 20% reduction in incidence of silicosis and TB in sandstone mines.

PC-81726-20 Involving workplaces in TB control: experience of BRAC in a peri-urban area of Dhaka city

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Introduction: BRAC an NGO in Bangladesh implementing TB Control Programme in collaboration with national tuberculosis control programme in Bangladesh since 1984. BRAC involved different segments including workplaces.

Objective: To aware factory management authorities and factory workers on basic messages of TB and eliminate TB related stigmas and thus to expand TB services in garments industries.

Methodology: Orientations on tuberculosis were held in selected factories of Dhaka city to establish the DOTS services. Factory workers were oriented on basic TB messages. Orientation of management authority was conducted to sensitize them on workplace TB service. Sputum collection center were organized in the factories. Most of the orientations were held in factory premises in the leisure time. Few of the orientations were conducted outside the factory.

Results: In 2007, in the peri-urban area of Dhaka city, 205 management authorities, 918 factory workers were oriented on TB. Total 172 cases were found sputum positive from the outreach smearing conducted in the factories. Among the identified 3861 cases in 2007 in this area, 468 (12%) patients were factory workers.

Conclusion: Expanding DOTS service in garments industries is urgently needed as most of workers are young women. After sensitization of factory management authorities, the cooperation were enhanced. Leisure period is effective for orientation of workers. Central level institutional support from business sectors is needed to expand services.

PC-82194-20 Feasibility of community-wide isoniazid preventive therapy among South African gold miners

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Setting: TB rates among South African gold miners remain high (>3%/yr) despite well implemented DOTS and routine active case finding. The feasibility of implementing community-wide isoniazid preventive therapy

(CWIPT) 'Thibela TB', in addition to standard TB control, among South African gold miners is described.

Methods: In mine shafts randomly allocated to CWIPT, all employees are invited to participate in the study. Enrollees who do not have active TB, are offered IPT for 9 months. An intensive community education and mobilization programme underpins recruitment and retention efforts, and includes establishing community advisory groups and social marketing using banners, pamphlets, comics, social and sports events, radio and TV. The community mobilization programme was evaluated by focus group discussions.

Results: Between June 2006 and December 2007, 4 mine shafts were enrolled. 14 407 participants consented to the main study. 12 573 were eligible for IPT (87.3%) and 12 310/12 573 (97.9%) started on IPT. In the first two shafts to complete enrolment, 66.6% and 66.7% of the total workforce consented to the study over 9 and 10 months, respectively. Focus group participants reported an exceptionally high awareness of TB, isoniazid preventive therapy, a sense of empowerment against TB and strong support for the study.

Conclusion: Implementing CWIPT is feasible. The vast majority of individuals are eligible for IPT. Community mobilization has supported rapid and large scale uptake of CWIPT.

PC-82344-20 Tuberculosis treatment beginning in hospitals

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Introduction: Most of tuberculosis cases can be treated in ambulatory basis, unless clinical status requires hospitalization. However, a significant part of the patients begins their TB treatment during hospitalization; that means either severity of the illness due to delay or other unwanted conditions.

Setting: All TB registers of new bacillary cases notified in 2006 at São Paulo State, Brazil, that had been hospitalized before or concomitantly to the beginning of TB treatment. TB records were analyzed with respect to reasons of hospitalization, type of health establishments, severity of illness, delay until treatment, type of discharge and treatment outcome.

Objectives: To describe the main reasons of hospitalization, type of institutions responsible for disclose diagnosis, time from hospitalization and the beginning of treatment, and overall outcomes of smear-positive cases that began their treatment at a hospital.

Results: From a total 8429 new smear-positive TB cases, 1519 were hospitalized at any time. From these, 957 had their treatment initiated at a hospital. Private health sector disclosed 133 (14.1%) of the diagnosis. The main cited reasons for hospitalization were acute respiratory insufficiency (295-30.8%), diagnosis elu-

cidation (275-28.7%), cachexia (70-7.3%), hemoptysis (56-5.9%), social conditions (56-5.9%) and AIDS-related reasons (37-3.9%). Average time of permanency at hospital was 30 days, ranging from 1 to 647 days, mean 9 days. While 47.5% initiated treatment within 1 day, 21.9% of the cases delayed more than 1 week to be treated. A total of 158 (21.2%) of these patients evolved to death.

Conclusion: Avoiding nosocomial transmission is one of the greatest advantages of ambulatory treatment, as well as to maintain the patient's social life. In conclusion, patients that begin their treatment while hospitalized have to be analyzed may represent a sign of late detection and possible more severe illness.

PC-81266-20 Comparison of treatment outcomes of smear-converting and non-converting TB patients in prisons, Azerbaijan

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Setting: Specialized Treatment Institution, Ministry of Justice, Azerbaijan.

Aim: To compare treatment outcomes of smear-converting (at the end of the third month of therapy) and non-converting patients in prisons of Azerbaijan from 1995 to 2006.

Methods: This abstract analyzes data from the retrospective cohort study which was conducted jointly by the MOJ and the ICRC in prisons of Azerbaijan from 1995 to 2006. Bivariate analysis was used to assess the relationship between the treatment outcome and the smear conversion variable (converting/non-converting patients). An unfavorable treatment outcome was defined as dead or treatment failure.

Results: In general, treatment outcomes of 4133 detainees, who were smear-positive at the integration to treatment, were available. Among them, 2679 (64.8%) patients had smear-negative results at the end of the third month of therapy. 2178 (81.2%) out of 2679 detainees had favorable treatment outcomes (cured or completed treatment). In bivariate analysis the treatment outcome variable was significantly associated with the smear conversion variable (crude RR = 2.01; 95%CI 1.88-2.14). In other words, this analysis suggests that smear-converting patients (at the end of the third month of therapy) are 2.01 times more likely to finish treatment successfully compared to non-converting patients.

Conclusions: Different risk factors may contribute to the treatment outcome of TB patients, therefore a multivariate analysis is needed to examine the association between the treatment-outcome variable and the smear conversion variable simultaneously controlled by

the effects of the other independent variables (DST results, disease and treatment history, X-ray results etc).

PC-82349-20 Involving prison staff in tuberculosis control

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Since 1996, São Paulo State's prison institutions are called to participate in Tuberculosis Control Program. They are requested to be present at TB meetings, to organize active case-finding activities and to give supervised treatment. Incarcerated population more than doubled in 10 years: from 62 278 in 1996 to 144 430 in 2006. There are now 143 prison units, with 2 general hospitals (1 for males and 1 for females) and 3 mental hospitals. Prisoners with TB are treated either at a common prison or at a hospital, depending of their health general status. For security reasons, prisoners are frequently transferred from one prison to another. In 2006, from a total 1155 TB cases in prisoners, 227 (19.7%) ended their treatment at a different prison than the first that notified it. A total of 184 (15.9%) defaulted or were lost of sight and 157 (14.5%) still lack informed outcome to date. Patients frequently come to a new prison without any document about treatment. A monthly report is released to prison staff asking about notified patient's status, laboratory results and other relevant data. This information is sent back to regional surveillance team to feed TB data base system. TB surveillance system is now web-based. As soon as a transference is registered, an automatic e-mail is sent to the informed destiny. If the data could be put more opportunely, the destiny institution would know about the patient's treatment, avoiding interruptions of the treatment. In February 2008, 125 professionals from the prisional system participated in a routine TB evaluation. In March, 80 of them were trained to enter TB treatment data of their patients. The main aim of this is to shorten the time elapsed between treatment occurrences and the input of data. By collaboration of prison staff we can take opportune actions to avoid defaults when TB prisoners have transfereces or releases from prison, so improving treatment outcomes.

PC-82259-20 Improving HIV services for tuberculosis patients in prisons, Thailand

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Setting: 8 large prisons in Bangkok and Nonthaburi Province.

Objectives: To assess rates of HIV testing and HIV care for TB patients.

Method: TB patients registered between October 2004 and September 2006 were enrolled. All patients were provided provider-initiated HIV testing and counseling (PITC) by prison nurses. TB patients with HIV infection received HIV related care inside prison health care system.

Results: Of the 1296 TB patients, 82.23% agreed to be tested for HIV infection. The HIV testing rates of TB patients increased from 60.1% in 2004 to 91.2% in 2005 and 96.4 in 2006. HIV prevalence from 2004 to 2006 was 50%, 48.4%, and 53.7%, respectively. During three years, 35.42% (388/1096) of HIV positive patients received cotrimoxazole preventive therapy and 14.02% (154/1096) for ART during TB treatment.

Conclusion: HIV services for TB patients in Thai prisons have been improved by the prison health care system at the central level. More collaboration with local health authorities are needed to integrate HIV services for TB patients in provincial prisons where HIV services depend on local hospitals.

PC-81549-20 Major rise in TB notification does not affect transmission in Kenya: results of 3rd national tuberculin survey

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Setting: Kenya has performed national tuberculin surveys among schoolchildren in 1986–1990 and 1994–1996. The number of tuberculosis (TB) cases has increased from 84 per 100 000 in 1994 to 300 per 100 000 in 2005.

Objectives: The third national tuberculin survey aimed to assess the prevalence of tuberculosis infection, BCG coverage, and the annual risk of tuberculosis infection. All estimates will be compared with previous findings.

Methods: A representative sample of school children aged 6–14 years from the 12 study districts sampled in the Kenya National Tuberculin Survey of 1986–1990 and 1994–1996 were tuberculin skin tested using the Mantoux method from September 2004 to July 2007. As in the earlier surveys infection prevalence was estimated by the mirror method with the mode at 17 mm.

Results: In total 99 359 children were registered, 96 925 (97.6%) were aged between 5 and 15 years and 76 376 (78.8%) of these had complete data. 12 108 (15.9%) children did not have a BCG scar and were included in the analysis. The prevalence of tuberculosis

infection in children without BCG scar was estimated at 10.1% with a corresponding ARTI of 1.1%.

Conclusion: The ARTI obtained from the current survey is comparable to that of the 1994–1996 survey and higher than the estimate of 0.6% obtained from the 1986–1990 survey. Also BCG coverage was comparable with 1994–1996 but lower than in the 1986–1990 survey. The survey suggests that tuberculosis transmission has remained the same over the last 10 years despite a massive increase in the number of reported TB cases.

PC-81687-20 Molecular epidemiology of tuberculosis in Cuba: past, present and future

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In the last two decades, the restriction fragment length polymorphism (RFLP), with the repetitive element IS6110 as probe, has been considered a gold standard for molecular epidemiological studies of tuberculosis. Its use has broadened the knowledge about the transmission of tuberculosis, conferring a new dimension to classical epidemiology. Recently, two simpler PCR-based methods, spoligotyping and MIRU/VNTR typing, have also been helpful for genotyping *Mycobacterium tuberculosis* isolates. In the last few years, the MIRU/VNTR typing has been improved with the inclusion or substitution of new loci with higher discriminative power and then it has become a good standard 'candidate' for this purpose. This paper includes a summary of the main molecular epidemiological studies carried out in Cuba, coordinated by the National Reference Laboratory, using RFLP- IS6110 analysis: two population-based studies (in Havana and Cuba), three institutional outbreaks studies, a genetic characterization of drug resistant *M. tuberculosis* strains, and a confirmation of a cross-contamination event. Implementation of a new methodology for routine typing of all the Cuban *M. tuberculosis* isolates is presented, using MIRU typing and RFLP- IS6110 analysis as a first and second typing method, respectively. Finally, we hypothesize about the near future of molecular epidemiology of tuberculosis in Cuba with the introduction of highest resolution genotyping and diagnosing methods, such as DNA microarrays, combination with high-tech informatics tools, and epidemiological investigations. This will allow an accurate and fast detection of infection sources in both institutional settings and the community. This will also contribute to eliminate tuberculosis in Cuba as a health problem.

PC-82440-20 Appropriate definitions of household for tuberculosis contact studies in highly endemic settings

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Setting: Ravensmead, a community with high rates of tuberculosis (TB) in Cape Town, South Africa.

Objective: The term 'household' is often used in TB research as a unit of measurement for transmission; however no standard definition exists. Our study aim was to evaluate a definition of 'household' commonly used in TB contact studies.

Methods: Access to a household was gained via a recently diagnosed adult TB index case. A home visit was conducted to collect comprehensive social and epidemiological household data. Household children (<16 years of age) were assessed for TB infection and disease using a standard contact score for average daily exposure in the preceding 3 months, the Mantoux tuberculin skin test (TST), Interferon- γ release assays, clinical assessment and CXR.

Results: Household enumeration indicated 25 members (9 adults, 4 adolescents and 12 children) of 3 families living in a main house and a fourth family living in an adjacent structure. Families shared a sitting room and kitchen but did not eat or sleep together. Family members' perceptions of contact time reflected less interfamily interaction than known from culturally different communities. There were 6 documented previous episodes of TB in the household in the preceding 5 years; 4 episodes (2 in adults and 2 in children) originated from the same family as the current index case. The 3 children in this family demonstrated the highest contact scores. 11 children were TST positive (median induration 18 mm, range 16–22 mm), 11 were Quantiferon positive, 6 were T Spot TB positive and 1 had active TB.

Conclusions: Social and epidemiological evidence revealed subset differences within the household. Our study illustrates the influence of household definition on the sampling frame and data collection. The definition of household used in contact investigations should be inclusive yet consider socio-cultural aspects of the community participating in the study.

TB AND HEALTH SERVICES

PC-81246-20 The magnitude of initial default at district level in the National TB Control Program of Pakistan

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Setting: After Pakistan has been scaling up the implementation of the DOTS as the National TB control Program, the treatment success rate and defaulter rate are statistically improving. However, there are still many TB patients outside of NTP including the patients who were diagnosed at diagnostic center but not treated there (initial default). Initial defaulter, especially sputum smear positive case could be the threat to public health.

Object: To determine the extent of initial default in NTP program at district level and to investigate the factors related to initial default.

Method: Descriptive cross-sectional study. Study areas were 2 districts (Lahore and Gujrat) supported by JICA (Japan International Cooperation Agency) TB Control project. The number of sputum smear positive patients in the laboratory registry (TB 04) and the treatment registry (TB 03) in Q3, 2007 was compared. Then comparison of initial default and time lag of registration from TB04 to TB 03 among districts and type of facilities were examined.

Results: The initial default rates between Lahore and Gujrat were 22.5% and 0.3% respectively and there was significant difference ($P < 0.0001$). There was no significant difference in the initial default rates between Tertiary/THQ (Tehsil Head Quarter)/DHQ (District Head Quarter) Hospital (3.1%) and RHC (Rural Health Center) (2.0%). Regarding time lag of registration from TB04 to TB03, there were significant differences between type of facilities (Tertiary/THQ/DHQ: Mean = 3.8 ± 5.0 days, Median = 2 days vs. RHCs: Mean = 2.3 ± 5.8 , Median = 1 day, $P < 0.001$) and district (Lahore: Mean = 3.2 ± 3.5 days, Median = 2 days vs. Gujrat: Mean = 2.5 ± 6.0 , Median = 1 day, $P = 0.0019$).

Conclusion: The study revealed that there were initial defaulters from NTP program and the number of initial default cannot be neglected. The duration and area of study would be extended for further analysis.

PC-81619-20 Knowledge, attitudes and practices of slum dwellers with respect to tuberculosis in Delhi, India

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Setting: Two slums (about 1000 households with 10 000 populations) located in New Delhi, India.

Objective: To understand the knowledge, attitude and practices of the slum communities relating to tuberculosis.

Methods: Direct interviews using a structured questionnaire were administered to 200 slum dwellers from systematic randomly selected households. Key informant interviews and four focus group discussions were conducted. Descriptive and bivariate analysis was made. Results were triangulated.

Results: Study was carried out among 200 individuals (100 males and 100 females). Nearly half of the respondents (46%) were in 21–40 years age group, 76% of the females were homemakers and 73% of the male were self or privately employed. TB symptoms commonly identified was coughing up of blood (91.1%) and cough for more than 3 weeks (67%). Significant difference was observed between literate and illiterates with regard to awareness of cough that persists for more than 3 weeks as a symptom of TB ($P = 0.014$). About 60% of the subjects considered X-ray examination the best investigation for diagnosing TB. Slum dwellers understand that TB is caused by worries, tension, poor diet and heredity. Friends and relatives were reported as common sources for TB information (82.5%). Multiple health seeking is a norm and accounts for delay in diagnosis and treatment initiation. Stigma was highly prevalent and knowledge about the availability of DOTS services was poor among the slum dwellers. Difficult access, unfriendly behavior of health staff, and poor availability of drugs were the main reasons for low utilization of public health facilities.

Conclusions: Increased public awareness with contextually and culturally appropriate health messages on DOTS can improve TB case finding and case holding among the slum population. Health providers both public and private, have to be trained to become better communicators and develop their skills in proper management of TB.

PC-81720-20 Enhancing TB control capacity for evaluating public-private mix DOTS sustainability: testing a new tool

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Introduction: A tool to monitor progress toward sustainability was developed to assess the PPMD initiative in the Philippines. The tool evaluated the progress

made toward achievement of the four elements of sustainability: technological, financial-economic, socio-cultural and political viability. A five year strategic direction was prepared and targets were set for each year a PPMD has been operational. Sustainability is determined by measuring the extent targets were met for the 13 sustainability indicators based on year of operation. **Objectives:** To assess the potential for sustainability of PPMD units installed under the Round 2 Global Fund Project.

Methodology: Data on performance of 69 PPMD units from April to June 2007 were gathered based on 13 sustainability indicators. The overall performance of a PPMD unit and its potential towards full sustainability was summarized using a scale in the last section of the tool which contained the targets, actual accomplishments and variances. Criteria on meeting targets are evaluated depending on the corresponding number of operations in years. Promising practices, reasons for variances were identified as well as recommendations and next steps for action.

Results: Performance gathered from 69 PPMD units indicates that 8 (11.59%) PPMD units have high potential for sustainability, 42 (60.87%) have achieved moderate potential for sustainability and 19 (27.54%) have low potential for sustainability.

Conclusion: Majority of the PPMD units evaluated have moderate to high potential for sustainability while 19 units were on the watchlist of priority PPMDs for follow-up. The new tool's classification on PPMDs sustainability performance helps program managers in prioritizing PPMDs for technical assistance and supervision. It also helps implementers to determine areas of priorities for improvement.

PC-81767-20 Decentralisation as a strategy to address major challenges of DOTS services: experience in Nigeria

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Aim: Taking TB services closer to communities by decentralising services to each peripheral health institution from the secondary health institutions.

Design: Kano has a population of 9.3 million spread between 44 Local Government Areas (LGA) and commenced DOTS strategy in 2003. Until recently TB services were obtained in Secondary Health Centres only. In these areas Direct Observation of treatment is difficult with high levels of irregular treatment. It is in view of this that the Kano State TB programme introduced a decentralised model to make TB services more accessible and affordable to communities. Each political ward in the state has a health facility offering TB services.

Methods: Six LGAs with 61 political wards and 57 health facilities were chosen to serve as pilot sites. In these facilities directly observed treatment was put in place and regularly supervised by the LGA TB and leprosy Supervisor. The facilities were linked to the LGA laboratory for the provision of TB microscopy services.

Results: Health facilities referring patients for sputum microscopy increased from one centre per LGA to 8 in all the LGAs and patients travel less than 4 km to access services. We observed an increase in the treatment success rate from 50.02% at 1st quarter 2006 when there was no decentralisation to 76.82% when decentralisation started and a small increase in case detection from 25.08% in 2006 to 26.34% in 2007.

Conclusion: TB services being brought closer to these communities has resulted in improved case holding, referrals and a small increase in case detection.

PC-81929-20 Barriers to accessing tuberculosis care: perception of the population in two selected provinces of Afghanistan

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Objective: To study general population's perception of existing barriers that patients mostly confront in accessing to existing tuberculosis services in rural areas of Afghanistan.

Methodology: A cross sectional study using 30-clusters sampling method. Structured and semi-structured questionnaire was applied to explore barriers from 900 rural inhabitants of Balkh and Badghis provinces aged 15 years and over. Study mainly focused on barriers associated with socioeconomic, personal characteristics and treatment.

Results: About 50.6% of population in two provinces perceived that tendency to hide disease because of public shame. 32.3% of population perceived that patients postponed seeking care due to social rejection. About 48.3% of population perceived that a poor economic condition was one of the major obstacles. About 26.8% of the population perceived that they did not know the TB symptom and that was the reason not to seek care earlier. About 48.0% of population perceived that workload at home was the main reason for postponing the care in middle of treatment. Significant portion of population perceived that tendency to wait for natural recovery and unavailability of diagnostic facilities in local areas were found to be barriers in delaying seeking care.

Conclusion: This study has elicited the perception of rural population of two provinces in Afghanistan on the barriers that patients mostly confront in accessing to treatment services and these barriers must be taken

into account in the decision of intervention to improve case findings and patients' adherence to treatment.

PC-82070-20 Tobacco smoking and patient delay in accessing TB treatment services in Kathmandu, Nepal

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Setting: Three districts (Kathmandu, Bhaktapur, Lalitpur) of Kathmandu valley with 2 million population and a 4% annual risk of TB infection (ARTI).

Objectives: To describe the effects of smoking on patient delay in reaching DOTS centre.

Methods: A cross-sectional study was carried out in 605 TB patients enrolled for DOTS between January and August 2006 in 37 randomly selected DOTS clinic in Kathmandu valley. Direct interviews were done using structured questionnaire. Bivariate analysis and multilevel mixed models were employed.

Results: Among 605 subjects, smoking prevalence was 50%. The median total delay was 114 days for smokers and 90 days for non-smokers. Patient delay was significantly longer in smokers than in non-smokers (60 vs. 45 days, $P = 0.007$). The most frequently reported initial symptom was cough in 86% of the respondents and 41% perceived smoking was the reason for their cough. About 20% of the subjects reported smoking as the main cause of TB. In multilevel analysis, smoking ($P = 0.038$), female sex ($P < 0.001$), illiteracy ($P = 0.002$), unemployment ($P = 0.011$), and symptom 'coughing up blood' ($P = 0.010$) were associated with lengthened patient delay.

Conclusion: Smoking behavior was perceived as one of the main reasons for coughing that influenced delayed in seeking health care. Smoking remained the most significant factor in lengthened patient delay. Early diagnosis and treatment of TB can be enhanced if the TB program includes tobacco control messaging in its public awareness campaigns.

PC-82315-20 PPM contribution to TB case finding: results from a pilot PPM pilot project in Nigeria

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Introduction: The National Tuberculosis and Leprosy Control Programme (NTBLCP) adopted the PPM DOTS strategy among other interventions to reach her set goals and targets for tuberculosis control. The programme as at end of 2007 attained only 31.1% case detection compared to 29.1% recorded in 2006, but the PPM DOTS strategy among other new initiatives being implemented in the programme have contributed to this marginal increase in TB case detec-

tion. Following successes recorded by the programme in pilot PPM project started in Anambra state in 2004, the programme in 2006 started scaling up PPM DOTS services which as at end of 2007 is being implemented in 12 states in the country within limited number of facilities. The PPM initiative has promoted effective partnership and collaboration with the private health care providers in the provision of tuberculosis services and thus leading to increasing TB case detection by the programme.

Method: The aim of our study was to determine the percentage contribution of PPM to total TB cases detected by the National Tuberculosis Programme in the pilot area (Anambra state). Segregation of TB case finding is not practiced in the programme and contribution of PPM to case finding needed for routine programme monitoring and evaluation is often lacking. We looked at all the tuberculosis treatment registers in Local Government Areas where the PPM DOTS facilities are located segregating TB case finding according to facilities noting contribution from PPM sites.

Results: In 2 year period reviewed, 2005 and 2006, percentage contribution by PPM to all forms of TB cases detected was 10.03 and 12.11, respectively. This represented 110 out of 1097 cases (all forms) detected in 2005 and 141 out of 1164 cases (all forms) detected in 2006. Also 12.29% and 11.40% of new smear positive cases representing 84 case out of 744 and 83 out of 728 SM+ cases.

PC-82368-20 Self-reported physician practices in diagnosing smear-negative and extra-pulmonary tuberculosis in Rwanda

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Background: Smear-negative tuberculosis (SNTB) and extrapulmonary tuberculosis (EPTB) pose a diagnostic challenge particularly in resource-limited, HIV-prevalent settings.

Methods: From 1/07–3/07, qualitative interviews were conducted with physicians responsible for the diagnosis and care of patients with TB at the national referral hospital, and two district hospitals. Physicians were asked about their knowledge and practices in diagnosing SNTB and EPTB.

Results: Of 17 physicians interviewed, 14 (82%) were male, the median age was 34 years (range 30–50), all were trained in general medicine or an internal medicine specialty. All physicians routinely used clinical signs and symptoms and sputum smear microscopy results to diagnose pulmonary TB, 16/17 (94%) used chest radiography (CR), only 3/17 reported using history of

risk factors. For SNTB diagnosis, 9/17 (53%) of physicians reported using a trial of antibiotics, 8/17 (47%) used HIV-test results, 2/17 reviewed cases with a clinical review committee. For EPTB diagnosis, 16/17 physicians reported collecting a fluid specimen or tissue for analysis, 14/17 used CR, 13/17 used HIV-test results, 4/17 used echography. Although 14/17 (82%) said they knew the national algorithm, only 8/17 (47%) reported following the algorithm. Barriers to following the algorithm included diagnostic delay, expense to patient and loss of the patient to follow-up. Physicians said that resources such as histology/pathology services, tests free of charge and training were needed. Physicians suggested revising the algorithm to: 1) meet internationally suggested case definitions and guidelines 2) include early HIV-testing 3) provide guidelines for the diagnosis of EPTB.

Conclusions: In practice, most physicians interviewed do not follow the current algorithm for diagnosing SNTB in Rwanda. Resources to improve diagnostic TB services are urgently needed. These data will inform the planned revision of national TB guidelines.

PC-82429-20 Public-private mix for TB control can increase TB case detection in Cambodia

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Background: The *Assessment of Private Providers for Tuberculosis in Cambodia* in 2004 showed that 63% of TB suspects first seek care with private health providers. Private providers do not follow national standard treatment guidelines and often provide incorrect treatments and treatment dosages. The NTP responded by introducing a PPM strategy for TB control.

Objective: To increase TB case detection and prevent emergence of MDR-TB by engaging private providers in TB control.

Method: Phase one of the PPM focused on a referral strategy. Since 2005 the strategy has been implementing in 11 of the 24 provinces. Private providers including pharmacies; cabinets; clinics; and laboratories are asked to refer all TB suspects to the public DOTS services. Providers were trained to make an assessment and make appropriate referrals.

Results: During 2007, 5660 TB suspects were identified and referred by private providers to public DOTS facilities. Among those referred 2899 showed up at public facilities. All of them had sputum examined, 535 were diagnosed as smear positive cases, 814 TB cases were treated under DOTS.

Conclusion: Private providers play a key role in the identification and referral of TB suspects to public DOTS services. Since almost 48% of referred TB suspects did not present at public facilities, a strategy to

allow private providers to diagnose and manage TB cases should be introduced. Increasing the involvement of private providers in TB control can increase case detection and prevent the emergence of MDR-TB in Cambodia.

POSTER DISPLAY SESSIONS

LUNG HEALTH: EDUCATION AND TRAINING/COMMUNITY PARTICIPATION/OTHER

PS-81465-20 Special innovation for enhancing new case detection in hard to reach areas

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Introduction: Tuberculosis is associated with stigma and erroneous beliefs in the minds of people. IEC can bring changes in their beliefs and attitudes. The second phase of RNTCP focused in organizing regular IEC activities for people living in hard to reach areas to promote self reporting of TB cases. GLRA & Swiss Emmaus, two International Organisations carried out IEC campaigns on TB in 26 districts, especially geographically difficult terrains in collaboration with the District Health authorities.

Objective: To assess the role of special IEC campaign in increasing the self reporting of new TB case detection in difficult to reach areas and to make a cost benefit analysis.

Methodology: Three remote PHC's were selected in each district covering an average of 1 lakh population in 4 days time. Orientation on TB and IEC methods were given to all participants. A total of 96 staff including 3 medical officers involved in each campaign. Each worker visited around 100 houses/300 persons every day and educated them on tuberculosis through IPC. Pamphlets on TB, public announcing and display banners were other tools used. Cost analysis was also done.

Results: During the campaign 527885 houses were visited and 2578270 people educated on TB. 3154 suspects were referred to the Health Centres for diagnosis. 1052 new TB cases were diagnosed including 420 sputum positive. It was noted that the new case detection had gone up to five fold compared to pre campaign case reporting. The cost for identification of suspect works out to Rs. 252/-.

Conclusions:

- New case detection has increased in the hard to reach areas.
- Facilitated training of General Health Staff in IEC and suspecting TB cases.

- Feasibility for cost effective coverage of remote and difficult to reach areas for enhancing new case detection.

PS-81477-20 Communication facilitation in RNTCP in 10 districts of Kerala, India: a short-term impact study

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Introduction: To improve the IEC activities and to incorporate newer ideas, Central TB division, Government of India directed all the states to appoint one communication facilitator for five districts each. GLRA-India was allotted ten districts in Kerala state. Two facilitators who are Post graduates in Social Work with experience in health related working fields were appointed from 1st March 2007.

Objectives: To assess the impact of utilizing communication facilitators on the quality of IEC and its impact on case detection and cure rate.

Methods: These two communication facilitators were given special training by the IEC Officer of Central TB Division and were deployed to base stations at Idukki and Kannur. They visited the designated 5 districts for 5 days each and conducted/coordinated IEC activities based on a monthly action plan. In addition they conducted default counseling, DOTS provider meetings, tribal volunteers meetings, sensitization of Tea plantation workers and supporting the DTOs in organizing exhibitions in an innovative way.

Results: The number of effective and planned IEC activities rose by 40% and the internal evaluation teams have reported that awareness on RNTCP and DOTS have shown marked improvement. New smear positive cases in the second quarter showed 4% increase in six districts when compared with the 1st quarter of 2007. There is considerable increase in case detection in 5 districts and reduction in default rate in another 5 districts.

Conclusions: In a short time, there is a demonstrable increase in new case detection and reduction in defaulter. Though all these achievements cannot be attributed to the activities of the communication facilitators alone, certainly the work of these facilitators have contributed significantly for this progress.

PS-81554-20 District hospital clinicians: supporting clinical reasoning to improve HIV and TB care and treatment

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Issues: District clinicians working in high HIV prevalence settings are faced with the challenge of diagnosing TB in HIV infected patients—often with very limited laboratory resources. In addition they are faced with managing patients beyond their current competencies and, as referral is difficult, even complex clinical patients are managed at the district level.

Description: The WHO IMAI Adult Clinical Manual sits alongside the Pocket Book of Hospital Care for Children and simplifies the diagnostic process with sound clinical reasoning. The manual guides the clinician from initial symptom presentation to differential diagnosis tables with key 'in favour' features and advises on further investigations. Diagnosis of smear-negative pulmonary TB and extrapulmonary TB and sorting out complicated TB-HIV patients is supported. Where a definitive diagnosis is not possible, guidelines for the initiation of empiric TB treatment are given. Clear guidance on monitoring response to therapy and initiation of ART are also given.

Lessons learned: This Manual is part of the broader IMAI/IMCI set of tools which address both common acute illness, chronic HIV care and TB-HIV co-management. The manual is one component of the IMAI Second Level Learning Programme with initial training, clinical training videos, casebooks, and clinical mentoring. These all support the process of sound clinical reasoning and ongoing learning after training. The Learning Programme is being developed in collaboration with more than 70 partner agencies with multiple sub-groups, including TB-HIV, ART/OI, oral health, reproductive health, adolescents, mental health, alcohol and other substance use.

Next steps: The care of the HIV-infected patient reaches beyond the specifics of HIV care and ART. The IMAI Second Level Learning Programme aims to support the district clinician in the full scope of patient care within the limitations of the reality of most district hospitals and within a district network.

PS-81559-20 Defaulters study

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Setting: Tashkent City has had 100% DOTS coverage since 2005. Intensive phase treatment is provided on in-patient basis, continuation phase treatment is on an ambulatory basis. Defaulter rates were 18% at time of study conducted. A recent USAID funded and conducted by Project HOPE quantitative study on the problem of default showed that most default occurs late in the intensive phase or immediately upon its completion. Unemployment, 'pensioner' and 'alcohol abuse' are statistically significant risk factors. The study was unable to answer 'Why do patients default?' It did show though that in over 40% of cases, either the

patient 'refused further treatment' or the hospital staff expelled the patient because of misbehavior.

Objective: To further analyze the problem of default in Tashkent and identify ways to reduce it.

Design: 32 in-depth interviews were conducted with defaulters, patients completed treatment and health care providers.

Results: Health workers and patients indicate that lack of information on tuberculosis and its treatment is the main reason for default. There is widespread disbelief that TB is curable. Even patients who successfully completed treatment, are often poorly informed. Other reasons for default are unfriendly attitude of staff, poor general conditions in TB hospitals, financial obstacles also play a role.

Conclusion: TB patients are often poorly informed about their disease and its treatment; communication between patients and health services staff is unsatisfactory. Many TB patients do not want to be hospitalized because of poor conditions in TB hospitals. Addressing these issues might substantially reduce default.

PS-81570-20 TB Ciranda: evaluation of educational project at Sao Marcos School, Municipality of Mogi das Cruzes, Brazil

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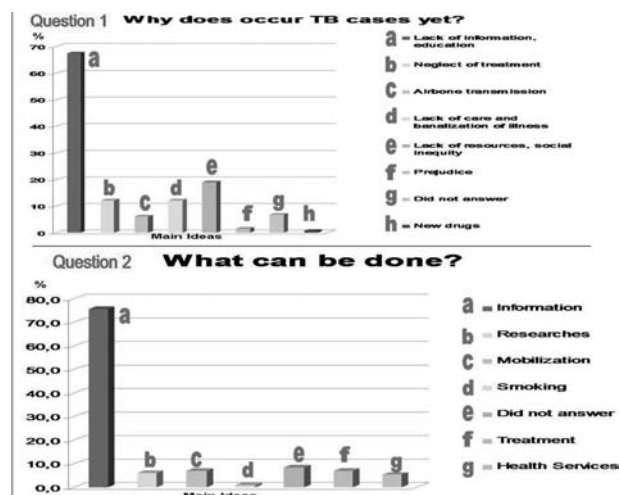
Setting: Private school in the municipality of Mogi das Cruzes, State of Sao Paulo, Brazil.

Objective: Evaluation of educational project called Tuberculosis (TB) Ciranda: an educational project for advocacy with a proposal to use weekdays on schools for activities of culture, art, music and information in the clarification work on TB problem.

Methodology: A qualitative methodology, the Collective Discourse (CD), was used by a questionnaire survey using an internet-based software called quali-quantissoftware (QLQT) The CD is a technique that, using a discourse strategy, allows capturing a pool of social representations to mold imaginary data. The CD consists of a non-mathematical, non meta-linguistics way of representing (and also of producing) in a rigorous way, the collectivity though, which is made by a series of procedures to build the collective statements. Those procedures culminate in a speeches-synthesis which, written on the 1st person of singular, gather responses from different individuals with discourse content of similar sense.

Results: According to the Figure, in question 1 regarding 'why does occur TB yet?' the main ideas were lack of information, education (67.0%); neglect of treatment (12.0%); airborne transmission (6.0%);

lack of care and importance of illness (12.0%); lack of resources, social inequity (19.0%); prejudice (2.0%), did not answer (7.0%); and new drugs (1.0%). In question 2 'What can be done to avoid new TB cases to happen?' the main ideas were information (75.8%); researches (6.1%); mobilization (6.1%); quit to smoking (0.8%); did not answer (8.3%); complete the treatment (6.8%); and health services (5.3%).



Conclusion: TB Ciranda is being used as an advocacy strategy to carry out information into communities as an attempt to disseminate knowledge, replying among peers information and also prevention. In 2008 students from high school assumed the duty to reply TB Ciranda on public schools on a social commitment.

PS-81636-20 Tuberculosis laboratory network in Serbia: education and training programme

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The TB Control Program in Serbia supported by Global Fund grant developed the education and training course for laboratory staff in order to increase their knowledge and improve their skills in bacteriological diagnostics of TB. In total, 65 microbiologists and 128 technicians from all local TB laboratories participated in the repeated three-day courses during 2005 and 2006. The course included lectures and training sessions and was focused on standardized procedures for direct microscopy, culture, drug susceptibility testing (DST) and on recently introduced external quality assurance programs for direct microscopy and DST. Great emphasis was also put on biosafety in mycobacteriological laboratories since a number of the laboratories only recently acquired biological safety cabinets. The immediate impact of the course was assessed by pre- and post-course testing and significant improvement was noted. The average

rate of false answers in the pre-course testing was 42%, while in the post-testing was 22%. The high rate of false answers in the pre-course testing indicated that education of laboratory staff in Serbia was urgently needed. This was also confirmed by the participants whose average grade of effectiveness of the course was 3.92, as assessed on the scale ranging from 0 to 4. The education and training program for laboratory staff was one of the factors that contributed to a significant decrease in TB incidence in Serbia over the last two years.

PS-82151-20 When TB is not in the news

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Aim: To stimulate and promote accurate and informed media reporting of tuberculosis in the print and electronic media in Nigeria and correct myths and misconceptions, Journalists Against AIDS (JAAIDS) Nigeria organized a series of media trainings in 2007 in collaboration with the National TB Control Programme.

Design: Separate training workshops held for journalists drawn from print and electronic media from the Northern and Southern parts of the country. Trainings included interactive sessions that provided policy and practice information regarding TB control in Nigeria. It also included sessions anchored by former TB patients and persons with TB-HIV, site visits to TB diagnostic and treatment centers and TB story ideas development sessions.

Methods: Prior to the training a desk review and content analysis of print media reporting on TB was conducted by JAAIDS, which provided content for the issues to be discussed at the training. Twelve newspapers (12) and four (4) magazines with national spread/circulation were monitored. The survey focused on editorials, opinion articles, news stories, feature reports, letters and adverts. Pre and post workshop evaluation forms were also distributed at the beginning of the training to assess participant's knowledge before and after the training as well as their suggestions for scaling up and improving content.

Results: A marked improvement has been observed in the quality and quantity of TB reports. Prior to training, reports were focused on events and Government pronouncements on TB. Following the training, TB reports reviewed have consistently focused on providing information on TB, its mode of transmission, patients experiences, curability, availability of treatment. Reports are also more investigative in nature.

Conclusion: TB training programmes for the media need to take cognizance of unreported areas and identify practical and innovative approaches to ensure that TB is kept in the news.

PS-81694-20 Success of community mobilisation for TB control in Nepal

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Aim: Nepal is running a successful TB control programme. DOTS strategy was adopted as national policy for tuberculosis control in 1995. By April 2001 DOTS was successfully implemented in all 75 districts of the country. The role of community participation was evaluated for success of DOTS in Nepal.

Design: Study of policy, analysis of data and policy implementation at local levels.

Methods: By review of TB, HIV/AIDS and laboratory activities of Nepal and analysis of reports of National TB Control Programme of Nepal.

Result: 33 439 TB patients are being treated annually through 977 treatment centers and 3115 sub treatment centers in Nepal. Almost 90% of these patients complete their DOTS treatment successfully. DOTS plus facility is available in 8 Centres and 31 sub-centers. Over 400 MDR-TB cases were registered and sputum conversion at six months was more than 70%. More than 4000 DOTS Centers and sub centers are providing service to TB patients. The DOTS centers are getting managerial and moral support from DOTS Committee through advocacy and awareness generation and other means. Each Committee involves the group of motivated people of different field, consisting of 9–16 individuals like local social workers, political leaders, teachers, intellectuals, ex-TB patients, NGOs, health care providers, journalists, etc.

Conclusion: Success in Nepal's TB control is an excellent example of programme implementation through communication participation. Such support and collaboration with local community will be a key to achieve Millennium Development Goals. Effective and productive collaboration with partners including community is also a key reason for excellent progress made by NTP Nepal despite limited resource and difficult terrain.

PS-82120-20 Does community sensitisation affect tuberculosis presentation among residents of Kampala, Uganda?

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Introduction: Advocacy, Communication and Social Mobilization (ACSM) strategies have become vital in controlling tuberculosis (TB).

Objectives:

1 To establish the effect of community sensitization program (CSP) on presentation of TB.

2 To determine the relationship between early case detection and transmission among households with an active TB cases.

3 To determine the relationship between early case detection and better clinical outcomes of TB cases.

Methods: Secondary data analysis of baseline evaluation of the index case of a household contact study was done—data collected in the period of 2004 to July 2007.

Results: The sex distribution was similar in both groups and the mean duration of cough of the index cases that presented and were enrolled was one month from CSP versus the duration of four months of NTP cases. 53.6% of the subjects diagnosed to have TB as a result of CSP presented with weight loss vs. 59.8% of the subjects that were enrolled via National Tuberculosis Program (NTP). 14% of cases from CSP had normal Chest X-ray (CXR) vs. 0.5% NTP cases with normal. The contacts of index cases as a result of CSP had less percent TST positivity than those of NTP, 73.3% had tuberculosis skin test (TST) of 15 mm vs. 63.6% of NTP hence less transmission in the households.

Conclusion: Community sensitization has an effect on presentation of TB, as the cases recruited through CSP presented early with short duration of cough, less weight loss, low smear positivity and minimal CXR grade. Early case detection was associated with less transmission of TB among households with an active TB case. Early case detection does not significantly contribute to better clinical outcomes of TB cases. Community sensitization should be embarked by Ministry of Health as a strategy to control TB in Uganda.

PS-82290-20 Amélioration de l'adhésion de malades tuberculeux au traitement par la remise de diplôme de guérison

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Objectif : Etudier l'amélioration de l'adhésion des malades tuberculeux au traitement en instaurant la remise officielle des 'diplômes de guérison' aux malades à la fin de leur traitement.

Méthode: Les malades dépistés au cours d'un mois (« cohorte mensuelle ») sont organisés en « groupe » appelé « les compagnons » qui se soutiennent mutuellement durant toute la durée du traitement. A la fin du traitement, une remise officielle des « diplômes de guérison » est octroyée aux malades tuberculeux ayant été déclarés guéris. Cette collation est suivie de manifestations de joie (repas, danses), collation à la quelle participent les autorités médicales de la province, les autorités médicales du district sanitaire, les autorités communales, les nouveaux lauréats, les anciens lauréats ainsi que les malades encore en traitement. Parmi

les discours à prononcer, on peut citer le discours-témoignage de nouveaux lauréats profitant discours-engagement des nouveaux malades prenant officiellement l'engagement de dépasser le taux de guérison obtenu par l'actuel groupe.

Résultats: En comparant les résultats de cohorte de NC TPM+ avant l'intervention (2004) et ceux de la cohorte de NC TPM+ avec l'intervention (2006), il ressort que le taux de guérison est passé de 82 à 92%, le taux de transfert a été amélioré de 10% à 2%.

Conclusion: Le résultat global du traitement des nouveaux cas de tuberculose bacillifère de la Ville de Kinshasa obtenu avec la remise de officielle de 'diplômes de guérison' a amélioré l'adhésion des malades au traitement.

PS-81592-20 Factors related to smoking behaviour among youth in East Java, Indonesia

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Aim: In Indonesia, smoking rates among youth have been increasing, smoking prevalence among males aged 15–19 years increased dramatically from 4% in 1995 to 24% in 2001. Indonesia is the fourth most populous nation 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 identify factors related to youth smoking that can be potentially altered by public policy interventions.

Methods: The Surabaya youth survey used a modified version of the Global Youth Tobacco Survey questionnaire concerning smoking among 1630 students in 40 high schools in four cities. Variables that appeared related to current smoking were then analyzed using multivariate logistic regression.

Results: Having family members smoking increased the risk of being a current smoker (OR = 1.73; 95%CI 1.04–2.89). Perceiving that you would get in trouble with your parents if you smoked was highly associated with a reduced risk of being a current smoker (OR = 0.36; 95%CI 0.22–0.59). Smokers, in particular, affirmed many social and personal reasons to smoke. Reporting that your peers smoked increased the risk (OR = 7.85; 95%CI 5.09–12.11) and perceiving that peers were supportive of smoking increased the risk by nearly 22 fold.

Conclusion: Any policy that can reduce the perception that smoking is normal and acceptable will likely reduce youth smoking.

PS-81642-20 New key drivers of HIV transmission among minors and teenagers in Zambia

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Introduction: New key drivers of HIV transmission have been discovered among minors and teenagers in Zambia. These have normally been ignored as mere stages of growth among these children but are now seen as key drivers of HIV transmission. These trends eventually lead to children getting exposed to vices such as child gambling, sex work and crime.

Method: The aim of our study was to determine new risk behaviours among minors and teenage children that expose them to HIV infection. We held discussions with in school and out of school youths, parents, teachers, sex workers and guesthouse owners in three major towns along the trucking corridor of Zambia namely Kapiri Mposhi, Chirundu and Chipata on the behaviour of minors from poverty stricken homes.

Results: In all the discussions we had, we discovered that in all these three towns, there are similar key drivers that expose the minors and teenagers to HIV infection through some of their behaviour. Such behaviour includes involvement in vices such as substance abuse, sex work and eventually leads to crime. Some of the vices the children are engaged in include child gambling, exposure to pornographic materials through watching obscene videos from illegal video shops and transactional sex among students in weekly boarding schools.

Conclusion: There is need for the government and parents to control materials children are exposed to and need to build more community schools and recreation centres that help keep children off the streets and engage them in activities that will benefit their lives.

PS-81673-20 HIV/AIDS risk behaviours and correlates of injection drug use among drug users in Pakistan

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We studied prevalence and correlates of injection drug use, awareness of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and risky behaviors among drug users serviced by a nongovernmental organization catering to drug users in three Pakistani cities (Quetta, Peshawar, and Rawalpindi). Logistic regression analysis was used to identify correlates of injection drug use. Of 608 drug users, 99.8% were male; median age was 32 years, and 44% were married. Most (79.8%) were Pakistani; 15.3% were Afghani. The majority used heroin (98.7%), mostly by inhalation; 15.2% injected

drugs. Only 41% had heard of HIV/AIDS, and 30% had been paid for donating blood. Injection drug use and needle sharing were highest in Quetta. Injecting drug users (IDUs) were nearly twice as likely to have donated blood and to have heard about HIV/AIDS compared to other drug users. Interventions to discourage transitions to injection, increase HIV testing, and safeguard the blood supply in Pakistan are urgently needed.

PS-81712-20 Survey about the ability of the community health organizations in AIDS prevention and control

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Objectives: To find out the ability of the community health organizations in AIDS prevention and control. **Subjects:** 159 community health organizations (CHOs), 25 presidents from CHOs, 178 workers from community administration organizations (CAOs), 486 community health workers, 243 common people and 20 female commercial sex workers (FCSW) in two cities.

Methods: Quantitative analysis and qualitative analysis.

Results: CHOs had quite a few qualified staff and relatively enough equipments to educate people including FCSW on how to avoid infecting HIV and deliver treatment of common opportunity infection (OI) to AIDS patients. Most of CHOs had trained its staff to combat AIDS and had good economic state. Most of the heads of CHOs and staff recognized the importance to combat AIDS and were willing to provide AIDS services. Workers in CAOs also show the willingness to help CHOs to combat AIDS. Local government had made out policies requiring CHOs to provide AIDS prevention services. However, current AIDS services provided by CHOs focusing on health education, lacking depth and width, couldn't satisfy the need of the community people including FCSW. Little funding, staff lacking special training, relatively few health workers working on public health, lacking legal support and discrimination environment were the five main influencing factors.

Conclusions: CHOs have a promising future in playing an important role in educating FCSWs and delivering health care service to AIDS patients at home. More funding, policy support, and special training on AIDS should be given to enhance the CHOs' ability of combating AIDS at community level.

PS-81743-20 Effect of Ramadan fasting on lung function

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Aim: To study the effect of Ramadan fasting on lung function by comparing (FEV₁, FVC and PEFR) in the afternoon of a Ramadan day and after breakfast and during the 1st half of Ramadan, 2nd half and a month after.

Design: This was a cohort study.

Methods: The study was performed on 148 non-smoking Ramadan fasting Muslim healthy girls with a mean age of 16.9 ± 1.33 years from Marrowi higher secondary school for girls, northern Sudan. Spirometry using microplus spirometer and body weight measurements were performed during the 1st half, the 2nd half of Ramadan (in the afternoon then after breakfast) then a month after Ramadan. Data was analyzed with SPSS computer program by comparing the means and using paired sample *t*-test.

Results: FEV₁, FVC and PEFR during the 1st half of Ramadan were found to be as follows; 2.36 ± 0.36 L, 2.44 ± 0.38 L & 364.18 ± 51 L/min compared to 2.21 ± 0.35 L, 2.34 ± 0.35 L & 360.7 ± 48.95 L/min respectively in the last half of Ramadan that both FEV₁ and FVC were found to be significantly higher during the 1st half of Ramadan compared with the 2nd (*P* < 0.05). FEV₁, FVC and PEFR values a month after Ramadan were as follows: 2.36 ± 0.35L, 2.43 ± 0.36 L & 362.3 ± 58.1 L/min respectively that both FEV₁ and FVC were significantly higher a month after Ramadan compared to FEV₁ and FVC values in the 2nd half of Ramadan (*P* < 0.05). Body weight during Ramadan was 48.7 ± 7.91 kg and increased to 48.84 ± Kg a month after.

Conclusion: Body weight significantly increased after Ramadan month fasting as well as lung function values, specially FEV₁ and FVC may be because of the stress induced growth hormone secretion during the month of Ramadan and muscle development including respiratory muscles following Ramadan.

PS-82166-20 VCT for HIV among adolescents in Zambia

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Introduction: About 90% of the population in the developing countries who are HIV positive are unaware of their status, and only 12% of those in need of VCT have had access to these services. It is now known that HIV counseling and testing services are a precursor to Anti retroviral Therapy (ART). However in Zambia these services are not accessible to majority of the people in need especially those in rural areas.

This implies that majority of people in Zambia many of whom are young people are of unknown HIV status. Young people matter in particular because at least half of all new HIV infections are occurring in people under the age of 25. It is appreciated that there has been a tremendous effort in terms of research and programmatic work to stem the spread of HIV among young people in Zambia. It has not been known what young people know or want and their attitude towards VCT. This qualitative study therefore was conducted among other things to capture the voices of young people concerning access and use of sexual and reproductive health information and services; and identify individual and societal factors that influence young people's protective and risk behaviour.

Methodology: Data for this paper were collected from 12 Focus Group Discussions (FGDs) with 103 adolescents aged 14–19 years. The FGDs were held as part of the 'Protecting the Next Generation: Understanding HIV Risk Among Youth' project currently being carried out by most of the AIDS service organisations in Lusaka.

Results: Adolescents knew about voluntary counseling and testing for HIV. Almost all groups indicated that they have ever heard about VCT on radio, posters, etc. However access of VCT was reported as still a problem. The advantages of VCT alluded to were varied. Testing and knowing one's status leads to protection (ABC), living without worry and stress free, make decisions and plan accordingly, live longer and positive. However the disadvantages of VCT outweighed the advantages.

PS-82322-20 Focal groups and tuberculosis perception of prisoners, Sao Paulo State, Brazil

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Setting: The target population were 3224 prisoners of 2 prisons located in Guarulhos, SP.

Objectives: Identify perceptions and social representations about tuberculosis in prisoners with cured or in TB treatment.

Methods: Focal group is an interactive method based in group discussions that aim to investigate the subjective dimensions related to a social process. In Guarulhos in May 2007, each group had about 15 members that shared the condition of being a TB patient cured or not. There were 6 meetings with around 2 hours of discussion, coordinated by 2 researchers. One of them was in charge of developing and stimulating the debate while the other took notes of the speeches. The objectives were achieved when the speeches became recurrent.

Results: The focal group participants demonstrated very little knowledge about TB and the received treat-

ment. The speeches about the subject had an archaic representation about the disease, mainly to its referral concerning the almost impossibility of cure and the difficulties of the treatment. It was clear or evident that there was a deep ignorance about the cause and transmission of TB. They refuse to face the problem, because the solution is out of their control. Meanwhile they are incarcerated the germ spreads free.

Conclusion: 1) When giving information about TB to the prisoners, it must be considerate the deep-rooted social representation connected with a dramatic previous situation that are still alive in social imagination: 'TB as a social punishment; an incurable disease'. 2) All the educative work should be concerned with this subjective dimension that can constitute a barrier to the treatment, stressing the efficacy of the medicine apart from the environmental conditions. 3) By using the TB cured prisoner's statements to help those in treatment.

PS-82470-20 Itinéraire thérapeutique des patients vus en consultation de médecine interne à l'Hôpital militaire d'Abidjan

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Introduction : En Côte d'Ivoire, parallèlement à la médecine moderne, il existe plusieurs autres recours thérapeutiques (médication traditionnelle, médecine spiritualiste, automédication). Le malade, devant cette multitude de recours thérapeutique, n'opère pas toujours le bon choix.

Objectif : Déterminer les différents circuits empruntés par le malade depuis la première manifestation morbide jusqu'à la consultation en médecine interne.

Méthodologie : Etude prospective à visée descriptive, ayant concerné 150 patients vus en consultation de médecine pour la première fois.

Résultats : La population étudiée concerne 74% de civils et 26% de militaires. les principaux itinéraires identifiés sont de 4 ordres :

- l'automédication traditionnelle et moderne (62%)
- le recours aux tradipraticiens (13,30%)
- le recours aux structures sanitaires modernes périphériques (48%)
- les malades vus directement en médecine interne (12%).

Ces différents recours sont marqués par des erreurs tant diagnostiques que thérapeutiques.

Conclusion : Ces pratiques aux conséquences parfois graves, rendent la prise en charge tardive. Des mesures concertées et suivies doivent être mises en oeuvre afin de sensibiliser la population sur la nécessité d'une prise en charge précoce.

TUBERCULOSIS IN HIGH BURDEN COUNTRIES—III

PS-82077-20 Outcomes of tuberculin skin testing in HIV-positive children attending a clinic in Kampala, Uganda

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Background: HIV and tuberculosis (TB) continue to be enigmatic phenomena; HIV infection accelerates the clinical course of tuberculosis and vice versa; therefore it is imperative to screen all patients with HIV infection for the disease. At the Pediatric Infectious Disease Clinic (PIDC) Mulago hospital all clients routinely receive a tuberculin skin test; the purified protein derivative (PPD) on their first visit to the clinic.

Aim: To describe the outcome of PPD among HIV positive children.

Design: A retrospective review—survey.

Methods: Records of 2517 patients who were enrolled between January 2005 and December 2007 and got PPD placed were reviewed. A PPD test was considered positive if the resulting induration was ≥ 5 mm. Chest X-rays and sputum examination (Ziehl Neelsen stain and/or culture for *Mycobacterium tuberculosis*) confirmed TB disease.

Results: Of the 2517 children who received PPD, 1827 (74%) returned for PPD reading; 296 (12%) were positive; 1576 (63%) were negative and. Of those with positive PPD 207 (70%) were confirmed to have TB and 9 (3%) got isoniazid prophylaxis. Of those with negative PPD 208 (13%) were investigated and found to have TB and one received isoniazid prophylaxis. Among the children who did not return for their test to be read 93 (14%) were eventually treated for TB and two received isoniazid prophylaxis.

Conclusion: A positive PPD test in HIV positive children strongly suggests the presence of TB and a good number not returning for their test to be read have tuberculosis.

Recommendations: Paediatric HIV programs need to invest in PPD test and ways of ensuring that children return for reading of the test.

PS-82096-20 Epidemiology of tuberculosis, 1990–2007

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Setting: Residents and migrants in a northern city, China.

Objectives: To study the epidemiological trend of tuberculosis (TB) from 1990 to 2007 and analyze the factors associated with the trend.

Methods: Analysis of data of all pulmonary TB cases from annual TB reports and National internet-based TB case reporting system.

Results: The notification rate of TB for the residents has declined from 45.1/100 000 in 1990 to 37.6/100 000 in 2007. The number of TB cases notified among the residents in 1996 (3589 cases) was higher compared to 1995 (3045 cases) and 1997 (3168 cases). Between 2004 and 2005 the number of cases notified decreased by 24%. The migrants have monitored since 1997. The proportion of patients notified who were migrants has continued to increase from 8.9% (301 cases) in 1997 to 13.9% (623 cases) in 2007. Among the migrant cases notified in 2007, 95.5% (595/623) was in the age-groups 15–24 and 25–34. Cohort analysis of treatment outcomes for 2006 (new cases) showed that smear-positive treatment success was 92.9% for the residents and 65.5% for the migrants. Transfer out is one of reasons as the result of incomplete treatment among the migrants, accounting for 30.5%. The treatment success for new smear-positive and new smear-negative was not very different, 89.0% and 87.4%, respectively.

Interpretation: Tuberculosis Convergence Management policy was issued in 1996 so that it led to the notification rate steeper rise in that year. SARS epidemic in China during 2003–2004 may influence on the TB cases notified in 2004. The incidence of TB has decreased in the residents but is still increasing in the migrants and this is the one factor for TB epidemic in the area. The public health initiatives should ensure sufficient funding to support fight against TB among migrants.

PS-82099-20 Comparison of QuantiFERON TB-Gold In-Tube test with tuberculin skin test: preliminary results of a large cohort in a high TB and HIV prevalence setting

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Background: Evidence evaluating and supporting the use of γ interferon assays in TB diagnosis over the Tuberculin Skin Test (TST) has recently grown. Although these promising results are clear in developed countries, their specific role in high TB-HIV settings remains unclear. We present preliminary data of a sub-study within a larger Community Randomized Trial to reduce TB prevalence in Zambia and South Africa (ZAMSTAR).

Objective: To compare QuantiFERON TB-Gold In Tube (QFT-IT) test with TST for identifying tuberculosis infection.

Method: Between April 2007 and January 2008, 211 household contacts of TB patients were recruited. TST and the QFT-IT tests were done according to the IUATLD and manufacturers' guidelines respectively. Cut-off values of >10mm was used to explore TST positivity.

Results: For 189 household contacts with results for both QFT and TST, 96 (50.8%) were positive by QFT in comparison to 76 (40.2%) using TST. There were 67 discordant results of which 28 (36.8%) were QFT+/TST–, and 21 (27.6%) were QFT–/TST+. Of the contacts that showed no reaction to TST (0 induration), 26 (36.11%) were positive by QFT. Concordance between the two tests was 44.24% (kappa = 0.2) indicating overall poor agreement.

Conclusion: Comparison of the performance of the two tests is difficult since there is no gold standard to measure TB infection and discordant results should be interpreted with caution in our setting. The overall concordance between the two tests was poor. More work is needed to explore the usefulness of QFT in this setting.

PS-82143-20 Contribution of TB screening as part of community-wide IPT to TB case finding among South African gold miners

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Setting: A study of community-wide isoniazid preventive therapy (IPT) in South African gold mines, where HIV prevalence (approx. 30%) and TB incidence (3.5% per year, despite annual radiological screening) are high.

Objective: To estimate i) the contribution of TB screening, as part of IPT, to overall TB case detection in the workforce and ii) the relative yield of symptom and radiographic screening.

Methods: Participants were screened for TB prior to IPT using a symptom check and CXR. All TB suspects identified either by the IPT study or routinely by the mine health service have sputum collected by study staff for microscopy, culture and speciation. We assume that a positive culture identified as *M. tuberculosis* represents a TB case. This analysis is limited to individuals with no prior history of TB.

Results: Between June 2006 and October 2007, 11 077 individuals were screened for TB by the IPT study, which detected 57.7% (120/208) of all TB cases during this period. The proportion of TB cases de-

tected by symptom and/or CXR screening by smear status is shown in the table.

	Smear positive (<i>n</i> = 56) <i>n</i> (%)	Smear negative (<i>n</i> = 64) <i>n</i> (%)
Symptoms only	3 (5.3)	12 (18.8)
Abnormal CXR only	30 (53.6)	43 (67.2)
Symptoms and abnormal CXR	23 (41.1)	9 (14.0)

Conclusion: TB screening as part of the study detected the majority of TB cases in this setting. Radiological screening substantially increases the number of TB cases detected.

PS-82148-20 Factors associated with incident TB in the South African gold mines: a cohort study embedded within Thibela TB

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Background: Thibela TB is a cluster randomized trial to evaluate community wide isoniazid preventive therapy (IPT) in South African gold mines. Understanding current TB epidemiology will be key to interpreting study findings.

Objectives: To estimate incidence of and risk factors for TB in control clusters.

Methods: The cohort comprised a random sample of workers from two control clusters, excluding any on TB treatment, recruited May 06–Feb 07 and followed to 1 Sep 07. Incident TB was defined as individuals starting TB treatment identified routinely by the mine health service. HIV status was determined by self-report.

Results: Among 2249 participants (median age 41 years [IQR 34–46], 97% male, 8% previously treated for TB), HIV result was given by 54% (of whom 12% pos, 88% neg). 38 started TB treatment during 1948.5 pyrs, incidence 2.0 per 100 pyrs (95%CI 1.4, 2.7). TB incidence was higher for those aged 40+ years (IRR = 2.4, 95%CI 1.1, 4.9) and working in the industry for 15+ years (IRR = 2.5, 95%CI 1.2, 5.3), but not associated with living in a hostel (IRR = 1.0, 95%CI 0.5, 1.9) or working underground (IRR = 0.7, 95%CI 0.2, 2.2). TB incidence was also higher for those with self-reported previous TB (IRR = 2.8, 95%CI 1.2, 6.4), any radiological evidence of prior TB (IRR = 3.6, 95%CI 1.7, 7.6) or silicosis (IRR = 5.0, 95%CI 2.3, 11.0). BCG vaccination was not protective (IRR = 1.7, 95%CI 0.7, 4.1). There were trends towards an association of TB contact in the past year (IRR = 1.8, 95%CI 0.9, 3.7) and HIV positivity (IRR = 1.8, 95%CI 0.4, 8.4) with outcome.

The HIV positive sub-group was too small to permit analysis of IPT and ART yet.

Conclusion: Despite a strong TB control programme, TB incidence remains high with several strong risk factors. This highlights the need for innovative control strategies, such as community wide IPT.

PS-82169-20 Study design for interferon-gamma release assays in HIV-infected populations

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Aim: When using tuberculin skin testing (TST) to determine the presence of latent TB infection (LTBI), cut-off values are based on epidemiologic risk factors. An understanding of the relationship between epidemiologic risk factors and cut-off values for interferon gamma release assays (IGRAs), especially in the HIV-infected, is needed.

Design: Literature search.

Methods: We conducted a MEDLINE search to identify IGRA based LTBI studies enrolling HIV-positive subjects that included the antigens CFP-10 and ESAT-6.

Results: Only seven studies met the criteria. For four studies conducted in low burden settings, the average number of HIV-positive subjects was 200; the average was 72 for the three studies in high burden settings. In low burden settings, among subjects not suspected to have active TB, IGRA results were positive for <10%; in high burden settings, >20% tested positive. No age dependent or other epidemiological gradient of test positivity was presented in any paper. Concordance between IGRAs and TST was estimated in only one low burden study and was low: 38%. No study published a gradient in concordance as a function of either CD-4 count, age or other epidemiological risk factor.

Conclusion: A model of concordance as a function of prevalence for fixed values of sensitivity and specificity shows that agreement between IGRAs and TST will necessarily be low in low prevalence settings, regardless of sample size. Studies in high prevalence settings have recruited few subjects, making it impossible to conduct stratified analyses based on epidemiologic risk factors. Greater investment in studies in high burden TB-HIV settings is needed.

PS-82202-20 Analysis of the *rpoB* and *katG* gene mutations of multidrug-resistant strains of *M. tuberculosis* isolated from the TB patients of Bangladesh

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Settings: Tuberculosis Laboratory of the International Centre for Diarrhoeal Disease Research, Bangladesh.

Objectives: This study has been planned with a view to elucidate molecular mechanisms gene mutation associated with multidrug-resistant (MDR) strains of *M. tuberculosis* isolated from the TB patients of Bangladesh and to investigate the prevalence of their genotypic patterns.

Methods: Proportion susceptibility testing method was followed to test susceptibility of *M. tuberculosis* to anti-tuberculosis drugs. A collection of 68 phenotypic MDR strains was included in this study. Sequencing of DNA was performed to detect specific mutation at *rpoB* and *katG* genes. Standard spoligo-typing technique was followed to genotype MDR strains. Spoligo patterns were matched with Spoligo data base to ascertain clade designation.

Results: Both single and double mutations were detected at *rpoB* and *katG* genes. Of 68 MDR strains, *rpoB* mutation was detected in 88.0% strains. The most common *rpoB* mutation was at C1349T ($n = 28$) followed by A1334G ($n = 6$), C1333G ($n = 5$) and A1304T ($n = 4$). *katG* mutation was detected in 85.0% strains. Most common *katG* mutation was detected at G944C ($n = 54$) followed by G944A ($n = 2$) and A823C ($n = 1$). These strains were genotyped into different frequencies of Principle Genetic Group (PGG) 1 and PGG 2 and 3.

Conclusion: *rpoB* and *katG* gene mutation of the MDR strains of Bangladesh differs from data of other Asian countries. Spoligo pattern of MDR strains of Bangladesh was heterogeneous.

PS-82216-20 Provider-initiated HIV testing and counselling of tuberculosis patients in India

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Background: Provider-initiated HIV testing and counselling (PITC) is internationally recommended for TB patients. However, little evidence exists regarding the

feasibility, effectiveness, and impact of this policy on TB and HIV programmes in India. We piloted PITC of TB patients in 2 districts in India considered to have generalized HIV epidemics, Tiruchirappalli (pop. 2.5 million) and Mysore (pop. 2.8 million).

Methods: Implementation of routine provider referral of all registered TB patients to the nearest HIV voluntary counseling and testing center (VCTC) was initiated in both study districts in June 2007. Healthcare providers were instructed to encourage all patients to know their HIV status. Patients with a prior positive HIV test result or a negative result within 6 months were exempt from the referral. Field investigators assessed PITC practices and abstracted data from routine TB and HIV programme records to determine the proportion of TB patients appropriately evaluated for HIV infection.

Results: Between June–September 2007, 2202 TB patients were registered in both study districts (Table). Of the 2015 patients eligible for PITC referral, 1086 (49%) were referred to a VCTC, and 881 (40%) were HIV tested. Including patients whose HIV status was known prior to TB diagnosis, PITC implementation resulted in the ascertainment of HIV status for 1031/2202 (47%) of TB patients. Overall, a minimum of 115 (5.2%) TB patients were HIV-infected.

Table Referral outcomes and HIV-status of TB patients, Tiruchirappalli and Mysore Districts, India, June–September 2007

	Number	Percent
Total TB patients registered	2202	100.0
Eligible for HIV testing referral	2015	91.5
Referred for HIV testing	1086	49.3
HIV tested	881	40.0
HIV status of TB patients		
HIV-negative	916	41.6
Tested negative before TB diagnosis	110	5.0
Tested negative after TB diagnosis	806	36.6
HIV-positive	115	5.2
Tested positive before TB diagnosis	65	3.0
Tested positive after TB diagnosis	50	2.3
Unknown HIV status	1171	53.2

Conclusion: During PITC implementation, 47% of TB patients had HIV status successfully ascertained. The low proportion of patients referred for HIV testing suggests ineffective PITC implementation and requires further evaluation. Even with suboptimal PITC implementation, 5.2% of all TB patients were identified as HIV-infected, enabling referral for life-saving anti-retroviral treatment. Patient interviews are ongoing to provide further evidence for optimal large-scale programme implementation.

PS-82239-20 MDR-TB rate among different types of retreatment cases seen at the DOTS Centre in Makati, Philippines

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Setting: Recently, culture and drug susceptibility test (DST) of all previously treated patients and for those who fail to convert on the third month of treatment was made a policy.

Objective: To determine the prevalence of MDR-TB among retreatment cases screened in the three treatment centers.

Methods: This is a case series of 2219 previously treated patients screened from January 2006 to December 2007.

Results: Culture was positive in 1164 (52.4%) of 2214 previously treated patients and DST in 684 patients demonstrated MDR-TB in 486 (71%) multi-drug-resistant-TB (MDR-TB) was noted in 74% of patients with prior DOTS treatment compared to 67.6% of patients treated out of the DOTS. MDR-TB was noted in 96% of patients with Category II failure, 94.5% Category I failure, 88.9% of Category II non-converters, 42% who relapsed after Category I, 68.4% after Category II, 15.4% patients who returned after default (RAD) from Category I and 23.5% from category II.

None of the isolates from prior failures of Category I and II were pansusceptible compared to 40% and 17.6% of patients who relapsed after prior Category I and II regimens, respectively; and also in 69.2% of those who returned after default from Category I and 70.6% for those from Category II.

Outcome of prior treatment	No Tested	No (%) culture positive	No (%) of DST done	No (%) MDR-TB	No (%) DR-TB	No (%) Susceptible
Category I Failure	66	46 (69.6)	37	35 (94.5)	2 (5.4)	0
Category II Failure	331	287 (86.7)	150	144 (96)	6 (4)	0
Category II Nonconverter	62	51 (82.2)	27	24 (88.9)	3 (11.1)	0
Category I Relapse	214	73 (34.1)	55	23 (42)	10 (18)	22 (40)
Category II Relapse	236	97 (39.4)	57	39 (68.4)	8 (14)	10 (17.6)
Category I Default	76	32 (42.1)	26	4 (15.4)	4 (15.4)	18 (69.2)
Category II Default	48	25 (52)	17	4 (23.5)	1 (6)	12 (70.6)
Total patients on DOTS	1033	511 (57.6)	369	273 (74)	34 (9.2)	62 (16.8)
Total patients outside DOTS	1186	553 (46.6)	315	213 (67.6)	32 (10.2)	70 (22.2)
All patients tested	2219	1164 (52.4)	684	486 (71)	66 (9.7)	132 (19.3)

Conclusion: The high yield of cultures and the high proportion of MDR-TB patients in those who had received previous anti-tuberculosis treatment validates the policy of doing culture and DST in all patients who have been previously treated. Empiric Category IV treatment may be appropriate for all failures from

either Category I and II as well as non-converter of Category II. Category II treatment would be beneficial to 84% of those who return after default of Category I and 76.5% after default of Category II but would not benefit 41% of patients among those who relapse after Category I and in 64% among those who relapse after Category II.

PS-82323-20 Gender differences in HIV testing and infection among tuberculosis patients in pastoralist settings in Kenya

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Background: In Kenya, an estimated 28 percent of new tuberculosis (TB) patients are co-infected with the human immunodeficiency virus (HIV). Testing for HIV infection among TB patients is an important public health strategy to assess the burden of HIV in high-risk patients, identify and appropriately care for those found to be co-infected and prevent further transmission. Little research currently exists describing gender differences in uptake of HIV testing and prevalence of HIV infection in TB patients in hard-to-reach pastoralist societies.

Methods: To address this gap, this study was conducted using cross-sectional data from three district hospitals in northern Kenya. Consecutive adult TB patients were interviewed and demographic, clinical, and risk factor data were collected and analyzed. HIV tests were offered to all TB patients.

Results: Of 160 male and 139 female TB patients, 13% of males and 15% of females had been previously tested for HIV infection prior to TB diagnosis. A significantly greater proportion of men (29%) than women (17%) declined an HIV test during TB treatment ($P < 0.05$). Among TB patients tested, 55 (48%) women and 38 (33%) men were infected with HIV ($P < 0.05$). The most frequently reported reason among both men and women for declining an HIV test was the belief among patients that they were not at risk for HIV infection, followed by fear of sickness, death or stigma. Among men, being separated, divorced or widowed, having less TB-HIV knowledge and being diagnosed with extra-pulmonary TB were associated with declining an HIV test. Higher socio-economic status and living in an urban area were factors related to declining a test among women.

Conclusion: The role of these results in informing gender-based TB-HIV prevention efforts among at-risk men and women in pastoralist populations will be discussed.

PS-82348-20 Failure of anti-tuberculosis treatment: predictive factors and analysis of undernotification

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Setting: In 2005, only 208 cases in treatment with scheme III were identified in Brazil. The analysis of the cohort of new and re-treatment cases showed that 1% of the cases submitted to first-line treatment progressed to treatment failure.

Objective: To estimate the magnitude of the undernotification of TB treatment failure, to study its implications for the outcome of the cases and to identify possible risk factors.

Design: Descriptive exploratory study.

Methods: Probable cases of treatment failure not previously recognized were identified by means of combining the results of specific variables called 'marker conditions' and by identifying cases of multidrug resistant TB (MDR) using probabilistic record linkage between the Sinan and the MDR database; these cases were separated into four mutually exclusive categories, ordered from the least to the most stringent selection criteria.

Results: In the period from 2000 to 2005, 1552 records of treatment failure had been officially recognized. The use of the proposed methodology led to the identification of 9299 further probable records, which represents an undernotification rate of 85.7%. Among the records of treatment failure, there is a predominance of cases with recurrent returns to the system, reported as returns after default or relapses and with prescription of therapeutic schemes inappropriate to the type of entry. As compared with records of cases without treatment failure, records of cases with treatment failure had higher proportion of progressing to unfavorable outcomes (RP = 2.68) with a high proportion of treatment defaults (32.9%) and MDR (11.9%).

Conclusion: There are deficiencies in the way the records of cases of treatment failure are reported to the official notification system. Data currently released by the Brazilian National TB Programme needs to be reviewed. Special attention must be given to cases of treatment failure to increase their chances of cure.

PS-82350-20 Identification of *Mycobacterium tuberculosis* Beijing strains in tuberculosis patients in Peru

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Settings: Tuberculosis is an infectious disease known to be a major cause of deaths in the world causing 1.6 million deaths annually. Currently, the strategies to control tuberculosis are threatened by the emergence of multidrug-resistant (MDR-TB) and the spread of highly virulent strains like the Beijing strain.

Methods: During 1999 and 2004, a total of 900 tuberculosis patients with positive culture from Lima, Peru, were studied as part of several projects, and sputum samples were collected. A total of 825 *Mycobacterium tuberculosis* clinical strains were randomly selected, of which 275 corresponded to HIV patients. The totality of the strains corresponded to the first sample. *M. tuberculosis* was grown in Löwenstein-Jensen medium. DNA was extracted by proteinase K digestion and phenol-chloroform precipitation. 50 ng of DNA per sample was analyzed by spoligotyping.

Results: A total of 182 unique strains were identified, from which 40 corresponded to the Beijing strain as being positive only to the direct repeat spacers 35–43. From the 825 isolates, the Beijing strains were uniformly distributed across the main regions of Lima. 2.8% (2/71) were found in the east region of Lima, 5.1% (8/158) were found in the north region, 6.0% (20/335) were found in the south region. Regarding the HIV population of Lima, 3.8% (10/261) of patients were found to have the Beijing strain.

Conclusion: These results show that *M. tuberculosis* Beijing strains are currently widely spread in Lima, where approximately 62% of all the tuberculosis cases and 82% of all the MDR-TB cases in Perú are located. This is an alarming signal to be considered in a national public health context.

PS-82352-20 Age-dependent incidence and mortality due to extrapulmonary TB

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Objective: To assess incidence and mortality by type of extrapulmonary tuberculosis (EPTB) and age.

Methods: Data from TB patients in Kinshasa, Democratic Republic of the Congo, were collected using routine TB treatment cards. Patients were offered HIV counseling and testing. TB diagnosis was made by primary health care providers based on symptoms, clinical exam, smear microscopy, and radiography if indicated. For analysis, data from each patient was placed into one of 5 categories based on patient age in years: 0–15 years, 16–25 years, 26–35 years, 36–45 years and older than 45 years. For all analyses, the 26–35 year old patients were used as the referent group.

Results: Between January 2006 and January 2008, data were obtained from 6367 patients; 5086 (80%)

were diagnosed with pulmonary TB and 1275 (20%) were diagnosed with EPTB. Patients 0–15 years old were most likely to present with EPTB. In this age group, 45% of TB cases were diagnosed as extrapulmonary. Patients in the 16–25 year old category were least likely to present with EPTB (13% of cases). Patients younger than 16 years of age had the lowest risk of death of EPTB during the treatment period (risk ratio (RR) 0.3, 95%CI 0.1, 0.7). Among those diagnosed with EPTB, children age 0–15 years old had the greatest odds of having lymphatic TB (odds ratio (OR) 3.6, 95%CI 2.5, 5.0) but had the lowest risk of death from lymphatic TB during the treatment period (RR: 0.2, 95%CI 0.1, 0.8). Overall, the odds of having lymphatic TB decreased as age increased. Patients 0–15 years old had the lowest odds of presenting with pleural TB (OR 0.1, 95%CI 0.1, 0.2) and abdominal TB (OR 0.3, 95%CI 0.1, 0.9). Independent of age, patients with abdominal and pleural EPTB had the highest risk of death during the treatment period.

Conclusions: Patients under 16 years of age were most likely to present with EPTB, especially lymphatic TB, but were the least likely to die from EPTB, independent of the site of EPTB.

PS-82369-20 Références des patients tuberculeux du centre antituberculeux d'Adjamé, Abidjan, Côte d'Ivoire

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Introduction : Tuberculose problème majeur de santé dans grandes villes pays en voie de développement. Besoins de déconcentration des gros centres particulièrement le Centre Antituberculeux d'Adjamé (30 à 35% des tuberculeux du pays). Quelle situation des tuberculeux référés dépistés au CATA vers les CDT. Objectifs :

- Décrire évolution des références de 2002 à 2007
- Décrire résultats des références vers les CDT en 2007

Méthodologie : Etude prospective des tuberculeux dépistés et référés à partir du CATA vers les CDT d'Abidjan. Tout sexe et toutes formes de TB confondus de 2002 à 2007.

Résultats : Evolution références de 2002 à 2007 : 2002 = 180 cas ; 2003 = 688 cas ; 2004 = 1208 cas ; 2005 = 1455 cas ; 2006 = 1724 cas ; 2007 = 1316 cas. Résultats références en 2007 : 6348 cas suivis au CATA, 1316 cas référés dans les CDT suivants : HG Abobo Nord (119), FSU Abobo Sud (429), FSU Com Anonkoua Kouté (166), FSU Yopougon Attié (134), FSU Com Yopougon Toit Rouge (103), CAT Treichville (111), HG Port-Bouët (40), CAT Abobo (124), HG Anyama (66), CAT Koumassi (24).

Conclusion : Bonne évolution des références de 2002 à 2007. Nécessité de déconcentration des gros cen-

tres. Problème tuberculose demeure dans les grandes villes.

PS-82402-20 WHO TB retreatment category predicts resistance in hospitalised TB retreatment patients in a high HIV prevalence

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Background: Multidrug resistant (MDR) tuberculosis (TB) is currently as high as 7.5% in retreatment cases in the province of KwaZulu-Natal, South Africa. The recent outbreak of extensively-resistant (XDR) TB occurred in the same province as our hospital. TB retreatment cases harbor more resistant TB organisms to standard TB treatment than new TB cases.

Objective: To determine if the WHO retreatment categories predict susceptibility patterns, and outcomes in a hospitalized population of retreatment TB cases in an area of high HIV prevalence.

Methods: All 252 consecutive admissions from 1 June to 31 December 2006 to a TB hospital were analyzed retrospectively. 93 patients had positive cultures for which culture and drug susceptibilities were available. Treatment category, outcome, resistance patterns were recorded.

Results: In the cohort of 93 consecutive retreatment cases with sputum positive cultures for *M. tuberculosis*, 75 cases (78.9%) had strains sensitive to all first line drugs, and 12 cases (12.6%) had MDR of which 3 cases were XDR. Death occurred in 22 patients (23%) in the cohort studied. Increased resistance was associated with increased mortality. Amongst the TB retreatment categories, treatment failure or interruption categories contained more TB resistant strains than the after cure and completion retreatment categories, although a trend was noted statistical significance was not achieved. We are currently analyzing one more year of data that will be presented at the conference.

Conclusion: To be presented at the conference.

PS-82425-20 Tuberculosis case detection rate in Cambodia: a challenge when incidence is declining

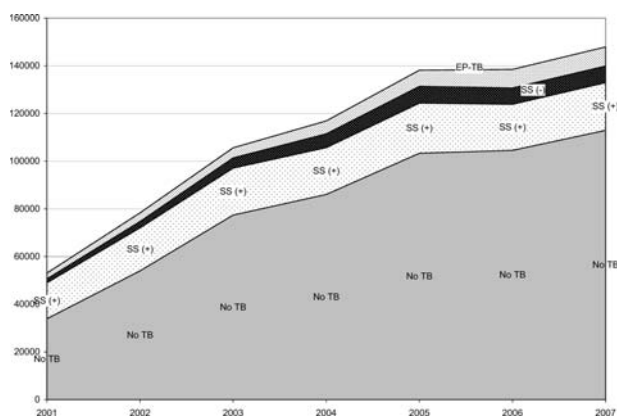
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Aim: To describe and analyze CDR in Cambodia, in relation with the trends of the number of TB suspects

screened, TB cases detected, and TB suspects who are sputum smear positive. Despite increasing case detection efforts in Cambodia, the CDR ss (+) target of 70% has not been achieved steadily. WHO estimated that the incidence declines in Cambodia 1% by year, which also affects the CDR calculations.

Methods: Descriptive study. Data was collected from the NTP records from 2001 (scale-up of DOTS services) to 2007. Indicators were calculated following WHO guidelines (WHO/HTM/TB/2004.344).

Results: In 2001, 183 316 sputum examinations were carried out, leading to the identification of 15 082 cases of smear-positive tuberculosis. In 2007, 466 308 smears were examined from 135 436 suspects and 19 421 patients were diagnosed. CDR ss (+) increased from 47% to 66%. The rate of smear positivity in persons with respiratory symptoms was 28.6% in 2001, 15.5% in 2004 and 13.3% in 2007.



Conclusion: Although the number of TB suspects screened and the number of TB cases increased along the period of study, the CDR ss (+) still is below of 70% in Cambodia. Since the target for the suspect positivity rate is 10%, clinicians should refer more patients for sputum smear examination. Additional efforts to raise TB awareness in clinicians should be done in order to reach the CDR. Potential impact of the declining incidence should be addressed through a prevalence survey.

PS-82443-20 A comparison of mycobacterial isolation and extent of radiological PTB in two high-burden African countries

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Rationale: Clinical experience suggests that the radiographic appearance of pulmonary tuberculosis is different in Zambia and South Africa.

Objectives: To compare isolation of mycobacteria and the radiographic extent and presence of cavities in bacteriologically confirmed pulmonary TB cases in South Africa and Zambia.

Methods: TB prevalence surveys were done in two communities in South Africa and two in Zambia. Each consenting participant had a questionnaire completed and a sputum sample collected for smear and culture. Every participant with a positive culture was followed-up—a chest radiograph (CXR) was taken and all were referred to the primary health centre for clinical management. The CXRs were read by two independent qualified readers according to the Chest Radiology Review System (CRRS).

Results: 445 participants had positive mycobacterial cultures and evaluable chest radiographs. In Zambia, 48 had *M. tuberculosis* and 216 had non-tuberculous mycobacteria identified. In South Africa, 115 had *M. tuberculosis* and 66 non-tuberculous mycobacteria. The radiographic extent of cases with *M. tuberculosis* was not significantly different between those from Zambia and those from South Africa with 41.7% and 49.6% respectively having disease involving more than one apex ($P = 0.36$). Cavities were present on the X-rays of 35.4% of cases from Zambia and 49.7% of cases from South Africa ($P = 0.09$). Interestingly enough, the difference in NTM-prevalence was statistically significant ($P < 0.05$).

Conclusion: NTM-prevalence between Zambia and South Africa differs significantly. This may be the reason for the clinically observed difference in radiographic appearance of cases of pulmonary tuberculosis between Zambia and South Africa. The influence of HIV-infection as a secondary risk factor must still be evaluated.

EPIDEMIOLOGY: ASTHMA AND OTHER

PS-82094-20 Airborne furry pet allergens and fungal DNA in Swedish allergen avoidance and conventional day care centres

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Introduction: Day care centers are important indoor environments. The aim was to compare allergen levels and fungal contamination in 'allergen avoidance day care centres' (AADC), not allowing pet keeping among staff or the children's family, and ordinary day care centers (ODC).

Design: A total of 11 AADC and 11 ODC were studied (70 rooms), studying levels of allergens and fungal

DNA in AADC and ODC, and associations with indoor factors.

Methods: Dust was collected by swabbing 60 cm² of the upper part of the door frame by a cotton swab, or by Petri dishes exposed 6–8 days to the air. Moreover, dust was collected by vacuum cleaning settled dust on special filters (ALK). Allergens were analysed by two-side sandwich ELISA, and fungal DNA by quantitative PCR. Data on fungal DNA in day care centers were compared with data on building dampness obtained from building inspection.

Results: The cat allergen (Fel d 1) level (GM) in AADC and ODC was 0.4 and 2.4 ng/m² and day, respectively ($P < 0.001$). The dog allergen (Can f 1) level (GM) was 2.1 and 4.1 ng/m² and day ($P = 0.001$). The horse allergen level (Equ c x) in AADC and ODC was 1.1 and 2.0 ng/m² and day ($P = 0.01$). Any fungal DNA was detected in 89% of the rooms (cotton swabs), *Aspergillus/Penicillium* DNA in 34%, and *Stachybotrys* DNA in 6%. Total allergen level was higher in older buildings ($P < 0.001$), and related to amount of carpets ($P < 0.001$), textile factor ($P < 0.001$), and pot plants ($P < 0.001$). Total fungal DNA was higher in rooms with linoleum as compared to PVC floor ($P = 0.02$), and related to amount of carpets ($P = 0.03$), malodour indoors ($P < 0.001$), and total allergen levels ($P = 0.003$).

Conclusion: AADC have lower levels of furry pet allergens in the air, particularly cat allergen. The association between fungal and allergen contamination indicate a general 'hygiene factor'. Analysis of allergens and fungal DNA on petri dishes or cotton swabs can be used to monitor indoor bioaerosols.

PS-81400-20 Asthma prevalence and severity among primary school children in Baghdad, capital of Iraq

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Objectives: To measure the prevalence of asthma and its severity among primary school children in Baghdad. **Methods:** A random sample of 3360 primary school children of both sexes was collected. Standardized questionnaire was completed by their parents.

Results: Response rate was 86%, male to female ratio was 0.75:1, age range was 6–12 years in the study population. Prevalence of wheezing ever was 25%. Wheezing during the last 12 months was 19.9%; only 3% of them developed >12 attacks. Nocturnal wheezing attacks were reported by 16.3%, only 3.1% of them were suffering >4 attacks per month, 10.5% of children demonstrated severe attacks limiting speech. Prevalence of asthma ever was 22.3%. Asthma was detected in 81.9% of those with wheezing in the last

12 months. Among children with wheezing ever; males were predominant, while among children with asthma ever; females were predominant. Prevalence rates of both asthma and severe asthma symptoms decreased with increasing age.

Conclusion: Asthma is a major health problem in Baghdad.

PS-81415-20 Asthma prevalence in adults in Kassala area, East Sudan

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Objectives: To study asthma prevalence in adults in Kassala university, east of Sudan.

Methods: A cross sectional study was performed in Kassala University during the year 2007 including students and employees. A modified adult version of ISAAC questionnaire was distributed to 803 subjects aged 18–67. The questionnaire covered personal data, asthma symptoms, allergy symptoms, environmental factors and asthma medications. Pulmonary function tests and skin prick test for common allergens were performed to all symptomatic subjects.

Results: 57.5% of the samples were females. 15.2% of all subjects have asthma symptoms but only 6% of the sample showed positive reversibility test for asthma. The prevalence of asthma symptoms was significantly higher among females than males (1.9 fold). The most common allergen is dust.

Conclusions: The prevalence of asthma symptoms in adult Sudanese in Kassala area seems to be higher than Khartoum area. The environmental factors analysis might lead to possible causes.

PS-82146-20 Asthma symptoms among pupils in Korea and China in relation to microbial exposure in the school environment

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Aim: There is little information on respiratory effects of microbial exposure in schools.

Design: The study compares data from three elementary/junior high school studies in Korea, and Taiyuan and Shanghai, China. The aim was to study if microbial exposure in classrooms is associated positively or negatively with asthmatic symptoms and airway infections in pupils in China and Korea.

Methods: The pupils received a self-administered questionnaire, totally 4630 participated (90–99% participation rate). Settled dust was collected in classrooms by vacuum cleaning (ALK-filters) and analysed by tandem

CG-MS for the concentration of 3-hydroxy fatty acids (3-OH FAs), marker of lipopolysaccharide (LPS) from endotoxin, muramic acid (MuA) marker of bacteria, and ergosterol for fungi. All data collection was performed in winter season. Multiple logistic regression was used.

Results: Airway symptoms during the latest 12 months was common, particularly daytime breathlessness after exercise. In Korea, wheeze was negatively associated with MuA. Daytime breathlessness was negatively associated with ergosterol, and positively associated with MuA. Nighttime breathlessness was negatively associated with ergosterol. There were no associations with total LPS and symptoms in Korea. In Taiyuan city (north China), wheeze was negatively associated with MuA. Daytime breathlessness was negatively associated with MuA and ergosterol, but positively associated with total LPS. In Shanghai (south China), there were no association between wheeze and microbial contamination. Daytime breathlessness was negatively associated with both MuA and total LPS. Respiratory infections were positively associated with ergosterol and negatively associated with LPS.

Conclusion: The level of fungal and bacterial contamination and associations differed between the different areas in China and Korea. Microbial exposure at school can be both protective and a risk factor.

PS-81281-20 HIV prevalence among TB patients in Gulab Devi Hospital, Lahore, Pakistan

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Aim: To estimate the prevalence of HIV infection among newly diagnosed TB patients in Gulab Devi Hospital, Lahore, Pakistan.

Design: Cross-sectional study.

Methods: A hospital based cross sectional study was carried out on a sample of 500 newly diagnosed TB patients registered for HIV testing in the study at Gulab Devi Hospital, Lahore, Pakistan, using consecutive sampling technique. Unlinked anonymous HIV testing was done. Basic laboratory and demographic data was collected by trained health workers using an interviewer administered questionnaire. Statistical analysis was done using SPSS version 11.

Results: This study showed that none of the TB patients registered for the study were found to be HIV positives. Among study group (TB patients) males are found to be more than female as male to female ratio is 2:1. Maximum study population, 120 (24%) were in age groups of 20–29 years and there were 10 patients in age group of 90+ years.

Conclusion: HIV prevalence among TB patients in this study was zero. This might be due low HIV prev-

alence status in Pakistan. According to the WHO, if HIV infection rates are lower in adult populations, HIV among new TB patients will be lower. This WHO statement embeds the finding of this study. It can be concluded that the HIV epidemic, has not started affecting TB epidemic, as yet, in the study area.

PS-81322-20 Tuberculosis suspicion and knowledge among private and public general practitioners in Oman

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Aim: To measure TB suspicion and knowledge among private and public sector general practitioners using clinical vignette-based survey and structured questionnaire.

Design: Cross-sectional study.

Methods: One questionnaire assessed demographic information and had 10 short clinical vignettes of TB and non-TB cases. The second questionnaire had questions on knowledge of TB, its diagnosis, treatment, follow up and contact screening based on Ministry of Health policy. TB suspicion score and TB knowledge score were computed and analyzed.

Results: A total of 257 GPs participated in the study of which 154 were private GPs. There was a significant difference between private and public GPs in terms of age, sex, duration of practice and nationality. Among all GPs, 37.7% considered TB as one of the three most likely diagnoses in all 5 TB clinical vignettes. Private GPs had statistically significantly lower TB suspicion and TB knowledge scores than public GPs in both simple and multiple linear regression analysis.

Conclusion: In Oman, GPs appear to have low suspicion and poor knowledge of TB, particularly private GPs. To strengthen TB control program, there is a need to train GPs on TB identification and adopt a Private Public Mix (PPM) strategy for TB control in Oman.

PS-81587-20 Spoligotypes of *Mycobacterium tuberculosis* in Taiwan

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Introduction: Tuberculosis remains a leading notifiable infectious disease in Taiwan. In 2006, there were 15 378 confirmed TB cases with the incidence rate of 67.38 per 100 000 people. According to the SpolDB4 database, the Beijing family, East-African-Indian (EAI) and T lineages are prevalent in the Far-East Asia region (approximately 50%, 30% and 10% respectively). To

understand the predominant spoligotypes and their impact on transmission, we investigate the population structure of *Mycobacterium tuberculosis* complex in Taiwan.

Materials and methods: From 2003 to 2006, a total of 5949 isolates were collected from clinical mycobacteriology laboratories distributed in four regions of Taiwan. Spoligotyping was performed by using a commercially available kit (Isogen Bioscience BV, Maarssen, The Netherlands). The results were analyzed with Bionumerics® software (version 4.601; Applied Maths, Kortrijk, Belgium). The spoligotypes were assigned according to the international database SpolDB4.

Results: There were 206 designated spoligotypes and 434 novel patterns found in this study population. The results revealed that the major prevalent genotypes of *M. tuberculosis* circulated in Taiwan were Beijing (38.3%) followed by Haarlem (15.8%), EAI (11.2%) and T (9.7%) lineages. Beijing and Haarlem lineages were evenly circulated in four regions, while EAI and T lineages were predominant in the southern and central regions of Taiwan, respectively. Of 1129 (19.0%, 1129/5949) undesignated isolates, 5.2% and 15.1% could be further defined as Beijing-like and Haarlem-like lineages, respectively. Nevertheless, there were still 899 (15.1%, 899/5949) isolates with novel spoligotypes.

Conclusion: Genetic diversities of *M. tuberculosis* were observed and further phylogenetic study is needed to classify isolates with novel genotypes in Taiwan.

PS-81622-20 Tuberculosis in Taiwan: preliminary evaluation of National TB Programme for halving TB in a decade

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Background: Taiwan launched a new TB program in 2005 to halve TB in a decade. The study aimed to analyze incidence and mortality and its trends from 2002 to 2007.

Methods: Patients' characteristics, results of medical examination and follow up records are obtained from National TB Register system of Centers for Disease Control. Information concerning the cause of death and related information are derived from Department of Health.

Results: From 2002 to 2007, the number of new TB cases declined from 16 758 to 14 597; the incidence rate was from 73.4 to 63.7 per 100 000 population. Regarding to case distribution each year, the majority was the elderly (over 65 y/o) taking parts over 50%. The mean age was 61; the median was 66. Base on the

sputum bacteriology, 40% of cases in 2007 were smear-positive, and 60% were smear or culture positive. The TB death reduced from 5.7 per 100 000 population in 2002 to 3.3 in 2007. Over 80% of TB death were aged 65 years and above. Since the NTP launched from 2005 to 2007, the incidence decreased 7% and 76% (19/25) regions revealed a reducing trend. The death decreased 14.6% and 68% (17/25) regions had same trend as well.

Conclusion: Both incidence and death rates revealed the descending trends. However, surveillance in regions which have mass population should be strengthened. For the regions which have opposite trends should be monitored. Managing HIV-TB is a growing concerning issue as well.

PS-81671-20 Impact of malnutrition on clinical presentation, clinical course and mortality in MDR-TB patients in Latvia

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Setting: While implementation of the multidrug-resistant tuberculosis (MDR-TB) management strategy in 2000 has improved treatment outcomes in Latvia, cure rates still fall below global targets. It is critical to identify modifiable factors that may improve outcomes in these patients.

Objectives: To elucidate the association between nutritional status and clinical presentation, clinical course, and mortality among patients treated for MDR-TB in Latvia.

Methods: 912 adults treated for pulmonary MDR-TB between 1 January 2000 and 15 June 2005. Nutritional status was determined by body mass index (BMI), with underweight defined as a BMI <18.5. The association between underweight and outcomes was evaluated using multivariate logistic regression and Cox proportional hazard models.

Results: 20% of patients were underweight at the time of diagnosis. Patients who were underweight were significantly more likely to be sputum smear positive, culture positive, have bilateral cavitation, and report fever and weight loss at clinical presentation than patients who were of normal or over-weight. Being underweight at diagnosis was significantly associated with a greater risk of experiencing >3 side effects over the course of treatment (OR_{adj} = 1.5, 95%CI 1.2–2.1, *P* = 0.03). For patients who were initially culture positive, being underweight was significantly associated with a delayed time to initial culture conversion (HR_{adj} = 0.78, 95%CI 0.63–0.97, *P* = 0.03). Patients who were underweight had twice the death rate compared to patients who were normal or over-weight (HR_{adj} = 2.0, 95%CI 1.1–3.7, *P* = 0.02).

Conclusion: MDR-TB patients who were underweight at diagnosis had a more severe clinical presentation, experienced more adverse events, and had an increased risk for death compared to patients who were of normal or over-weight. Nutritional supplementation may be an appropriate adjunct to anti-tuberculosis therapy in these high-risk patients, and its impact on patient outcomes should be evaluated.

PS-81829-20 Drug resistance profile of pulmonary tuberculosis in Macedonia, 2007

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The study was designed to evaluate the profile of resistance to four essential anti tuberculosis (TB) drugs among patients with pulmonary tuberculosis. Out of all notified cases in 2007, 438 (77.6%) had pulmonary tuberculosis (368 new cases and 70 previously treated). The sensitivity test (DST) with standard Löwenstein-Jensen media was performed by 170 (38.8%) of treated patients. Out of these patients, 147 were new cases and 23 previously treated. Out of tested patients, 33 (19.4%) were resistant to any from four essential anti TB drugs. Out of 147 tested new cases, 22 (14.96%) were resistant to any essential anti TB drug, 11 (7.48%) tested isolates were resistant to streptomycin, 8 (5.44%) to ethambutol, 7 (4.76%) to isoniazid, 1 (0.6%) to rifampicin. Resistance to one essential anti TB drug was confirmed by 18 patients (12.24%), to two drugs by 3 (2%), to three drugs by 1 (0.6%). Resistant isolates of *M. tuberculosis* to four drugs and MDR tuberculosis were not confirmed. Of 23 previously treated patients, 11 (47.8%) were resistant to any essential anti TB drugs. The most frequent was the resistance to streptomycin, in 9 (39.1%) of examined isolates. Resistant to isoniazid were 34.7% (8/23) of examined isolates, 30.4% (7/23) to rifampicin, 26% (6/23) to ethambutol. Resistance to one essential anti TB drug was confirmed by 3 patients (13%), to two drugs by 2 (8.6%), to three drugs by 3 (13%), to four drugs by 4 (17.39%). MDR tuberculosis was confirmed by 7 (30.43%) of examined isolates. From MDR patients, one was resistant to H + R, one to H + R + S and five patients were resistant to four essential anti TB drugs (H + R + Et + S).

Conclusion: Despite of increasing of resistant tuberculosis, it is not serious problem for control of tuberculosis in Macedonia.

PS-81870-20 Clinical and epidemiological profile of non-tuberculous mycobacteria lung disease in Rio de Janeiro, Brazil

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Aim: Analysis of prevalence and clinical aspects from one of the largest series of nontuberculous mycobacteria (NTM) in Brazil, among the cases that were submitted to the diagnostic evaluation at the centre of reference for tuberculosis multiresistant in Rio de Janeiro, Brazil. Also help researchers and clinicians better understand NTM characteristics and distribution in the country, improving scientific knowledge for its diagnostic criteria as well as provide tools for the treatment of diseases that are commonly confused with tuberculosis.

Design: Retrospective analysis.

Methods: Retrospective analysis between September 2000 and February 2008, at the centre of reference for tuberculosis multiresistant in Rio de Janeiro, Brazil.

Results: From 90 confirmed cases of pulmonary disease due to NTM, 57% were male. Average age 54 Y (range 20–83). The most prevalent pathogens were: *M. kansasii* 35%, *M. avium intracellulare* 21%, *M. abscessus* 17%, *M. fortuitum* 10%, *M. avium* 7%, others 10%. Diagnostic specimen: smear 84%, bronchoalveolar lavage 8%, tissue biopsy 3%, blood 1%, others 4%. Prior treatment for TB: 76%. Outcomes: favorable 70%, death 11% (2% due to neoplasia), abandon 4%, no data 14%. Mean duration of treatment: 16 months. Radiological findings: infiltration with cavitation 78%. 69 patients (77% of cases) have some comorbidity associated: hypertension 19%, COPD 14%, aids 10%, diabetes 9%, hepatopathy 6%, cancer 6%, rheumatoid arthritis 3%, asthma 3%, silicosis 3%.

Conclusion: *M. kansasii*, were the most prevalent mycobacteria (35%), followed by *M. avium intracellulare* (21%). Pre-existing lung lesions, TB prior treatment and comorbidities were commonly present, which could have facilitated colonization/infection with NTM.

PS-81944-20 A birth cohort analysis of tuberculosis incidence rate in Singapore

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Objective: To study epidemiological trends of tuberculosis incidence rate in Singapore by age and period of birth.

Methods: Notification of TB to the national TB registry is legally mandated in Singapore. Data of new

tuberculosis (pulmonary and extra-pulmonary) cases among residents by age and sex were obtained from the registry. The age-specific incidence rates by 5-year age groups and at 5-year intervals were used to analyze for birth cohorts over time.

Results: The birth-cohort analysis showed a declining age-specific incidence rate for each successive birth cohort peaked at 15 to 29 years of age and gradually declined thereafter. However, in the decade 1985–1995, there appeared to be an upward inflection of rates which was most evident in the older birth cohorts born before 1955. After 1995, the rates in the same birth cohorts declined again. This seemed coincident with the launch of the revised national programme, the Singapore TB Elimination Programme, in 1997/8.

Conclusion: This study showed that although all birth cohorts had a higher peak rate in adult life, this risk decreased with each successive cohort. A declining trend of TB incidence in older age groups especially in the cohorts born after 1955–59 was also observed. If these results represent a true decrease in incidence rates, the risks of tuberculosis in adult life and elderly are likely to decrease in future.

PS-82172-20 Increasing trend of non-tuberculous mycobacteria: real or artefact?

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Aims: Since the late 1980s, the number of cases of tuberculosis has increased in England, Wales and Northern Ireland. In light of this, the aim was to describe the recent epidemiology of non-tuberculous mycobacteria from 1995 to 2006 and examine whether the observed results were real or artefacts of current surveillance.

Methods: Hospital laboratories in England, Wales and Northern Ireland voluntarily report mycobacterial infections to the Health Protection Agency Centre for Infections. Details routinely reported include age and sex of the patient, species and specimen type. All reports of non-tuberculous mycobacteria between 1995 and 2006 were analysed.

Results: The rate of reports rose from 0.9 per 100 000 population in 1995 to 2.9 per 100 000 in 2006, an increase of 250%. In 2006, 1609 reports of non-tuberculous mycobacteria were received. The most commonly reported species was *M. avium-intracellulare* (40%), which increased mainly in pulmonary specimens and those aged 65 and over. *M. gordonae* showed the biggest increase over the period studied rising from one report in 1995 to 151 reports in 2006, increasing in both sexes and across all age groups. Clinical information was poorly reported.

Conclusions: The total number of reports of non-tuberculous mycobacteria has increased considerably

since 1995. The increase observed in reports of *M. gordonae* appears to be related to changes in laboratory culture and identification methods, whereas the increase in reports of *M. avium-intracellulare* may reflect a real increase in the population. The clinical significance of reports of non-tuberculous mycobacteria is questionable and further clinical details are needed in order to interpret the observed results.

PS-82183-20 Transport sector and conspirance of school girls' vulnerability to HIV: a case of Zambia

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Background: Objectives were to examine the sexual relationships between school girls and Bus Drivers and Conductors (BDCs) and the frequency with which they engage in unprotected sex. Analyse factors propelling HIV/STI transmission and assess vulnerability of girls and BDCs to HIV/AIDS in Zambia.

Methods: The study instrument was a questionnaire in which some answers were given orally and others in writing. The sample consisted of 1200 school girls aged 14–18 and 840 BDCs aged 15–35 in six cities of Zambia (Lusaka, Ndola, Kitwe, Mufulira, Kabwe and Luanshya).

Results: 61% of BDCs reported having unprotected sex with school girls and their wives in the last twelve months, 38% reported having had an STI, but blamed sex workers for it. 18% reported having sex with school girls only. 73% thought school girls are a 'safe sex zone'. 34% did not use a condom at last sex. In contrast, school girls reported having multiple BDCs sex partners in classes of lunch, 'free transport' and for pleasure. 12% reported having an STI. 37% reported having unprotected sex with fellow school peers. 78% reported initiation through peers and 17% by choice. 41% did not use a condom at last sex. Below 1% attempted to seek VCT services.

Conclusion: The analysis of data suggests that the transport sector is at the core of the vicious circle of STIs and HIV transmission from adults to children below the age of 17. Data further suggest unreported child defilement and molestation which constitute a moral and child health crisis in Zambia if not in Africa. Social conspiracy of silence is undoing achievements in children's rights, health and welfare in the past decade. On the flip side of child defilement and molestation is the local transport industry and its staff who have been left unattended to by HIV prevention programs.

PS-82212-20 Pneumonia aetiology in ventilated patients at the ICU of the CHU of Fez and related risk factors: prospective study

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Aim: To determine risk factors, bacterial etiology and antibiotic susceptibility of species responsible of nosocomial pneumonia in intensive care units of CHU Hassan II of Fez.

Design: Prospective study was conducted in this unit from February to June 2007.

Methods: Protected distal specimen was used for bacteriological analysis from all mechanically ventilated patients within 48 h. In addition, clinical and epidemiologic data were collected for these patients.

Results: Statistical analysis showed that 68.8% of patients developed pneumonia. Infection etiology was marked by the predominance of two environmental species: *Acinetobacter baumannii* (44%) and *Pseudomonas aeruginosa* (22%) with variable antibiotic susceptibility.

Conclusion: The study period was considered as epidemic to this two species.

Clinical data analysis showed that temperature, thorax radiography abnormality and bronchial expectoration can be used as pneumonia predictor in mechanically ventilated patients at the intensive care units. Risk factors deduced in this study were: prior use of antibiotics, stays duration, exogenous contagion (environmental factor) and patients status.

PS-82278-20 Imputation of incomplete HIV data in the US National Tuberculosis Surveillance System

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Objective: To assess the impact of missing HIV values in the NTSS using multiple imputation.

Background: The National Tuberculosis Surveillance System (NTSS) collects information on all newly reported US cases of TB. Between 1993 and 2006, 45% of reported cases had an incomplete HIV status, not including California. High levels of missing data often result in spurious findings and bias in research studies.

Methods: We compared logistic regression model results using different strategies for handling incomplete HIV data. HIV status and patient demographic characteristics were used to impute missing data and measure their association with the likelihood of multidrug-resistant (MDR) TB for persons 15–64 years old.

Multiple imputation (MI) with the Markov Chain Monte Carlo method was used to impute HIV data.

Results: Of 152 238 culture-positive TB cases reported between January 1993 and December 2006 with drug susceptibility results for both isoniazid and rifampin, 113 892 (74.8%) were 15–64 years old. Analysis of patients with complete data ($n = 75\,161$) indicated a positive association between HIV infection and MDR-TB (odds ratio [OR] 3.1, 95% confidence interval [CI] 2.8–3.5). Associations were lower using mean substitution for missing values of HIV (OR 2.9, CI [2.6–3.2]), single imputation (OR 2.3, CI [2.1–2.5]), and multiple imputation (OR 2.3, CI [2.1–2.5]).

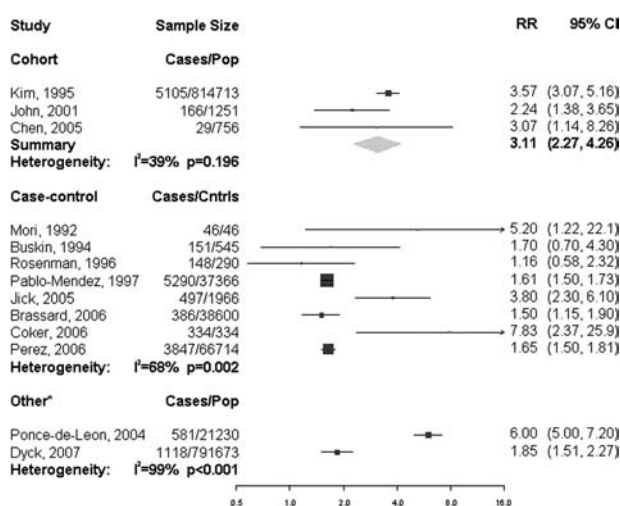
Conclusion: Failure to impute missing HIV data led to an overestimation of the association between HIV infection and MDR.

PS-82310-20 Diabetes mellitus is positively associated with tuberculosis: a systematic review of 13 observational studies

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Aim: The rising prevalence of diabetes in tuberculosis-endemic areas may adversely affect tuberculosis control as diabetes may increase the risk of tuberculosis. We conducted a systematic review and a meta-analysis of studies assessing the association of diabetes and tuberculosis.

Figure Forest plot of observational studies on the association of diabetes mellitus and tuberculosis



*studies for which study design could not be classified as either cohort or case control, as TB case accrual occurred prospectively, while the distribution of diabetes in the population was assessed during a different time period after baseline

Methods: We performed literature search in PubMed and EMBASE databases, hand-searched reference lists, and contacted experts in the field. We included observational studies that had reported an age-adjusted quantitative estimate of the association between diabetes mellitus and tuberculosis disease, and excluded studies that studied the effect of diabe-

tes on tuberculosis treatment outcomes, and studies that investigated the impact of tuberculosis on the occurrence of diabetes. Two investigators independently extracted information on study population and setting, statistical methods, effect estimates, adjustment factors, and key quality-associated variables. We computed summary relative risks by the random-effects analysis, and performed sensitivity analyses by several population characteristics and quality-associated variables.

Results: The search yielded 13 observational studies ($N = 1\,786\,212$ participants) with 17 698 tuberculosis cases. Diabetes was associated with an increased risk of tuberculosis: $RR = 3.11$, 95%CI 2.27–4.26 for cohort studies. Case-control studies were heterogeneous ($I^2 = 68\%$) and ORs varied from 1.16 to 7.83. Associations were stronger in studies with greater background tuberculosis incidence, and in non-North-American studies. Studies of higher quality with regard to exposure and outcome ascertainment, and control sampling, showed stronger effects.

Conclusion: Diabetes mellitus was found to be positively associated with tuberculosis regardless of study design and population.

PS-82317-20 Comparison of QuantiFERON®-TB Gold results to historical tuberculin skin test results in NYC

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Setting: NYC Bureau of Tuberculosis (TB) Control chest clinics.

Objective: Evaluate performance of QFT-G compared to TST in terms of risk factors for TB infection.

Methods: QFT-G data from October 2006–October 2007 were evaluated using descriptive analyses and compared to historical TST data from 2002–2004.

Results: Through October 2007, 15 762 patients received QFT-G; 1084 (7%) tested positive, 14 441 (92%) tested negative, and 237 (1%) had indeterminate results. Among the 15 525 patients without indeterminate results, 3% (252/8348) of US-born patients and 12% (832/7177) of non-US-born were QFT-G positive ($P < 0.0001$). The 3 countries with the highest proportion of positive patients were Nigeria [26% (31/118)], Nepal [26% (26/100)], and Haiti [22% (87/399)]. QFT-G positivity significantly increased with age [<15 years: 4% (65/1472) to ≥ 65 years: 26% (70/268); P -trend < 0.0001]; this age trend was consistent for US-born and non-US-born patients (both P -trend < 0.0001). Males [7% (539/7299)] and females [7% (545/8226)] had similar rates ($P = 0.06$). From January 2002–August 2004, 32 988 patients received a TST; 26% (8429) had a positive result (≥ 10 mm); significantly more than with QFT-G ($P <$

0.0001). Non-US-born patients [40% (7038/17 584)] were more likely than US-born [9% (1391/15 404)] to have a positive result ($P < 0.0001$). Patients from Nepal had the highest positivity rates [64% (65/102)], followed by those from China [55% (1061/1922)], Haiti [53% (618/1174)], and Nigeria [53% (162/308)]. TST positivity increased with age [<15 years: 23% (850/3629) to ≥ 65 years: 38% (139/369); P -trend < 0.0001]. Rates among males [28% (4438/15 810)] were slightly higher than females [23% (3991/17 178); $P < 0.0001$].

Conclusions: Fewer patients tested positive with QFT-G than with TST. Though QFT-G positivity is lower, higher positivity is associated with known TB risk factors (e.g. non-US birth) indicating that differences may be due to the higher specificity of QFT-G.

PS-82393-20 Evaluation of the tuberculosis control program of Belo Horizonte, Minas Gerais, Brazil, 2001–2005

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Aim: The routine evaluation of Surveillance Systems in Health allows to identify difficulties and operational limitations, being an important tool to accomplish the necessary adaptations for the improvement of surveillance system.

Design: To evaluate the Surveillance System of Tuberculosis (SVTB) of Belo Horizonte (BH)/Minas Gerais.

Methods: Notification of tuberculosis (TB) cases from 2001 to 2005 have been evaluated for: consistence, representativeness, sensibility (measured by the reason among the notified and expected cases), usefulness and Predictive Positive Values (VPP). We calculated the Relative Risk (RR) and 95% confidence interval (95%CI).

Results: We analyzed 9.466 reports. There was a decrease of unknown outcome after nine months from 72% in 2001 to 36% in 2004. The distribution of TB cases for the interval between diagnosis date and the date at beginning of treatment had medium of zero day. Among the new TB cases: 65% were men; 95% had above 15 years-old and 82.8% had between 20 to 64 years-old. The sensibility oscillated during the period reaching 113% in 2002; 101% in 2004, but only 82% and 88% of the cases were notified in 2003 and 2005, respectively. The medium incidence was 50.7/100 000 inhab. for pulmonary form, 14/100 000 for extrapulmonary form and 4.4/100 000 for the mixed one. Among the TB cases 26% were under supervised treatment (DOTS), the 74% without DOTS had (RR) 1.78 times more abandonment than the group without (95%CI = 1.58–2.00, $P < 0.05$). The cases notified

as 'new cases' had a cure rate (RR) 1.09 times larger than the 'reentrance and recurrence' cases (95% CI = 1.07–1.11, $P < 0.05$). The VPP of new cases notified varied among 98.9% in 2001 and 97.4% in 2004.

Conclusion: SVTB-BH allows the demographic characterization of TB cases, as long as cases attendance, calculation of indicators, and performance of the strategy DOTS being an useful as surveillance system instrument.

PS-82409-20 Multidrug-resistant tuberculosis in the extreme south of Brazil, 1999–2007

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Aim: The emergence of strains of *Mycobacterium tuberculosis* multidrug resistant (MDR-TB) to anti-mycobacterial agents is a worldwide problem whose global magnitude is not well described. Some studies in Brazil demonstrated that there is a low incidence of tuberculosis MDR-TB cases.

Design: To describe the epidemiologic profile of the tuberculosis MDR cases in Rio Grande do Sul state (RS), Brazil in the period from 1999 to 2007.

Methods: It was evaluated the registrations in the National Information System Databank of RS state between 1999 and 2007.

Results: 45 674 registrations were analyzed, of this 144 was MDR-TB cases at RS (prevalence 0.3%). Among the MDR-TB cases 70% were male; 65% white color and 55% with education from 3 to 7 years. The total of MDR cases 35% were type of entrance 'new case', 22% were 'recurrence', 12% were 'reentrance' and 32% 'transference'. The cases with pulmonary form represent 97%, of these 88% had smear positive test (SPT), 46% realized smear culture with 44% were positive, only 11% had DOTS, 15% were alcoholic, 9% had AIDS, but only 18% had test HIV. During the treatment 46% of patients didn't SPT in the 2nd month, 47% in the 4th month, 40% in the 6th month. There was not statistical difference for sex. Regarding the alcoholic patient's had 2.26 times more chance to be MDR ($P = 0.003$ and CI 1.26–4.03) larger than a patient no alcoholic. A patient's chance with extra pulmonary TB of being MDR was 8.3 ($P < 0.001$ and CI 2.96–26.24) then pulmonary form.

Conclusion: The RS state it presented prevalence above registered in the country (0.3%/0.13%) in the period. Most of the MDR cases was in white men with low education. It is necessary to adapt to the accomplishment of smear positive test during the treatment and to increase offer and quality of DOTS.

PS-82417-20 Predictive geostatistical algorithms for TB and MDR-TB clusters in a high prevalence area in Lima, Peru

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Analytic methods commonly used in TB epidemiology do not account for spatial correlation (i.e. autocorrelation) between clinical and demographic observations. In regression analyses, this omission can bias parameter estimates and yield incorrect standard error estimates. In this project, we present a geostatistical approach that accounts for spatial correlation in mapping active TB and modeling clinical and ecological variables based on clustering of TB and MDR-TB cases in an urban environment. From April 04–Feb 06, clinical and demographic information of 1549 patients diagnosed with smear positive pulmonary TB in Peru; was georeferenced by health clinic where diagnosis was made using a differentially corrected global positioning system receiver. Feature extraction tools from ENVI® software were used for analysis and visualization of all types of land covariates and to identify pixels that were associated with clustered TB and MDR-TB cases. SAS/GIS® was used for univariate, correlations and regression analyses from the field and remotely sampled datasets. Global autocorrelation was generated in ArcGIS®. Individual health clinic data in the study site were further evaluated in terms of their co-variations with spatial autocorrelation by regressing them on the candidate spatial filter eigenvectors. The resulting spatial filters were able to describe the full range of all possible mutually orthogonal map patterns present in the data. Parameters for significant interactions were estimated with Markov Chain Monte Carlo (MCMC) predictor models generated in GIS using object based technology, QuickBird visible and NIR data. The results suggest that the geographic distribution of the clinical data in the study site exhibit positive autocorrelation: health centers of patients with MDR-TB tend to cluster in geographic space. Georeferenced data and spatial statistics can confirm epidemiological/environmental factors that influence TB and MDR-TB in the community.

PS-82489-20 Place des maladies respiratoires à partir de deux enquêtes nationales de santé en Algérie, 1990 et 2005

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La transition épidémiologique observée dans les pays développés apparaît de plus en plus dans les pays en développement. L'Algérie, à l'instar de ces pays traverse une triple transition (épidémiologique, démographique

et économique). A ce titre, le profil de morbidité respiratoire est étudié à travers deux enquêtes nationales de santé en population générale à deux périodes différentes (1990 et 2005).

Cette transition épidémiologique est marquée par la diminution du poids des maladies transmissibles et l'augmentation du poids des maladies non transmissibles. La comparaison portera sur la morbidité ressentie, les consultations, et les hospitalisations.

Morbidité ressentie : 35,7% en 1990 vs 24,97% en 2005.

Consultations : 27,2% en 1990 vs 24,92 en 2005.

Hospitalisation (accouchements normaux compris) : 7% en 1990 vs 11,32 en 2005.

Hospitalisation (accouchements normaux exclus) : 10,7% en 1990 vs 13,21 en 2005.

De cette analyse, on note une augmentation des poids des maladies respiratoires puisqu'elles sont le 1er motif en terme de morbidité ressentie, de causes de consultation et d'hospitalisation.

Les stratégies de lutte axées sur la prévention primaires (lutte anti-tabagique, amélioration de la qualité de l'air), sur la prévention secondaire (dépistage précoce par la promotion des soins de santé primaires et consensus sur la prise en charge thérapeutique de certaines affections chroniques avec le développement de la prise en charge intégrée).

Projet Incomed/Tahina, Algerie. Contrat n° ICA3-CT-2002-10011.

POLICY AND PROGRAMME IMPLEMENTATION: DOTS EXPANSION—III

PS-82049-20 Would community involvement in TB case finding improve access to TB services? Lessons from peri-urban Lilongwe

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Background: The World Health Organisation argues that the Malawi TB control programme detects half of its TB cases. Key barriers to access to TB diagnostic services include transport and opportunity costs due to repeated visits to health facilities. The poor stop diagnostic care-seeking before diagnosis is made (Kemp 2001). Although community-based organisations play an important role in supporting TB service delivery, they have limited capacity to optimise their capabilities.

Aim: To explore the impact of involving community-based groups in TB service delivery in urban Lilongwe.

Design: Participatory approach with community-based organisations and policy makers at both national and district level to establish a local sputum specimen collection centre. Community-based organisations were trained.

Methods: The community members raise TB awareness, identify and refer chronic coughers to sputum collection centre and care and support treatment for diagnosed patients. Collect data from chronic cough and TB treatment registers, in-depth interviews and questionnaire.

Results: Collaborative working and community engagement has enhanced awareness of TB and need for early treatment seeking. The intervention has increased average TB case detection per year from 56 to 131. The number of smear positive cases increased from 19 per year to 26 per year. Analysis of qualitative data shows early case detection and treatment initiation as well as reduced turn-around of sputum specimen. No default case was recorded.

Conclusion: Strengthening informal community-based organisations through training leads to high TB service utilisation, increased and early case detection. Involving community-based organisations ensures community ownership of the project. Early access to TB diagnostic services break transmission chain of tubercle bacilli hence reducing TB burden. The Malawi NTP has responded by scaling up the activities country-wide.

PS-82053-20 Evaluation of the DOTS programme in Kaliningrad Oblast, Russian Federation

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Background: In May 2002, the WHO in cooperation with national and international partners started implementation of the SIDA-funded WHO pilot TB control project in Kaliningrad Oblast. At baseline, the TB case notification rate was 116.5 per 100 000; TB mortality, 33.6 per 100 000; treatment success rate: 35.4%; default rate: 21.8%; died: 24.9%. Regional capacities and policies for sustainable MDR-TB, TB-HIV, and MDR-TB-HIV control were inadequate. DOT, home treatment, a default tracing system, and cohort analysis were implemented, and the capacity of the laboratory network has been strengthened. Severely complicating the implementation of the project, weaknesses in human resources capacity have existed since initiation of the project.

Objective: To evaluate the results of the implementation of the DOTS TB control programme in Kaliningrad Oblast.

Materials: Records of 4201 new TB cases registered in the civilian sector from February 2003 to December 2007.

Methods: Cohort analysis.

Results: The following positive dynamics have been observed:

—TB mortality rate decreased by 14.3%.

- Successful treatment outcomes increased to 45.9% (2006), and the default rate decreased to 9.2%.
- About 85% of TB patients receive standard regimens of treatment.
- Improvement of the information exchange system among all the participating agencies both in the civilian sector and on the interdepartmental level, including the use of computer-based technologies.
- The region's GLC application for access to second-line drugs was approved in February 2007.

Conclusions: Results of the analysis for 2003–2007 reflect an improving TB epidemiological situation with regards to mortality and prevalence at the region level and provide evidence of successful implementation of a DOTS programme in the Russian environment. For sustainability of the TB control project, it is critical to strengthen access of patients from vulnerable groups to TB care and strengthen staffing of the TB service.

PS-82056-20 Establishment of sputum collection centres in Myanmar

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Setting: Sputum acid-fast bacilli (AFB) microscopy is the core element of DOTS strategy and it should be decentralized up to rural health center (RHC) in hard to reach area of Myanmar. NTP, Myanmar established the sputum collection center at the seven RHCs of five townships in three Divisions.

Objectives: To introduce sputum collection centers to the RHCs in hard to reach area aiming to lessen the transport difficulties for the patients and to assess the feasibility of sputum collection centers establishment. Townships were selected with low case detection rate and with either high transportation cost or long traveling distance to township laboratory.

Methods: It was an intervention study without control. The health staff and local authority at the township level were advocated about sputum collection center and followed by training to the Basic Health Staff from the selected RHCs. Close supervision was done by Township Medical Officer and quarterly supervision was done by microbiologist. Study period was one year from August 2006 to July 2007.

Results: Sputum collection centers were drained from 319 villages with population of 0.2 million. 360 TB suspected patients and 142 TB patients used sputum collection centers. Sputum positivity rate for TB diagnosis was 14.4% and TB suspect examination rate was 169/100 000 population. Case detection rate of those RHCs increased compared to previous year. Total time, traveling distance and cost saved by using sputum collection center were 1520 hours, 7661 miles and 1311 USD respectively.

Conclusion: The awareness on established sputum collection centers are needed to improve for better utilization. It is leading to increase case detection and sputum collection center could be upgraded into sputum microscopy center.

PS-82101-20 Results of World Bank TB control project independent monitoring in the Russian Federation

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Introduction: A WB loan agreement (100 mln USD) was signed by the RF in September 2003 and came into power in 2004. The project funded by this loan has aimed to support activities strengthening nationwide implementation of the revised TB control strategy. A regional assessment was conducted in 2004, and a federal assessment in 2005. Activities focusing on TB detection, diagnosis, treatment and monitoring started in 2006, with trainings and procurement of laboratory and diagnostic equipment. By January 2008, the project has disbursed and committed 91.8 mln USD. The WHO/Russia office signed an agreement in May 2007 to conduct independent monitoring, which is an integral part of the project.

Objectives: To evaluate progress in achieving WB project indicators and analyze reasons for suboptimal performance in order to propose recommendations for optimization.

Methods: In 2007 the methodology was developed for conducting independent monitoring, which assesses achievement of project outcome/impact indicators and includes on-site data collection and analysis, based on standard recording/reporting forms and interviews with regional stakeholders and patients.

Results: In 2007–2008 upon agreement with national health authorities, 49 monitoring missions were conducted by WHO staff and external experts. The following findings from 42 regions were reported: all outcome/impact indicators were achieved in 3 regions; 4 regions achieved 80–90% of indicators; 8 regions achieved 60–70%. In total, a positive trend in project implementation was documented in 30 regions (71% of regions included in analysis).

Conclusion: A minority of the evaluated regions reached or were near the project indicators at the time monitoring missions were conducted. However, positive dynamics in most of the analyzed regions were documented. Independent monitoring proved to be a useful tool for health system evaluation and should be routinely implemented in health system management at the federal level.

PS-82125-20 DOTS-plus expansion in the Russian Federation

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Background: Prevalence of MDR-TB in the Russian Federation (RF) is high (20.3% among all culture positive respiratory TB cases in 2006, according to national statistics). The 4th round Global Fund (GF) project was started in the RF in 2005 with activities complementary to the World Bank loan project and the Federal Target Programme. One of the major components of the GF project aims to strengthen MDR-TB control activities. By the end of the project, it is planned to have allocated a total of approximately 30 million USD to strengthen the national laboratory system for diagnosis of MDR-TB, establish 13 Centres of Excellence for MDR-TB control, and provide second line drugs through the GLC mechanism for treatment of 7500 MDR-TB patients.

Goal: DOTS-Plus expansion in the RF in line with international recommendations on management of drug-resistant TB.

Methods: WHO technical assistance for Russian regions and institutions in preparation of DOTS-Plus projects according to GLC requirements, assessment and application support missions and trainings were provided.

Results: GLC applications have been approved for 17 regions/institutions, which are now ready to enroll 4516 MDR-TB patients for treatment in the framework of the GF project in the RF. Additionally, 11 applications from regions/institutions for enrollment of 1757 MDR-TB patients were submitted to the GLC and are under discussion. WHO is providing assistance in the development of 4 additional applications to treat 650 MDR-TB patients.

Conclusion: 3200 MDR-TB patients can start adequate MDR-TB treatment using high quality second-line drugs in Russia in 2008; in total, 7500 MDR-TB patients could be enrolled for treatment by the end of the project. The overall process has shown good co-operation between GLC, Russian Health Care Foundation, WHO and regions. It serves as a strong stimulus to improve the overall performance of TB control at the regional level.

PS-82174-20 TB contact investigations: the results of twelve years of experience of the National TB Programme of Morocco

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Aim: To analyse the findings of tuberculosis (TB) contact investigations conducted as part of the rou-

tine activities of the National TB control Programme (NTP) in Morocco.

Methods: Data on household TB contact investigation activities carried out by the NTP from 1993 to 2004 were reviewed. The proportion of contacts screened among those identified, the prevalence of active TB among those screened, and the proportion of cases identified in contacts among all those registered were calculated for each year and for each diagnostic category.

Results: More than 1 million household TB contacts were identified in approximately 200 000 investigations. In average, 77% of identified contacts were screened for TB every year. The overall prevalence of TB (any type) among screened household contacts was 2.5%. The proportion of TB cases identified in household contacts among registered TB cases (any type) was 5.6%. This proportion was found significantly higher in children below 10 years and in patients diagnosed with symptomatic primary complex.

Conclusion: Performing TB contact investigations as part of the routine activities of NTP services is shown to be feasible in low-middle income countries. Developing clear national guidelines for contact investigations is essential to effectively implement these activities under programmatic conditions.

PS-82182-20 Why does the patient seek a diagnosis at the hospital? Representation of health-care professionals' perceptions about the tuberculosis diagnosis, Brazil

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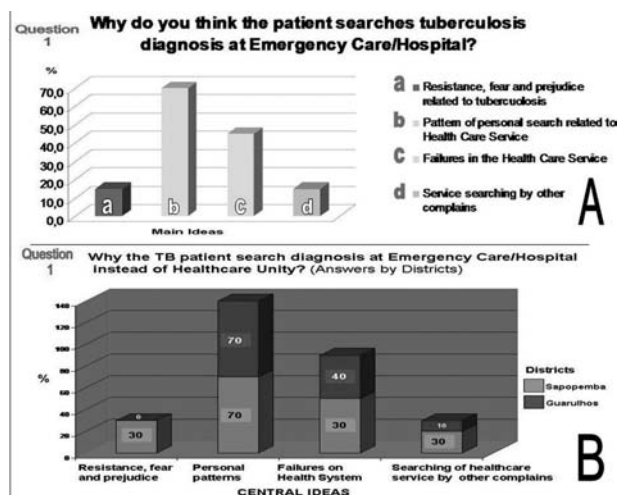
Setting: Sapopemba District and Cecap District from the Municipalities of Sao Paulo and Guarulhos, respectively.

Objective: To analyze the healthcare workers perception related to 'why patients search for tuberculosis (TB) diagnosis in Emergency Care/Hospitals (ECH)'.

Method: A qualitative methodology, the Collective Discourse (CD), was used. It is a technique that, using a discourse strategy, allows capturing a pool of social representations to mold imaginary data. The CD consists of a non-mathematical, non meta-linguistics way of representing (and also of producing) in a rigorous way, the collectivity though, which is made by a series of procedures to build the collective statements. Those procedures culminate in a speeches-synthesis which, written on the first person singular, gather responses from different individuals with discourse content of similar sense.

Results: On Figure 1A 'why the patient search TB diagnosis at ECH?' the main ideas were resistance, fear

and prejudice related to TB (15.0%); pattern of personal search related to Health Care Service (HCS) (70.0%); failures in the HCS (45.0%); and service searching by other complaints (15.0%). On Figure 1B the main ideas are the same when analyzed by different municipalities, but Cecap in Guarulhos did not mention resistance, fear and prejudice.



Conclusions: Unsolved questions must be answered and Operational Researches were the way to answer them by CD. All this was possible with support by USAID and DAHW. To answer the question of study the main perception of interviewed ones is characterized by personal patterns concerning the searching of health service defined on 5 behavioral patterns: patient wait to worst his/her condition to search the HCS; male patient does not attend the healthcare unity; immediatism, he/she is promptly attend at the ECH; individual does not think in health prevention and when reach the ECH the symptoms are worsen; and on a daily basis he/she search attending at ECH.

PS-82196-20 Community DOTS supporters: a synthesis of field experiences from Ethiopia

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Aim: Active involvement of communities is one key strategic elements of comprehensive DOTS to make up for the operational limitations of services based in health facilities. Actually in Ethiopia the functional coverage of the population by DOTS services is only 72%, largely accounting for the modest case detection rate (32%). In some Regions however various institutions have carried out valuable projects involving different types of community staff (volunteers, agents or supporters) to assist TB care. These experiences deserve full understanding an assessment for the inputs they bring at a crucial time when Ethiopia is processing to expand a considerable network of remunerated community workers.

Objectives: Four different community-DOTS programs have been identified in three Regions of Ethiopia. The performance of these interventions is being assessed in terms of:

- Role and responsibility of community health agents—particularly regarding (1) prevention and ACSM, (2) detection/referral and (3) support of TB treatment and adherence,
- Mechanism and cost of their supervision,
- Training and selection patterns,
- Incentive and perception issues,
- Level of integration with the new network of Health Extension Workers (HEW) in charge of supervising all community health activities.

As these projects demonstrate, significant improvement in TB case detection output, specific attention has been given to document the changes observed in CDR and success rate, even though methodological limitations may weaken conclusions regarding causality.

Way forward: Community DOTS is still an issue for research and no simple fit-to-all scheme is available; Hence every region has to build on their own specificity. The relative degree and extend of the contribution of community workers to patient's care is still under discussion. This analysis of experiences in the national context brings new useful perspectives into the development of the community network in Ethiopia.

PS-82205-20 Capacity building of hospitals: implementation TB standard of NTP 2007, Thailand

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Setting: Standard of Tuberculosis Prevention and Control were success indicator of Bureau Scorecard MOPH in Thailand 2007. All hospitals need implementation to goal for success rate >85%.

Objectives: 1) To develop implementation TB Standard of NTP. 2) To evaluate implementation TB of NTP.

Methods: This evaluation study. Studied population and samples were 40 hospitals in DPC1, 2007. Methods by co-ordination with policy administrator: Head of provincial public health and Director of hospitals, Survey basic data, provided TB standard follow NTP and evaluate Form, Meeting for guide line to physicians, nurses, workers of TB clinic and AIDS clinic, workers of Laboratory. And monitoring and evaluation.

Results: The results found that Survey basic data of 40 hospitals in 2006 were political commitment 75%, Finding and Diagnosis 80%, DOTS 90%, Recording and reporting 95%, Infectious control in hospital 75%, Integrating TB-HIV 95% and Treatment outcome 75%. After development indicated that political commitment 100%, Finding and Diagnosis 95%, DOTS 95%, Recording and reporting 95%, Infectious control in hospital 85%, Integrating TB-HIV 100% and Treatment outcome 90%. After developing better than be-

fore development significantly (P -value = 0.01). However when grouping 3 group that group A 20 hospitals, group B 15 hospitals and group C 5 hospitals.

Conclusion: This study show that developing implementation in 40 hospitals for capacity building TB Standard of NTP that effect to result of implementation better than before development. However maintain group A for sustainable, then up grade group B and group C to group A in 2008.

PS-82218-20 Quality of TB supervision in the era of integrated health services: illustration from Ethiopia

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Background: It is widely recognized that quality of TB service is maintained through efficient supportive supervisions (for program management, patient care, laboratory diagnosis or community support). Most NTP rely on supervisors based in district. In vertically organized programs these district teams, devoted to TB control, can use comprehensive supervision instruments.

Ethiopia is opting for a strong pattern of integration at all levels (health facilities, district) with limited program-dedicated staff; it is also building up a unique information system with a reduced set of core indicators that will decrease the flow of data available for program management. In that context of health system reforms and full integration, with acute limitation of health staff, new techniques have to be experienced and implemented to maintain quality of DOTS services provided.

Design: The Ethiopian NTP is exploring innovative ways to establish and validate minimum package of district supervision, to correct efficiently failures and gaps in DOTS services.

A critical review of present supervision integrated practices is undertaken in various settings (urban, rural, hospital and health center) of three regions with a standard grid exploring specific contribution to quality of TB care, laboratory services and community DOTS functions with regard to periodicity, skills, tools, output, limitations and performance.

Results: Taking into account existing and forecast constraints in human resources, this study comes up with (i) proposal of simplified supervision instruments aimed at improving the quality of TB program and (ii) identification of operational skill requirements crucial to carry out sustainable supervisions in a supportive way. The supervision instrument will then be tested and evaluated with the support of the Italian Development Cooperation. Operational and expertise gaps will subsequently be addressed by relevant trainings in the same research framework.

PS-82222-20 Implementation of DOTS in Swaziland: health care workers' knowledge and practices

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Aim: The survey aimed at assessing knowledge and practices of Health Care Workers (HCWs) in Swaziland on TB case finding and diagnosis, case management, TB-HIV co-infection management, TB recording and reporting, staff training and supervision and drug availability issues in order to summarise and recommend additional strategies for DOTS programme improvement.

Design: Cross-sectional survey conducted in February 2007.

Methods: All the 15 TB diagnostic units were targeted. Review of patients' records and HCW interviews were conducted using a structured questionnaire. Verbal consent was obtained from prospective participants and data capturing and analysis were computerized.

Table Action on supervision at the TB diagnostic units (Feb 2007)

	Yes	No	Don't Know	Total
Does your internal supervisor look at the Register	6/38%	9/56%	1/6%	16/100%
Does your internal supervisor look at treatment cards	7/44%	9/56%	0/0%	16/100%
Does your internal supervisor look at the tracing booklet	3/19%	10/62%	3/19%	16/100%
Does your internal supervisor look at the TB suspects register	6/38%	9/56%	1/6%	16/100%
Does your internal supervisor look at the laboratory register	5/31%	10/63%	1/6%	16/100%
Does your internal supervisor do on the job training	6/38%	10/62%	0/0%	16/100%

Results: 47% and 31% of HCWs reported that TB suspects were patients with a cough of 2 weeks or more and 3 weeks or more respectively. 97% of the HCW asked for a sputum test and 81% for an X-ray and no other investigations at diagnosis. Doctors and only 13% of the nurses performed diagnosis of extra pulmonary and paediatric cases. Most HCWS ordered culture and sensitivity for non converters after initial phase (66%) and return after failure (31%). 94% of HCWs knew the national regimen of new adult pulmonary TB patients compared to 81% for adult retreatment regimen. Only 41% had trained 31% supervised community treatment supporters. 91% TB patients collected their drugs from the TB treatment room. The majority (77%) of HCWs discussed TB-HIV with patients, 56% offered all TB patients HIV testing and counseling and 47% of the facilities had HIV testing facilities. All facilities have a TB register but only 56% crossed checked with the laboratory register and 47% involved in cohort analysis. Only 87

(32%) of patients had treatment outcomes in the register, and only 25 (16%) had treatment outcomes on the patients' cards. 50% of HCWs were supervised, only 6% of supervisors used a checklist.

Conclusion: Recording of treatment outcomes and DOTS supervision were weak and need urgent strengthening.

PS-82304-20 The social representation of incentives by the TB patient under DOT from Guarulhos, Sao Paulo, Brazil

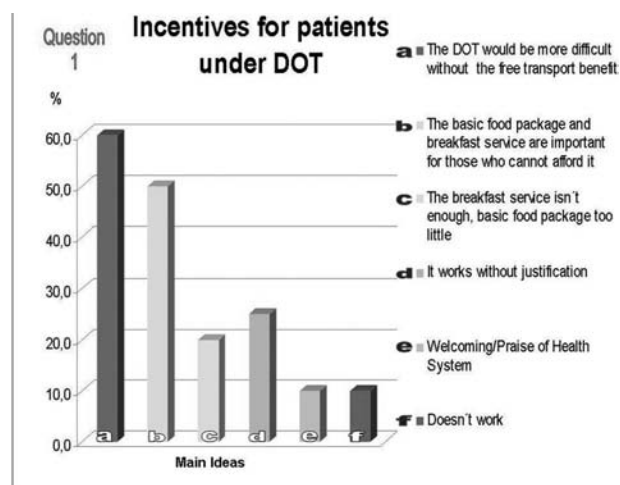
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Setting: Public healthcare units from Health District I at the municipality of Guarulhos in the State of Sao Paulo, Brazil.

Objective: Analyzing the individual perception of incentives given to a tuberculosis (TB) patient related to 'supervised treatment' (DOT) offered by Healthcare Service.

Methodology: A qualitative methodology, the Collective Discourse (CD), was used. It is a technique that, using a discourse strategy, allows capturing a pool of social representations to mold imaginary data. The CD consists of a non-mathematical, non meta-linguistics way of representing (and also of producing) in a rigorous way, the collectivity though, which is made by a series of procedures to build the collective statements. Those procedures culminate in a speeches-synthesis which, written on the 1st person of singular, gather responses from different individuals with discourse content of similar sense.

Results: According to Figure 1, in question 1 about incentives for TB patients under DOT—'What do you think about that? It works? Talk about that.' The



main ideas were DOT will be more difficult without free transport benefit (FTB) (60.0%); the basic food

package (BFP) and breakfast service (BS) are important for those who cannot afford it (50.0%); the BS isn't enough, BFP too little (20.0%); it works without justification (25.0%); welcoming/praise of Health System (10.0%); and it doesn't work (10.0%).

Conclusions: Among patients interviewed the main component pointed out by them was the FTB and BFP and also BS due to lack of economic conditions the incentives contributes to the adherence to DOT. The Sao Paulo State's TB Control Program since 1998 in accordance with National TCP and World Health Organization adopted DOTS strategy. With DOTS many unsolved questions must be answered and Operational Researches were the way to answer them by CD. All this was possible with support by USAID.

PS-82305-20 Community TB care in Nigeria: steps in implementing a pilot in a multi-cultural and multi-ethnic setting

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Aim: Despite the adoption of DOTS as the strategy for TB control in Nigeria in 1993, case detection rate still remains at a dismal 31.1% and the treatment success rate at 79% (Country Report 2007). Accessibility to DOTS services still leaves a lot to be desired as the majority of the population live far away from the DOTS centres. With the adoption of the Stop TB Strategy, CTBC has emerged as a major initiative in making DOTS services accessible to patients by extending DOTS services beyond the established centres to the door steps of patients. The National Tuberculosis and Leprosy Control Programme (NTBLCP) commenced the piloting of CTBC in March 2007 in six of 36 states of the country. To achieve this, stringent steps were taken to make this initiative functional in our communities. It is hoped that this will assist in contributing to the global targets for TB case detection and treatment success rates.

Methods: The NTBLCP went through the following processes to establish the pilot study: An all inclusive process was adopted to develop a generic CTBC model and documents (guidelines and training curricula). Situation analysis to identify six states from the six geo-political zones of the country, two local government areas (LGAs) per state, two communities per LGA, one DOTS facility per community and two community volunteers per community was carried out. Advocacy was made to enlist the support of stakeholders, community leaders and gatekeepers at the national, state, LGA and community levels. The capacity of community volunteers and treatment supporters were built by training to enable them implement CTBC activities. Recording formats and referral linkages were updated to incorporate routine data collection from CTBC.

Results: The initiation of the process has been successful. We have been able to involve 24 communities and 48 community volunteers with numerous treatment supporters in the pilot study.

PS-82312-20 Results and sustainability of USAID project in the Implementation of DOTS in Sao Paulo State

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Setting: São Paulo State is situated in the Southeast of Brazil, with an estimated population of 41 663 623 inhabitants in 2007 who are distributed in 645 cities. Guarulhos and Carapicuíba are cities located in the S. Paulo metropolitan area with respectively 1 315 059 and 396 434 inhabitants in 2007. In 2004 a collaboration agreement was signed with USAID.

Objectives: Evaluate the results and sustainability of the TB control activities supported by USAID resources.

Methods: To obtain the TB data was utilized Tbweb and Labtb state information systems. The indicators were: number of sputum-smear microscopy and culture with quality control carried out in those cities, DOT coverage with food incentives, cure rate, Tb web implementation and operational researches.

Results: The number of respiratory symptomatic examined in 2003 to 2007 increased 3 times more in Guarulhos and 2.6 times in Carapicuíba, whereas the positivity dropped to half and 3.4 times respectively. The numbers of AFB examinations increased 2.3 times and 6.2 and the cultures 13.4 and 7 times respectively. The number of TB patient in DOT raised from zero to 70% and from zero to 93% relatively in both cities. The cure rate improved from 75% to 78% and from 85 to 88%. The food incentives now are being provided by the municipalities. Four operational researches were conducted in these regions.

Conclusion: The USAID resources have been promoting an encouragement to the TB program in S. Paulo state, demonstrating to the public state and municipal authorities the efficacy and efficiency of TB control activities, therefore ensuring the sustainability of the project.

PS-82325-20 Effectiveness of supervised treatment for tuberculosis in five units federated in Brazil

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Introduction: One of the main concerns in the current days to increase the effectiveness of the national programs of control of the tuberculosis is the increase of this adhesion, with the improvement of the percentages of cure and reduction of the percentages of abandonment. Strategy DOTS is recommended by the OMS with intention to improve such pointers.

Objectives: To verify the effectiveness of strategy DOTS and the percentages of cure and abandonment in the priority cities Brazilian.

Methods: Exploratory ecological space aggregate study, in 114 with priority cities for tuberculosis in 2004 and 109 in 2005 in the states of Amazon, Mato Grosso, Pernambuco, Rio Grande do Sul and São Paulo, using itself given of coorte of tuberculosis cases.

Results: Porto Alegre presented in the two years the percentile minor of Units of Health with Program of Control of implanted Tuberculosis and DOTS and minor covering of the Program Health of the Family, however it was not the capital with percentile minors of cure in the same period. In the same way, the cities of the Rio Grande do Sul had been with lesser coverings DOTS, but not necessarily with lesser ratios of cure and abandonment when compared with the ones of the other Federate Units of the study. Cuiabá was the capital with bigger coverings DOTS, percentile greater of cure and minors of abandonment. None of the capitals reached 85% of cure and 5% of abandonment praised by the Health department. The medium one of the cure enters the selected cities in the period varied in 2005, of 63.6% in Pernambuco 81.7% in Amazon, in 2004. The medium value of the ratio of abandonment varied of 5.7 in São Paulo, 2005 11.5% in Mato Grosso, 2004. The lesser coverings of the Program Health of the Family had been in the Rio Grande do Sul.

Conclusion: In this study, the percentile greater of cure and the minors of abandonment are not associates to strategy DOTS.

PS-82336-20 DOTS implementation in a health district of São Paulo city, Brazil

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Setting: The Brasilândia Health District (North of Sao Paulo City), 31.5 km², 406 617 inhab (according to 2006 estimate) was selected due to TB epidemiological situation: incidence 30% and mortality 50% above city average rates. Health services at basic health units (16), 1 speciality ambulatory, 1 STD/AIDS reference centers, 1 Emergency centers, 1 General Hospital, 1 Laboratory and 52 Family Health Program teams with 345 community Health Care Workers.

Objectives: DOTS actions have been implemented since 2004, initially with USAID and Johns Hopkins

and further with PAHO's financial and technical support.

Activities accomplished:

- DOTS training more than 1000 professionals from district health centers.
- Workshops for service planning and organization.
- Information system and case follow-up Direct Supervision.
- Laboratory Improvement with daily specimen collection; processing and results on a 24 hr basis + quality control.
- Household routine active case finding by community health workers.
- Continued Education with clinical cases debates.
- Reference centers for complicated cases, drug side-effects and resistances and Patient Referral Paths for TB-HIV cases for cooperated DOT at health units.
- Bus tickets, food baskets and snacks to encourage patients under DOT.
- Evaluation and monitoring meetings.
- Best performing units prize awarding yearly.

Results:

	2002 (%)	2006 (%)
Active TB Case Finding (goal = 1% pop.)	...	100
New pulmonary cases >15 years Sputum smears	79	91
Culture contribution to (-) AFB case diagnosis	3	8
HIV testing in TB new cases	48	79
(+) AFB case DOT coverage	8	72
Treatment Completion and Cure of (+) AFB cases	69	86
Examined Household Contacts	37	72
Default rate	22	7
Mortality rate/100 000 population	7	4
All forms Incidence rate/100 000 population	83	68
(+) AFB pulmonary case/100 000 population	39	36

Discussion and Conclusion: With existing infrastructure and practically same manpower, substantial improvement of TCP indicators was obtained by organizing services and patient flow. Training and continued education are critical to program performance improvement. Incentives for patients and professionals also contribute to result improvement.

PS-82428-20 Advocacy, communication and social mobilisation: a strategic effort to expand the TB control programme in Orissa

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Setting: TB remains a serious public health problem in Orissa. The Revised National Tuberculosis Control Programme (RNTCP) using the DOTS strategy covers the entire population of 38 plus million since 2004. Although quality of services has generally been maintained and the state results are close to the global

targets, there are significant district-wise variations in programme performance. Reasons for poor performance include inadequate referral from the heavily utilized secondary and tertiary level institutions, weak supervision, low buy-in of RNTCP, inaccessibility and low utilisation of public health services.

Objective: To facilitate increased adoption of DOTS by all health care providers and increase community ownership of DOTS in Orissa leading to increased TB case notification and improved case management.

Methods: A review mission was coordinated by the state health authority to review and analyse current situation and critically evaluate Advocacy, Communication and Social Mobilisation (ACSM) needs and existing processes in the state. This mission also identified key process, outcome and impact indicators for ACSM related activities and developed a comprehensive multi-year ACSM strategy for State and District levels. The state also coordinated collaboration with different stakeholders and technical partners to adopt and endorse the ACSM strategy for active implementation in the state.

Conclusion: Strong leadership and political commitment led to the rapid endorsement and implementation of a comprehensive multi-year ACSM strategy across the state. An early project assessment will be done in September 2008 to review initial results and guide further implementation.

PS-82447-20 Implementation of the new technical instructions for tuberculosis screening and treatment for immigrants

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Brief description: The Technical Instructions (TIs) for pre-entry tuberculosis screening for persons applying for legal permanent residency in the US have recently been revised. Significant changes in the 2007 TIs include the following:

- Tuberculin skin testing for applicants 2–14 years of age;
- Mycobacterial cultures and susceptibilities (in addition to smears) for applicants who have X-rays or symptoms suggestive of tuberculosis disease;
- Treatment to cure under directly observed therapy (DOT);
- Completion of treatment prior to immigration to the United States according to ATS/CDC Treatment Guidelines.

Methods:

- These TIs were implemented October 1, 2007 in the two Panel Clinics in Ciudad Juarez, Mexico.

- Prior to the implementation, the Panel Physicians received adequate training in the TIs.
- Nursing staff from both clinics received training in tuberculin skin testing by the Mantoux method.
- A laboratory was established in Ciudad Juarez to perform mycobacterium fluorescent and concentrated smears, cultures using solid (LJ) and liquid media (MGIT) as well as strain identification and susceptibilities.
- A center (DOTMania) for the treatment and follow-up of patients was established.
- Key outcomes for the first three months of operation, Oct–Dec 2007, were reviewed and are presented.

Results: From October 1 through December 31, 2007, approximately 12,500 applicants were screened for signs and symptoms of active TB, including X-rays. Of these, 353 persons were further screened through sputum smear and culture. A total of 1104 sputum specimens were processed. Positive cultures were obtained on 116 specimens: of these 74 specimens were MOTT and 42 specimens were *Mycobacterium tuberculosis* complex. Of the 353 persons screened, 20 had positive cultures for *M. tuberculosis* complex.

DOTS: PUBLIC-PRIVATE MIX

PS-81221-20 Improving delivery of TB care through public private mix (PPM)—an assessment of treatment outcome

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Background: PPM has been adopted in many countries to improve health outcomes. To ensure the TB healthcare quality, equity and improve treatment outcomes, the national health insurance (NHI) bureau and CDC cooperated a PPM model which was widely accepted in 2004. Hospital/clinic which enrolls in the project could receive extra case managing, medical exam fee, case finding and treatment success rewards in addition to regular NHI claims for treating TB patients.

Methods: Taiwan CDC reporting system data from 2005 to 2006 were used in this study. After an individual is diagnosed as a TB case, health care workers should notify and record surveillance, examination as well as follow-up data in the system.

Results: A total of 491 hospitals/clinics enrolled in PPM model. In 2005, there were 10 817 (66% of all confirmed TB cases) enrolled in the PPM; in 2006 were 12 179 (79%). The patients' mean age was 61; median was 66. As for treatment outcomes, our analysis indicated that treatment success rate for those

who registered in the program in 2005 were 73% versus 55% who were non-enrolled; in 2006 were 75% versus 44%. TB death rates in 2005 were 13% versus 34% who did not register in this project; in 2006 were 13% versus 46%.

Conclusion: The public private mix model is showed to have a significant role in TB control, and the cooperation of public health and hospitals/clinics are nevertheless needed to be enhanced.

PS-81253-20 Use of pharmacies as a source of referral: a PPM-DOTS pilot in Cambodia

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Setting: Cambodia is a high burden country for tuberculosis with a 65% case detection rate and 89% treatment success rate. With 64% of Cambodians infected with *Mycobacterium tuberculosis* and a death rate of 92/100 000 the NTP is focused on improving the health of the Cambodian people by reducing the morbidity and mortality rates due to tuberculosis. The private sector is accessible with two thirds of Cambodians seeking care outside the public sector for their first visit with TB symptoms. The NTP recognizes the importance of private providers in TB services.

Objectives: Improve TB case detection and identify strengths and weaknesses of pharmacy referral intervention. Gather information to support a strategy to scale up this approach.

Methods: The PPM strategy was developed by the NTP and approved by the Ministry of Health in 2004. Since then, the PPM strategy implemented by PATH has expanded to 27 operational districts, 338 health centers, 22 referral hospitals, and 683 pharmacies in 6 provinces. Pharmacists were trained to identify and refer TB suspects to public DOTS services. National recording and reporting forms were adapted to include private providers and a Memorandum of understanding (MoU) was developed.

Results: During the first two years, 4230 TB suspects were referred from pharmacies to DOTS centers; 1769 were enrolled and received smear microscopy and chest radiograph. Of these, 3356 were found to be smear positive. Interviews with TB suspects referred by pharmacies but not documented as having visited a DOTS center revealed that 94% visited a center for follow up services.

Conclusions: Pharmacies play a key role in the identification and referral of TB suspects to the DOTS program. Routine recording and reporting should be strengthened in order to improve assessment of program performance. Specifically, revised forms should be in place at all DOTS centers and staff trained on proper recording in order to accurately report on referral.

PS-81341-20 Hospital DOTS linkages in Bangladesh

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Introduction: While good progress has been made in DOTS expansion in primary health care networks, the NTP is presently expanding DOTS to public and private hospitals. Urban areas have an extensive mix of public sector providers, which include private and medical college hospitals, specialist centers. NTP succeeded in implementation of DOTS Corners in almost all the medical colleges both public and private.

Objective: To expand DOTS linkages with hospitals.

Methods: Identification of General and Specialized both public and private. Involvement of staff, opening of DOTS Corner and implementation of DOTS.

Results: 30 specialized and general hospitals are involved, having plans for further expansion. The staffs were trained; drugs and other logistics were supplied. Suspects are referred and tested by sputum microscopy and treatment is started by a Medical Officer, in case of smear negative suspects further evaluated by the Resident Physician of the hospital. Once diagnosed is registered for DOT, the others staying far away are referred back to nearest DOTS Clinic for treatment and reporting. Severe complicated cases are admitted until required period then transferred back to nearest DOT center for completion of treatment.

During 2006, 2843 cases were detected; out of which 1104 were smear positives, 401 relapses, 835 smear negatives and 503 EPTB. During 2007, 2968 cases were detected, out of which smear positive were 1388, 901 smear negative, 65 were relapse and EPTB were 614. The treatment success rate is 85% (2006). Details will be presented.

Conclusion: Learning lessons in implementation of DOTS in hospital settings will facilitate, accelerate, or improve expansion of DOTS to the hospital network.

PS-81365-20 Engagement of the private sector in the TB programme in Somalia

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Setting: Somalia is a complex emergency country where tuberculosis (TB) remains a significant health problem; February, March 2007.

Objective: To map the private sector and empower its involvement in TB control.

Design: The method conducted the assessment was cross sectional survey, through, observations, questioners, and document analysis. Interviewed the NTP focal person and other staff involved the care of TB patients, private practitioners, police forces, military forces Somali medical association NGOs, medical health authorities, WHO and other TB health care

providers. Visited TB centers, and have had observation and meetings with TB staff and TB patients in order to make sure the health education given, Participated workshops and brain storming sessions. Revise of national NTP documents; National guidelines, and NTP surveillance data. Identify the private providers. Assess the potential contribution of private providers to TB. Assess of inputs required to optimize private sector contribution. Obtain research findings from WHO review reports and global fund proposal.

Results: Based on this survey private sector is composed of 48 hospitals. 91 private clinics; 46 non profit NGO; 5 military hospitals; 18 health centers for police; 500 pharmacies and 50 laboratories.

Conclusion: The private sector (including pharmacies) has been and will continue to be the major provider of health services. In South and Central of Somalia, policy and plans need to address the role and responsibilities of the private sector in the provision of safe, low cost drugs; accurate information to clients; and both curative and preventive services. They should address specific measures to protect the public from abuse, fraud and excessive costs, and how the public sector resources can be used to improve the services and products provided through private practitioners and suppliers of pharmaceuticals. Initiatives that could be taken to expand the scope of health sector development.

PS-81372-20 Do we really succeed in involving private sector in urban TB control? Case study of Kathmandu metropolitan City

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Setting: Tuberculosis (TB) still remains as a major public health problem in Nepal. About 45% population infected with TB. Out of which 60% are economically active population. All large cities have higher levels of TB burden. Kathmandu metropolitan City, being a capital city of Nepal, has weak public health system, poor responsiveness of the concerned authorities, and strong private sector is worsening the situation of TB control. In spite of large number of government hospitals, NGOs, private Hospitals and polyclinics case detection found very low (40%, 2006). It is expected that around 50% of the TB patients are with private sector. That means majority TB patients in metropolitan area are not getting TB treatment under NTP policy. As a result there is high possibility of increasing MDR-TB.

Objectives: To analysis involvement of private sectors (for-profit organization) in TB control at urban area.

Methods: In this descriptive study, retrospective data of Kathmandu Metropolis area from 2001 to 2006 were analyzed. Microsoft office excel was used to analyzed data.

Result: National tuberculosis centre, focal body to implement National TB control program claim to participate private sector since beginning of DOTS implementation, however evidence shows that private sectors (for profit) holds only a very small number cases. In data analyzed period it was not found more than 2 percent. Number of DOTS centre in metropolitan area increasing every year other than in private sector. In Case of treatment outcome metropolitan city has lower than national treatment success rate.

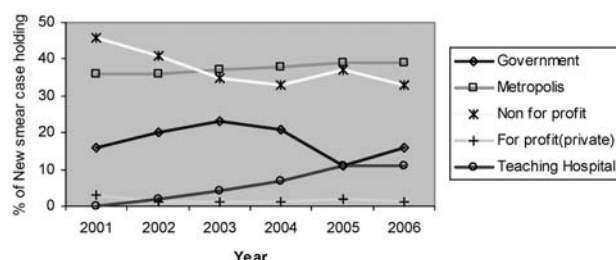


Figure Percentage of Nssp case holding by PPM mix at Kathmandu metropolitan City, 2001 to 2006.

Discussion: After ten years of DOTS implementation, private sectors (for-profit organization) involvement is very small. Not involvement in NTP may indicate inappropriate management of TB patients, results increased in MDR-TB. So, NTP should revitalized its existing efforts to involve private sectors under NTP and should be rapidly increased role in TB control.

PS-81502-20 TB-DOTS in a mega city of Pakistan, Karachi, through public-private mix

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Aim: To report the importance of private sector in control of TB in urban cities.

Design: Five year experience in TB-DOTS in city of Karachi.

Results and Conclusion: The successful implementation of TB-DOTS program in a mega city like Karachi cannot be achieved without participation of private sector in the program.

Karachi is the biggest city of Pakistan and one of big cities in the world. The city of more than 12 million people with a population density of 2795 persons/sq km is administratively divided in to eighteen towns. The 22% population of the city is constituted by migrants from other parts of country hence the city is known as mini-Pakistan. The TB-DOTS program was started in city in last quarter of year 2002, initially in five TB clinics of a specialized chest institute and few other public health facilities but gradually it was extended to other public and NGO hospitals so that in year 2007 TB-DOTS services are being

provided through thirty eight public and twenty six NGO centres including eight canter of MALC & three of Aga Khan Health services.

In 2006 an NGO, Good life, entered in TB-DOTS program through support from GFATM. The CDR increased from 54% in year 2006 to 72% in year 2007 mainly due to contribution of non-public sector; however the default of 12% in year 2006 is still high. The low detection of suspects indicate the low utilization of public centers by community in mega city with strong private sector. TB-DOTS data from 2003 to year 2007 will be presented including share of various stake holders in case detection & case holding, outcome indicators, male : female, age group, cat-1 & 2 cases, constraints, etc.

PS-81517-20 Public-private mix DOTS (PPMD): a successful strategy in engaging health care providers and increasing access

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PPMD was adopted as a national strategy for the Philippines in 2003 to increase case detection and improve access to DOTS services in urban areas by making greater use of private sector providers. The Comprehensive and Unified Policy (CUP) for Tuberculosis Control was introduced in 2003 to enhance PPMD by unifying and harmonizing TB management by government agencies outside the public health sector. Between 2001 and 2004 the Philippine Coalition Against Tuberculosis (PhilCAT) piloted five different PPMD models and another 11 'self-initiated' PPMD units, all of which proved to be feasible and effective. The total number of PPMD Units to be installed nationwide by the end of 2008 is 226 and will be covering 55% of the country's population. A WHO external evaluation showed that the units were effective and were providing quality DOTS services. Recent results of the PPMD strategy implementation are very encouraging, with an increase in case detection of 17% in implemented areas. The treatment success rate of PPMD units is 92%. About 5000 private physicians nationwide have been trained as DOTS referring physicians. To improve sustainability of the PPMD the following mechanisms have been developed: A monitoring and evaluation (M+E) infrastructure, a financial incentive, the TB-DOTS Out-patient Package, provided by the Philippine Health Insurance Corporation, and local coalitions have been built. The PPMD strategy has proved effective and well received by the public. Its sustainability and further expansion to address urban poor and other marginalized populations in provision of tuberculosis services will measure its overall success.

PS-81538-20 Experience of franchising DOTS services in three metropolitan cities of Pakistan

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Aim: To assess the effect of PPM model through franchising DOTS services and its impact on case detection.

Design: Implementation of DOTS in private sector and collection of segregated data from GPs.

Methods: Routine surveillance.

Results: The National TB Control Program expanded DOTS to 100% public health facilities but CDR remain 37% till the end of 2005. To engage and expand the DOTS Coverage to private practitioners green star was supported through GFATM round Three. The strategy was implementation of DOTS services to selected GPs particularly in areas where public health facilities do not exist or difficult to access. More than 3000 general practitioners were contacted and consented to participate in the project. Initial constrain was poor documentation and recording and reporting practices. And poor case holding. The project was modified with recruitment of field officers and motivators. The strategy was to establish a chest screening camp at the designated area and suspects were referred to GPs. GPs after screening and diagnosis inform the field officer on telephone about the patient particulars. The strategy of active case detection and motivation by franchised services at private sector improved case detection and treatment outcome as more than 15 000 patients were registered with 87% treatment success rate. The green star intervention contributed significantly in the case detection in the CDR of selected districts.

Conclusion: A successful method for DOTS through franchising DOTS services by improving health services to unreached populations.

PS-81571-20 Systematic approach to developing district-based and public-led public-private partnership for DOTS implementation

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Introduction: Public-private partnership development is considered important for enhanced coverage and improved outcomes of tuberculosis control interventions. Pakistan has been one of the few countries that followed a systematic approach to developing public-private partnership with a stronger public sector support for the process.

Objectives: To develop and operationalize a set of guidelines and tools for enabling the private hospitals/clinics and laboratories to effectively plan, implement and monitor DOTS.

Method: A strategic framework formulated, through nationwide consultation process, for public-private partnership development. The operational strategies for implementing district-led public-private partnership developed through working group process. A set of development needs were identified and addressed through DFID-assistance. The development included: guidelines for mapping and selection of private hospital/clinics and laboratories, PPM implementation planning guide, adapted training materials for doctors and paramedics at private clinics/hospitals, and monitoring guide for private hospitals/clinics and laboratories. This set of guidelines and materials is currently being piloted and evaluated (for feasibility and effectiveness) in four districts, through DFID-supported Communicable Disease Research Programme.

Result: Early implementation experiences indicate feasibility of PPM-DOTS implementation in districts. The implementation of PPM intervention would increase the case finding and treatment success.

Conclusion: The approach would be further refined for scaling-up in other districts of Pakistan.

PS-81691-20 Private sector playing important role in moving forward to achieve TB-related MDG targets in Punjab, Pakistan

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Background: Pakistan is advancing to achieve MDG targets. Province Punjab, being the largest province, contributes 56% of case load of Pakistan. Punjab has touched the MDG targets since Q2 2007. Case detection rate 70%, treatment success rate 85%. Private sector is also working in collaboration with Public sector. A study is designed to find out the role private sector in success story of Punjab.

Objectives: To find out the contribution of the private sector in achieving targets of MDG in Punjab Pakistan.

Methodology, Study Design: Descriptive Observational study. Study Area: 35 districts of Punjab having 89.1 Millions of population. Study Subjects: Cohorts of TB patients registered under DOTS in Qtr1, Qtr2, Qtr3 and Qtr4 2007 in, 598 Diagnostic centers of public sector, 56 health centers of Pakistan Anti TB Association, Gulab Devi Hospital, and 150 General practitioners. Task mix defined: Drugs and logistic were supplied by Provincial TB control Program Punjab, while case management was done by Gulab Devi Hospital and medical centers of Pakistan Anti TB Association. An NGO providing logistics to General Practitioners. Data Collection: Quarterly Reports and TB register, Interview from Public and Private health care providers.

Results: Case Detection Rate, in whole Punjab, Public sector, Private Sector in Qtr 1 2007 is 61%, 38%, 23%, in Qtr 2 2007 71%, 51%, 20%, in Qtr 3 2007 69%, 49%, 20%, in Qtr 4 2007, 65%, 48%, 17% respectively. Consolidated report of year 2007 shows CDR whole Punjab 66%, in Public sector 46% and private Sector 20%. This shows 70% contribution of Public sector and 30% of Private sector in CDR of Punjab Pakistan (*P* value 0.00). Sputum Conversion rate in public Sector and private sector is 94% and 90% in Qtr 1 2007, 95%, 91% in Qtr 2 2007 and 97%, 91% in Qtr 3 2007 respectively. Early Default rate of Punjab is 3% in Qtr 1 2007 to Qtr 3 2007.

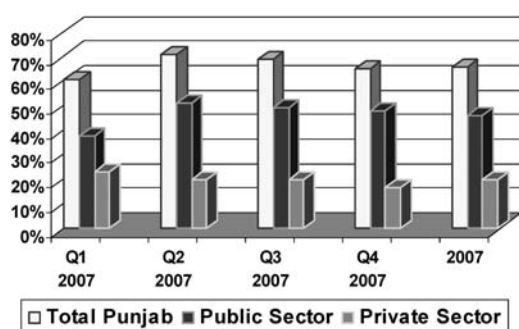


Figure Case detection rate: contribution of public and private sector.

Conclusion: In Punjab, Pakistan Private sector is contributing significantly (30%) to increase Case detection.

PS-81719-20 'You are the cure of TB' campaign: developing a tool for generating stakeholders' commitment to PPM DOTS

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Introduction: Filipinos with symptoms of TB seek and receive care from a wide variety of providers, including those outside the network of NTP's. These include private sectors and public sector institutions outside the purview of the NTP. A campaign tool was developed to identify relevant stakeholders in their localities and mobilize their resources to help in the control and prevention of the TB.

Objectives: Describe the characteristic and composition of non-NTP stakeholders engaged in PPMD, determine the number and proportion of non-NTP providers in PPM initiative and catalog the commitments generated by the campaign tool.

Methodology: A preliminary stakeholder analysis was conducted to identify potential stakeholders in 56 PPM area of coverage. Symposia were conducted among stakeholders and the 'You are the cure of TB' campaign tool was used to identify and generate commitment and contribution to PPM program activities.

Multi-sectoral agreements were signed and formalized from the commitments generated by the tool.

Results: Among 56 PPMD units that use the tool, a total of 610 stakeholders volunteered to be enlisted to participate in PPMD initiative. 452 (74%) of the enlisted partners are from the private sector while 158 (26%) are government institutions. Stakeholders are civil society groups (44%) non-NTP government agencies (24%), industrial and commercial establishments (14%), health care facilities (11%) and media organizations (2%). 59% committed to participate in TB case finding and case holding activities, 57% for awareness raising, 22% for mobilization of resources and 15% for other forms of support.

Conclusion: Majority of stakeholders in implementation of PPMD are private non-NTP partners. The initiative's success depends on how well organized and managed multi-sectoral collaborations are implemented. Mapping the composition and characteristics as well as their capacities and resources will aid in mobilizing and monitoring commitments.

PS-81723-20 Establishing coordinating committees for PPM DOTS: a strategy for building partnerships in TB control

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Introduction: The Philippines is one of the pioneer sites for strengthened public-private partnership. In 2004 the National Tuberculosis Program (NTP) adopted PPMD as a national strategy to increase case detection and harmonize the TB management among all health care providers.

Objective: Describe the process PPMD implementation as a national strategy and the outcome of the partnerships in terms of private care providers mobilized and patients detected and cured.

Methodology: A national coordinating committee (NCC) and sixteen regional coordinating committees (RCC) were set-up. The RCC selected areas where PPMD units were to be installed and provided technical assistance in the conduct of the advocacy symposia to generate commitment; training of private physicians and launching. The progress of implementation was monitored and data were collected from each of the 70 PPMD units installed from 2004–2006.

Results: A total of 3148 private physicians as of 2007 had been mobilized and 14 269 TB patients detected from referrals of private providers since 2004. For 2007, 3035 smear (+) TB cases detected contributed to 3% increase in CDR. Of the 2223 smear (+) cases in 2006, 91% were successfully treated.

Conclusion: The establishment of coordinating structures to support the implementation of the PPMD strategy is crucial in ensuring the success of the strategy. The active participation of the Philippine Coalition

Against Tuberculosis (PhilCAT) was also an essential factor.

PS-81725-20 Toward universal access to DOTS services: bringing private care providers into the health system

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Introduction: One of the strategies adopted by the National Tuberculosis Program (NTP) of the Philippines to ensure universal access to DOTS by all TB patients was Private-Public Mix DOTS (PPMD). Using this approach, 2748 individual private providers were engaged and 3035 smear (+) cases were detected in 2007 through referrals made. Engagement process included advocacy to generate commitment and training on the policies and guidelines of the NTP. Referral of patients by each provider was monitored in the 70 PPMD units established with support from the Global Fund to Fight TB AIDS and Malaria (GFATM). **Objective:** Determine the extent of utilization of DOTS services by individual private care providers.

Methodology: Data on referrals by private providers to the 70 PPMD units for 2007 were collected and analyzed. These are recorded in the Masterlist of Referring Physicians maintained in each of the PPMD units.

Results: Of the 2748 private providers engaged, around 41% utilized DOTS services provided. Utilization rate varied from one unit to another ranging from 12% to 100% with a standard deviation of 21%. In 19 PPMD units utilization rate was over 60% while this was less than 40% in 25.

Conclusion: To ensure universal access to quality-assured TB care, the engagement of private providers is an effective strategy. However there is still a need to identify facilitating factors as well as barriers to utilization of DOTS services to further increase utilization of available DOTS services.

PS-81960-20 TB diagnostic committee experience in tertiary government hospital in urban setting in Manila, Philippines

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Introduction: The TB Diagnostic Committee (TBDC) of the National TB Program was institutionalized in late 1990's in the Philippines. This committee is composed of group of experts: Pulmonologist, Radiologist, Infectious Specialist, NTP Coordinator. In hospital setting, the team used to meet weekly to review, discuss, provide quality diagnosis for sputum smear negative radiologic suspect cases. The aim is to reduce overdiagnosis and overtreatment. Henceforth the team

shall recommend treatment to TB cases with chest X-ray consistent with TB under supervised treatment.

Methods: Medical records review at the Public Health and Domiciliary Unit and OPD was conducted since 2005 to know demographic profile and quantify the decision and recommendation of the TBDC. Patients for further work up were followed at the OPD to confirm diagnosis and management.

Results: Partial evaluation of 566 sputum smear negative radiologic suspect cases was done by the TBDC. Of this, 361 (63.8%) male; 205 (36.2%) female. Three hundred forty-six (61.1%) came from Metro Manila; 220 (38.8%) came from provinces. Recommendation of TBDC showed: 459 (81.1%) start anti-tuberculosis drugs; 34 (6%) normal chest; 58 (10.2%) compatible with other chest and lung diseases; 10 (1.8%) surveillance; 5 (0.88%) DR screening. Of the 58, 27 (46.6%) underwent laboratory procedures like FOB, CT guided biopsy, CT scan to confirm diagnosis. Seven (25.9%) have bronchiectasis, 3 (11.6%) pneumonia, 2 (7.4%) COPD, 2 (7.4%) lung abscess, 4 (14.8%) extrapulmonary, 1 (3.7%) tuberculoma, 8 (29.9%) surveillance.

Conclusion: The TBDC findings suggest that enhancing and strengthening quality case finding would be effective means in administering treatment to TB cases. It showed the importance of proper decision and referral to address substantial other lung diseases.

PS-81962-20 Engaging general practitioners in TB control through public-private mix DOTS in Myanmar

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Setting: 72% of TB patients seek medical care in the private sector as first point of contact in Myanmar. Public-Private Mix DOTS (PPM DOTS) scaled up through the Myanmar Medical Association (MMA) since 2006 with support from 3 Diseases Fund (3DF).

Objectives:

- 1 To contribute to the NTP in case detection.
- 2 To promote public health orientation among MMA members.
- 3 To organize and train general practitioners for quality TB services.
- 4 To actively participate and strengthening PPM partnership.
- 5 To promote community awareness on TB.

Methods: MMA PPM DOTS is implemented in 23 townships under stewardship of National Tuberculosis Programme (NTP) and technical assistance of WHO. Scheme I for PPM DOTS includes health education and referral of suspected TB patients, Scheme II, referral and DOT; Scheme III: NTP approves the clinic as DOTS centre.

Results: Increased number of GPs implementing PPM DOTS from 26 in 2002 to 474 in 2007, which enhances their awareness of NTP guidelines, reflected in increase case detection rate in their respective townships. 451 GPs are in Scheme I, 20 GPs in Scheme II and 3 GPs in Scheme III. The contribution of GPs to NTP case detection of new smear positive patients, during 10 months of 3DF project period, was 20.3% in their respective townships.

Conclusion: PPM DOTS activities greatly increased case detection rate and improved case management. Each health care provider benefited from the cross linkage between GP and NTP. The lessons learned provide an evidence based foundation for expansion to other townships.

PS-81976-20 Evaluation of TB pharmacy DOT (P-DOT) in London

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Introduction: The provision of directly observed treatment (DOT) for TB treatment in community pharmacies has proved successful in India.¹ In North East London there are 60 to 70 pharmacies for every TB service so a similar pharmacy-based service was proposed (P-DOT) with background evidence to support its introduction.^{2,3} For the wider implementation of this service it is pertinent to evaluate the newly introduced P-DOT services.

Aim: To evaluate existing P-DOT services in NE London and suggest improvements.

Methods: The North East London TB Commissioning Unit consulted with nursing staff and Primary Care Trust (PCT) leads on implementation of P-DOT. Data regarding these services were collected.

Results: Two services had implemented P-DOT services: Hackney and Newham PCTs. Data (Table) reflect approx. 6 months activity. In Hackney, choice was offered between TB service-provided DOT and P-DOT; in Newham only P-DOT was offered, except in complex cases. The majority of uptake of this service was by patients already consuming methadone in pharmacies. Numbers of patients enrolled with the service were low but these are expected to increase as services become more established (total: 6 patients). Nevertheless, this suggests a cost-saving of approx. £46 000 compared with usual care.

Conclusion: Results suggest that TB DOT patients concurrently attending a pharmacy for their methadone consumption may be best served by P-DOT. As more patients are enrolled, further research will identify whether some pharmacies are better placed to deliver P-DOT than others. Five PCTs will implement P-DOT in the new financial year allowing patients more choice of services and better access to care. Results from this evaluation will improve implementation.

Service aspect	Newham	Hackney
Number of patients put on P-DOT	2	4
Why patients were put on P-DOT	Not complex needs	Prescribed methadone
How P-DOT is being offered (patient choice?)	Original specification: No choice over P-DOT but choice of which community pharmacy in Newham	Choice between TB service DOT provision or community pharmacy
How else DOT is being provided and how many	TB service DOT (for complex needs patients, patients requiring transport, and very local patients)	TB service DOT (for all other patients not on methadone or otherwise complex needs)
How many pharmacists are participating	9	13
Factors associated with P-DOT	None identified	Methadone
Is activity being documented?	Yes	No
Communication between pharmacies and clinic?	Yes—phone, documentation	Yes—phone

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PS-82189-20 Structures privées dans la lutte contre la tuberculose en R.D. Congo: le cas de Kinshasa

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Cadre : Le Programme national de la tuberculose de la R.D.Congo a 23 Coordinations provinciales et 1066 centres de diagnostic et de traitement. Ces centres sont des centres de santé, soit hôpitaux et centres médicaux privés dans lesquels on a intégré les activités de de lutte contre la tuberculose. La Ville de Kinshasa dépiste à elle seule le cinquième de malades du pays et elle a 110 centres de dépistage et de traitement, qui sont des structures publiques et privées. Et parmi ces dernières, il y a 72 structures de confessions religieuses, des entreprises privées.

Objectif : Déterminer le taux de détection et de guérison réalisé par les 72 structures privées que compte Kinshasa.

Méthodes : Nombre d'examen directs d'expectorations réalisés et le nombre de cas dépistés pour l'année 2006 par les 72 structures. Calcul des indicateurs de détection et de guérison.

Résultats : Pour l'année 2006, sur les 213 495 frottis d'expectorations réalisés, 132 188 frottis ont été effectués par les structures privées soit 62% de 213 495. Sur les 33 424 frottis positifs trouvés pour tous les centres, 65% (soit 21 927) de ces frottis des

structures privées Sur les 10 971 nouveaux cas de tuberculose bacillifères, une part non négligeable (8462) est attribuée aux structures privées soit 77%. En ce qui concerne le taux de guérison, il est encore inférieur (78%) par rapport à la moyenne de la ville (84%).

Conclusion : Les structures privées apportent un appui considérable dans la lutte contre la tuberculose surtout en ce qui concerne le dépistage.

PS-82208-20 Public-private mix as an opportunity for TB control in Zambia

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Background: In Zambia where high rates of TB-HIV co-infection exist, the contribution of the private sector to TB control cannot be ignored. The NTP notifies approximately 55 000 TB cases per annum, with 70% of these cases being TB-HIV co-infections. WHO estimates a prevalence of approximately 680/100 000 population in Zambia. The Ministry of Health (MOH) has incorporated Public-Private Mix in its National Strategy to Stop TB.

Methods: A WHO commissioned National Situation Assessment (NSA) for PPM-DOTS was conducted in 2007 by visiting and assessing health institutions in Zambia.

Results: Results revealed that the Private Sector serves approximately 23% of the general population (approximately 2 million) whose statistics are not captured in routine health surveillance data. Currently, 483 private practitioners are registered with the Medical Council (Medical Regulatory Body), 80% of which are in the 2 most urbanized Provinces (Copperbelt and Lusaka Provinces). Although DOTS coverage in Public Health institutions is 100%, findings show that TB care in the private sector varies from the recommended DOTS Strategy. Faith-based organizations, through the Churches Health Association of Zambia (Semi-Private) and a few private institutions fully collaborate with the NTP and serve approximately 30% population mainly in the rural areas. The NTP has begun to scale up PPM in close collaboration with the Faculty of Private Practitioners and is ensuring PPM operational plans and guidelines are developed and fully implemented.

Conclusion: Implementation of PPM in Zambia for TB control will lead to an increase in case detection; with approximately 10 000 additional cases to be reported annually, from the private sector.

PS-82241-20 Building programmes one step at a time: Eldoret, Kenya's fight to Stop TB now

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Background: TB care and treatment programs are primarily administered through national programs with occasional assistance by NGOs. The Moi University School of Medicine (MUSM) and the Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya, sought to partner with the DLTLD to further care of TB patients in western Kenya. Emphasis has focused on establishment of programs consistent with national guidelines but innovative in program design with emphasis on sustainability.

Methods: Program development at MUSM/MTRH proceeds in a step wise fashion, emphasizing collaborative efforts with DLTLD, grants, foundation support, international educational collaborations, and forged partnerships.

Results: Initial program concentrated on improved smear diagnostics and active case finding (FIDELIS: grant Rd 3—1657 smear+ cases, >85% cure rate; Rd 5—4065 smear+ cases, outcomes pending). Cell phone networking between >170 cough monitors in the case finding project facilitates tracing and case holding. The second step linked TB clinic services to on site HIV care through institution of diagnostic testing and counseling (68% MTRH TB Clinic patients are HIV+). USAID-AMPATH (HIV treatment program at MUSM/MTRH) has assumed support of the active case finding programs for sustainability as well as adoption of standard TB-HIV care protocols. In 2006 a laboratory culture facility was started as a FIND diagnostic demonstration site (Smear negative cases receive free culture. January 2008: 326 cultures with a positivity rate of 14.1%). Retreatment culture tracking program has been instituted with improved surveillance for drug resistance (300% increases in utilization). MDR treatment program is under development. (4 identified patients awaiting initiation of program; drug donation from Eli Lilly and DLTLD and inpatient ward capability by MTRH.)

Conclusions: Academic institutions can successfully assist in the development of innovative TB control programs to STOP TB NOW.

PS-82255-20 Study on public-private partnership in RNTCP-DOTS in Delhi, India

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Aim: To study the extent of private sector involvement and identify constraints in PPP and perception of private providers under RNTCP in the State of Delhi.

Design: Descriptive Study.

Methods: Structured questionnaire.

Results: Low public-private partnership in RNTCP in Delhi Major study findings that came into light during the study:

- 1 Around 60% private providers are involved in other national health programmes along with RNTCP. Most of private providers are involved in Referral services, provision of DOTS followed by health education.
- 2 Most of the private providers are getting anti TB drugs IEC material, stationary and training as supports from the public sector. In addition they are getting Rs.175 (US\$5) per treated case as incentive. But majority of them expect more financial support from the government to contribute more effectively to TB control in the country and supply of medicines and laboratory items in time.
- 3 Surprisingly almost 75% of private providers had no apprehensions before joining the RNTCP as private providers, but about 20% through that involvement would increase government interference in their working.

Conclusion: Efforts needed to improve public-private partnership Based on observations made in the study and review of literature on this subject, it is concluded that in view of massive growth of private sector in health care and their closeness to the people, the RNTCP which was initially meant to be implemented through public sector should involve more and more private provider-both private practitioners and non government organizations.

TUBERCULOSIS CONTROL IN SPECIAL POPULATIONS AND INSTITUTIONS

PS-81225-20 2 years' impact of the FIDELIS project on promoting TB control in Jiangxi province

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Background: FIDELIS project has been implemented 2 years since 2006 in Jiangxi province, covered population of about 43 million. There were 11 and 5 prefectures FIDELIS project completed one year and two year implementation respectively.

Methods: The poorest areas were prioritized in the selection of project site. People with limited access to health care were emphasized. Incentive mechanism is to be established in TB doctor and lab technician. TB

control staff in county level conduct two times clue investigation on the TB suspects and intimate contactors by countryside during the implementation year, old informal meeting for the village cadres, village doctors and older to find out the suspects, and organize them to receive further consultation or referral. Specific doctor of each hospital is designated to be responsible for collecting the information of PTB in all the sectors, and report them to county level TB institution. Particular staff in each county TB institution is appointed to conduct supervision and monitoring visits to the county and township hospitals on monthly basis.

Results: Patients with limited access to health care accounts for 25 005. Target of smear positive cases were 30 947 and actually 32 036 (104%) cases were actually achieved. Cure rate was 93.8%.

Conclusion: Conducting FIDELIS project in Jiangxi province has made great progress. FIDELIS project implemented in poverty areas of Jiangxi, increased the tuberculosis case detection rate and improved the results of treatment. It is an effective way for tuberculosis control through combining all the medical and social resources.

PS-81234-20 Programmatic decentralisation: enhancing local government unit involvement in MDR-TB management

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Background: From 2003 to 2007, Tropical Disease Foundation, Inc. (TDF), Philippines, in collaboration with 17 local government units (LGU) in Metro Manila, decentralized 183 DR-TB patients from 3 MDR-TB treatment centers to 113 local DOTS facilities, also called MDR-TB treatment sites. In early 2007, Programmatic Decentralization (PD) was started, a process that involved the transfer of MDR-TB care from specialized treatment centers to treatment sites, thereby, improving access to care and enhancing treatment adherence.

Process and Discussion: Criteria were developed to guide treatment centers to identify patients for PD that included a) culture and smear conversion and b) absence of uncontrolled side effects and unstable comorbidities. PD entails several activities: coordination with LGU, training of treatment site staff on programmatic management of drug-resistant TB (PMDT), actual patient endorsement, re-orientation on supervised treatment, laboratory follow-ups and clinical assessment, medical referrals by treatment sites, delivery

of second-line anti-tuberculosis drugs and periodic monitoring by the National TB Program and TDF. PD was implemented in a phased manner: Phase 1 started in February 2007 in 4 cities, Phase 2 in November 2007 with 6 more cities, Phase 3 in April 2008 with the remaining 7 cities in full implementation. By December 2007, 30 MDR-TB patients have been decentralized to 25 treatment sites, 22 (83%) of whom are still continuing treatment, three were cured, one died and four were referred back to the treatment centers for further management.

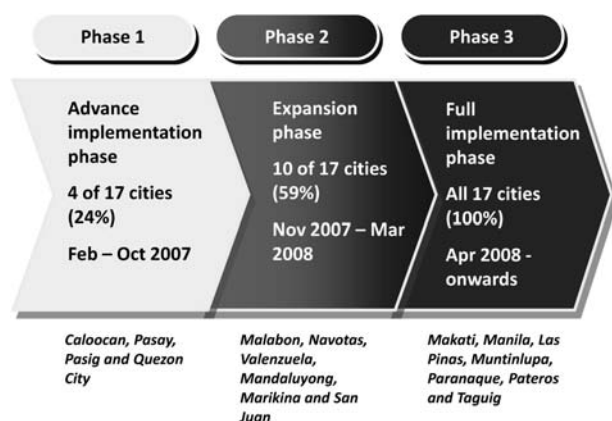


Figure Phased implementation of Programmatic Decentralization.

Conclusion: In PD, there is a big shift from project-based to program-based implementation, from centralized delivery of MDR-TB services by specialized treatment centers to treatment sites, from a focus on case management effectiveness to program efficiency and from involvement of few project staff to participation of local health workers. PD makes PMDT more accessible and patient-centered.

PS-81265-20 TB case finding methods in penitentiary system of Azerbaijan in 2007

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Setting: Penitentiary Institutions, Baku, Azerbaijan.

Methods: In order to avoid transmission of TB to other inmates and employees, and to facilitate early identification of TB cases, the Ministry of Justice of Azerbaijan deploys a combination of three case finding methods in prisons of Azerbaijan: entry screening, passive case finding, and mass screenings of prison population. All new arrivals at pre-trial detention places (PTDs) are screened for TB by a medical examination, Standard TB Questionnaire (STQ) and chest X-ray. Entry screening is also performed by a STQ method at each transfer between colonies at the time when prisoners arrive to a colony. Moreover, mass

screening of prison population (colonies + PTDs) is conducted by deploying two methods: STQ and chest radiography. Two consecutive sputum smears and a culture examination are performed for all TB suspects identified during mass screenings in penitentiary institutions (PI) of Azerbaijan.

Results: In 2007, 778 TB cases were integrated to category II treatment. 153 (19.7%) TB cases were identified by deploying entry screenings in colonies and PTDs, and 57 (7.3%) cases were found during mass screening of prison populations. 568 (73%) TB cases were found by passive (self-referral) method. 2007 was the first year when the complete and clear information on data about entry screenings was obtained. 70% of TB cases identified by the mass screening were new infectious cases. In 2007 the human and technical resources capacity of the MOJ only allowed to screen 33.4% of the prison population for TB by the mass screening method.

Conclusions: In Azerbaijan, mass screenings of prison population have a great role in identification of new infectious TB cases. All efforts should be consolidated in order to screen at least 80% of the prison population by the mass screening method. For this reason, a second mobile MMR unit was purchased by the MOJ with the financial support of the GFATM.

PS-81340-20 DOTS implementation in prisons of Bangladesh

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Introduction: TB is huge problem in prisons of Bangladesh. There are 5–8 times more prisoners staying in the prisons at a time exceeding the normal capacity. TB easily transmitted among the prisoners. There are risks among inmates; staff and families are obvious considering diffusion to the general population.

Objective: To function DOTS corner in all prisons.

Methods: Prisons identified, staff trained, drugs and logistics supplied by NTP linked with respective area NTP-Partners for case management.

Results: Service providers of major prisons of the country trained on DOTS during 2nd quarter of 2003. DOTS implemented in prisons of 2 big cities since last quarter of the same year further expanded to 18 in the country. During 2006, 401 were registered for treatment, out of which 263 were new smear positives. This is over three times the case detection among prisoners in general population. During 2007, 405 were registered for treatment, out of which 292 were smear positives, 59 smear negatives and 32 EPTB, and 22 were relapses. The treatment success rate is 65% of the cohort 2006. The transfer out rate is much higher 31% as they were released on bail. Presently the rate is same for the expanded prisons. Detail results will be presented.

Conclusion: Majority of the suspects are diagnosed by Chest Disease Clinics of respective prisons, follow up and referral linkages need to be strengthened to evaluate each cases transferred out.

PS-81360-20 Assessment of TB control activities in private companies located in the crisis districts of KZN, South Africa

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Background and Objectives: KwaZulu-Natal has the highest TB incidence rate of 1054/100 000 cases which also affects the work force. Although many companies have implemented wellness programmes, it is not known whether these programmes include TB control activities or if available whether these activities meet the needs of the employees. Therefore, the aim of this study was to assess work place TB control activities in KwaZulu-Natal.

Methods: A database of all private companies in the four TB crisis districts of KwaZulu-Natal was established in November 2007 by the Medical Research Council. A random selection of thirty companies was done. A selection was done on those companies that have more than one hundred employees. A questionnaire was used to collect data in all these companies in November 2007 and January 2008.

Results: Of the 30 selected companies, 18 companies provide health services within the company. TB patients in all these companies receive their TB medication from the government health facilities. 15 have DOT supporters of which only 7 have trained DOT supporters. 19 have TB awareness programmes and only 9 have TB policies. These are preliminary results; more results will be reported later since at this stage they are still undergoing a detailed analysis.

Conclusion: While it is still premature to draw any firm conclusions, it appears that there are a significant number of companies that are not involved in TB control activities.

PS-81364-20 Successful DOTS stories from a complex situation: Somalia

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TB is highly epidemic in Somalia. The latest estimates 2006 indicate that around 18 500 people develop TB every year (or 224 per 100 000 population), and 8500 of them are smear positive. The tuberculin survey conducted 2006 also indicates the high prevalence of TB. The estimated annual risk of TB infection was 2.22% (0.58–3.18%), and assuming a Styblo ratio of 50 this gives an annual sputum smear positive incidence of 111 (30–160) per 100 000 population. The

progress made in TB care in Somalia is truly encouraging. TB patients are diagnosed, treated, supported and cured despite extremely difficult situations. The number of TB centers has increased from 30 in 2002 to 48 in 2007. In the last 5 years (2002–2006), around 55 000 TB patients received TB care in Somalia, and more than 85% of them were successfully treated. The encouraging progress is a result of the joint work of partners who work within and outside of Somalia.

PS-81386-20 Comparison of total cost of health services among TB (new and MDR) inpatients in Masih Daneshva, Iran

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Setting: Economic concepts define and clarify the different aspects of medical care, making them more susceptible to analysis, especially in developing countries according to budget limitation.

Aims: The purpose of econometric studies regarding to the nature of admitted TB patients and hospital cost, is that to find the cost of servicing and duration of stay in new case-TB and MDR-TB.

Materials and Methods: This study was an applied retrospective cross-sectional study conducted in the 2006 year in Masih Daneshvari hospital (Referral center for MDR-TB in Iran).

Results: In this research we have accounted the mean total services costs of MDR-TB inpatients, as comparison to the new case patient and it was defined the costs of servicing to inpatients MDR-TB are about 9.5 times more than the new case TB inpatients in Masih Daneshvari Hospital, and the duration of stay in MDR-TB inpatients is 8.5 times more than new case TB inpatients. Manpower and drugs cost made up the greatest part of the costs. The total cost of MDR-TB inpatients are 31 577 020 (Rials) in fourth month bedridden and 3 293 908 (Rials) in two weeks.

Discussion: The important point in this study is the fact that The National TB Program in each country can recognize the importance of productive treatment of TB patients to avoid making them MDR, in this study was shown that the costs of servicing will increase if we don't have especial program to control or follow up. As the limitation of budget in the developing countries, it's important to manage their money in a good way and set the managed programs to control of cost.

PS-81393-20 The impact of pre-immigration screening process on pulmonary tuberculosis among Ethiopian immigrants in Israel

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Setting: Israel has absorbed more than 75 000 displaced Jewish immigrants from Ethiopia, a country in which tuberculosis prevalence is 44 times higher than in Israel (344 vs. 8 per 100 000, respectively). A health station was established in Addis Ababa in 2001 in which the immigrants were screened for pulmonary tuberculosis (PTB) before their departure to Israel.

Objectives: This retrospective cohort study aimed to evaluate the pre-immigration screening process initiated in 2001 on PTB morbidity and to assess its cost-effectiveness.

Methods: Ethiopian immigrants who were screened before departure (study group) were compared to those who were screened after arrival (comparison group). Outcome determinants were TB rates and time elapsed from immigration to Israel and disease detection dates in both groups.

Results: Between 1998 and 2005, 24 051 Ethiopian immigrants arrived in Israel. PTB was diagnosed in 332 (1.4%), demonstrating incidence density of 325 patients: 100 000 persons-years. PTB cumulative incidence was lower in the study than in the comparison group, demonstrating 711 and 1746 patients: 100 000 immigrants, respectively (RR = 0.4). PTB was detected earlier in the study than in the comparison group (193 vs. 487 days from entry, respectively, $P < 0.01$). Disease incidence declined significantly during the first two years following immigration. A five-year predictive model indicated that 98 individuals would be free of PTB, saving US\$91 055 annual treatment cost, due to screening.

Conclusion: Pre-immigration screening process reduced PTB incidence in subsequent years following immigration. PTB was diagnosed earlier in the screened group than in the comparison group. The process was found both cost-benefit and cost-effective, encouraging public health authorities to resume the screening procedures.

PS-81394-20 Tuberculosis behind bars in Israel: policy making within a dynamic situation

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Setting: The crowded environment of correctional facilities may enhance infectious diseases transmission, such as tuberculosis.

Objective: The purpose of this study was to define for the first time, tuberculosis burden in prisons in Israel, and to recommend policy adaptations for tuberculosis control. Israel is a country of low tuberculosis incidence (7.9 cases/100 000 population in 2004), in which about 13 000 inmates are being incarcerated annually.

Methods: All prison clinic lung records from 1998 through 2004 in Israel were reviewed to identify pulmonary tuberculosis patients. Additionally, we reviewed tuberculosis epidemiologic investigation files from one northern prison (years 2002 through 2005) to evaluate possible tuberculosis transmission.

Results: During the study period, 23 Israeli inmates had pulmonary tuberculosis (25 cases/100 000 prisoners), which was 3.5 times higher than for the general population. Of those, 18 (78%) were born in the Former Soviet-Union and immigrated to Israel after 1990. In the evaluated prison, four pulmonary tuberculosis cases were reported, and 22% (149/670) of all inmates and staff were referred for treatment of latent tuberculosis infection.

Conclusions: To prevent future tuberculosis cases, we recommend new prevention measures including a symptom questionnaire for all new inmates, and selective tuberculin skin testing, for inmates infected with HIV/AIDS, those who inject drugs, and those who emigrated from the former Soviet Union after 1990. New staff should be screened by the two-step tuberculin skin testing and annual symptoms questionnaire thereafter. Incarceration may be used as a point of detection for tuberculosis and a window of opportunity for treatment in this hard-to-reach population.

PS-81435-20 BELTA-TBnet: improving TB control through free access to TB diagnosis and treatment in Belgium

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TB frequently occurs in risk groups without health insurance coverage, such as illegal immigrants and homeless. Because of the financial barriers they face, TB is not diagnosed or diagnosed very late, and treatment will be irregularly taken or abandoned, resulting in avoidable excess morbidity and mortality and ongoing transmission of TB in the community. The BELTA-TBnet project, funded by the Belgian government, was launched in December 2005 to ensure that all TB patients have access to adequate care. During the first 2 years of the project, 297 patients (12% of all TB cases notified in Belgium during this period) have applied to BELTA-TBnet for assistance. Only 5% are Belgian; 90% are patients without social coverage, 10% are MDR patients whose second-line drugs are not reimbursed by the health insurance. Initially the project was perceived by the staff to be associated with a considerable extra workload: the clinicians were confronted with a number of new but inevitable administrative procedures and the TB nurses and social workers were required to make a special effort to ensure DOT among the often non-compliant patients. For a project such as BELTA-TBnet to be useful and effective, particular attention must be paid to administrative simplicity, good information and communication with the TB workers in the field. During implementation, BELTA-TBnet was confronted with additional needs (e.g. one-day hospitalisation cost for IV amikacin injection; additional second-line drugs to treat XDR-TB; drugs to treat side effects of second-line drugs). Thanks to the flexibility of the project it was possible to respond rapidly to these needs. Although it is too early to draw definite conclusions, initial data suggest that the BELTA-TBnet patients might have a considerably better treatment success rate than the general TB population. Another positive effect of BELTA-TBnet has been that the social security situation of many TB patients has been regularised.

PS-81492-20 Effectiveness of alcohol interventions among TB patients in Tomsk Oblast, Russia

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Background: Among tuberculosis (TB) patients, Alcohol Use Disorders (AUD) are frequently associated with hepatotoxicity, poor adherence to the treatment, and development of multidrug-resistant TB. Pharma-

cological intervention and behavioral counseling delivered by physicians are effective treatments for AUDs. It is unknown, however, whether combining these treatments may impact their effectiveness, especially within the context of TB care. A randomized controlled trial began in July 2007 in Tomsk, Russia, to assess the effectiveness of Brief Counseling Interventions (BCI) and administration of Naltrexone, singly, or in combination, within the context of standardized TB care.

Methods: The study population includes adult patients recently diagnosed with TB and confirmed diagnosis of AUD (either abuse or dependence). All physicians in the Tomsk TB service were internally certified to deliver BCI. Naltrexone has been given under directly observed therapy (DOT) in combination with brief medication adherence counseling.

Scope of the Research: After seven months of the study, 26 (43%) of 60 eligible patients have been enrolled in the trial. Challenges in the development, application, and monitoring of the study interventions include: 1) Communication between the TB and addiction specialists; 2) Distinctive culture of alcohol consumption in Russia; and 3) Paradigm of the physician-patient relationship.

Conclusion: Despite challenges, the process of training and delivering BCI has incited interest and motivation among TB physicians. The majority of patients have also been receptive to the treatments. Both pharmacological and behavioral alcohol interventions have been thus far successfully integrated into TB care, though patients appear to be less receptive to the former.

PS-81518-20 Evaluation of effect of tuberculosis control in the migrant population in Jiangsu Province, China

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Aim: Various approaches implemented to increase the TB case-detection and treatment success among migrant population.

Methods: A county in Suzhou, Jiangsu Province, China was selected as project area. Various interventions were implemented among the migrant population, such as building a supportive environment, including policy, training, health promotion and nongovernment organizations cooperation; providing free medical examination and TB treatment; providing travel and nourishment subsidies; prolonging service time of the TB control sections. Data of cases' detection, management, treatment was collected from Oct. 2006 to Oct. 2007 and compared with the data of baseline survey.

Results: Suspects consultation rate was 263.8/100 000, whereas the baseline survey was 65.6/100 000 ($P < 0.001$). The new registration rates of active TB cases and smear-positive cases were 72.3/100 000 and 36.4/

100 000, whereas the rates of baseline survey were 30.0/100 000 ($P < 0.001$) and 26.4/100 000 ($P < 0.05$). All cases detected had been managed and treated. Treatment success rate of new smear-positive cases increased from 47.4% of baseline survey to 89.3% ($P < 0.001$). Treatment success rate of smear-negative cases increased from 46.2% of baseline survey to 80.9% ($P < 0.001$). There were no significant difference of the two treatment success rates between migrant population and resident population (treatment success rate of new smear-positive cases was 88.6% ($P > 0.05$), treatment success rate of smear-negative cases was 85.2% ($P > 0.05$) during the same period. **Conclusion:** The project was efficient, the suspects consultation rate, the new case registration rate and the treatment success rate all increased among the migrant population through the implementation of the project, and achieved the same treatment results as the resident population did.

PS-81615-20 Screening of tuberculosis among asylum seekers: a missed opportunity

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Setting: All asylum seekers who arrive in Norway are screened with Mantoux test and those above 15 years also a chest X-ray. The benefit of screening in low prevalence countries is heavily debated.

Aim: To assess a national program for screening, treatment and follow up of tuberculosis infection and disease in a cohort asylum seekers.

Methods: A cohort study included all asylum seekers ≥ 18 years who arrived at the central reception centre, Tanum, from Jan. 2005 to June 2006, with a Mantoux test ≥ 6 mm, a chest X-ray suggesting tuberculosis, or a positive immune globulin release assay test.

Follow up registration forms were sent to the public health officials in the municipality where the asylum seekers had moved, and to an internist if the person had been referred.

Data from the cohort was matched with the Norwegian National Tuberculosis Register containing tuberculosis patients and persons who were treated for latent tuberculosis infection.

Results: Out of 5510 adult asylum seekers, 2258 fulfilled the inclusion criteria. In all 1635 forms (72%) were returned from the first municipality they had moved to and 337 of the 516 forms (67%) sent to a second municipality. 651 persons (29%) had been assessed by a public health nurse or physician in the municipality. The median time for assessment was 9 weeks after arrival in Norway (range 0–124). A total of 240 subjects had been referred to and 155 (65%) had been

seen by a chest physician with a median of 25 weeks after arrival in Norway (range 0–114). 25 patients were diagnosed with tuberculosis and another 12 were treated for latent infection.

Conclusions: The entry screening diagnosed an expected number of tuberculosis cases, but fewer than expected with latent infection were followed up and assessed for preventive treatment. Better information flow and definite recommendations for follow up in the municipalities may increase the numbers of referrals and inception of treatment for latent tuberculosis.

PS-81793-20 Should detainees be screened for TB at entry in prisons in countries with high and intermediate TB endemicity?

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Setting: Tuberculosis (TB) screening at entry in prisons is commonly implemented in high income but not in most developing countries including Brazil, despite higher TB burden: e.g. in Rio de Janeiro (RJ) prisons, the 2006 TB incidence rate (3110/100 000) was 31 times higher than in the general population.

Objectives: To investigate the need for such a screening, we performed, among detainees entering RJ prisons, a survey aimed at measuring TB prevalence, identifying risk factors and evaluating the most appropriate screening method.

Methods: Chest X-ray of 1696 incoming male detainees. Sputum smear examination and culture of inmates with any X-ray pulmonary, pleural or mediastinal abnormality. TB diagnosed on bacteriological results or, if bacteriological results were negative, on response to TB treatment.

Results: TB prevalence was 2.7% (46/1696) and 32/46 (69.6%) cases were bacteriologically confirmed. X-ray lesions were often extensive. In logistic regression model, TB-associated variables were: 'be illiterate' (adjusted OR 2.10; 95%CI 1.02–4.34), 'cough ≥ 3 weeks' (aOR 2.85; 1.54–5.27), 'history of TB treatment' (aOR 3.61; 1.76–7.39), 'to live in Rio suburbs' (aOR 4.54; 1.02–20.07) and 'in Rio city' (aOR 5.48; 1.29–23.33). However, these factors were often found among inmates without TB: e.g. 'cough ≥ 3 weeks' was declared by respectively 20.7% and 50.0% of detainees without and with TB. A screening based on 'cough ≥ 3 weeks' followed by sputum microscopic examination would have identified 364 TB suspects (21.5% of the study population) but only 10/46 (21.7%) TB cases.

Conclusions: These results call for a systematic TB screening at entry in prison, if feasible based on X-ray, and demonstrate the urgent need for improving detention conditions and medical assistance in police remands. Since 2006, this entry TB screening is recommended by Brazilian authorities and should be part of the mandatory entry medical examination which is in the process of generalization in Brazil.

PS-81885-20 Post-entry immigration screening for tuberculosis in Queensland, Australia, 2003–2007

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Introduction: Immigration referrals are an important source of tuberculosis (TB) diagnoses in the low TB incidence state of Queensland, where disease occurs mostly in migrants from high TB incidence (>50/100 000/year) countries (HRGM).

Aim: Evaluate outcomes of immigrants referred for TB screening post-arrival in Australia to inform future management practice.

Methods:

- A) Longitudinal cohort review of case records of immigrants referred to Queensland TB Control Centre (QTCC) from July 2003 to February 2004, for up to three years, examining radiological and clinical features and final outcomes.
- B) Database review of all TB cases in Queensland among immigration referrals 2003–2007.

Results:

- A) Between July 2003 and February 2004, 84% of 782 referrals were HRGM mainly from Asia, of mean age 38.5 years. Of 701 chest X-rays, 5.9% were suspicious of active TB, 14.5% of inactive TB, 31.8% demonstrated minor fibrosis/granulomata; the remainder were normal or non-tuberculous. 13 referrals (1.85%) were diagnosed with active TB, 6 culture confirmed and 12 within six months screening. Cumulative risk of TB was 2.23/100 person-years (py) (95%CI 1.2–3.78) and 26.2/100 py (95%CI 13.7, 45.5) when radiology was suggestive of active TB. No active cases occurred in previously treated persons with stable X-rays or in those with minor fibrosis/granulomata.
- B) Between 2003–2007, immigration screening-related TB diagnoses accounted for 9.8% (62/629) of total TB in Queensland. Immigration-related TB diagnosis was more likely in overseas students (OR 6.2; 95%CI 3–13) and refugees (OR 4.6, 95%CI 1.8–11.8) when compared to permanent migrant TB cases. The epidemiology of TB-related referrals with TB is discussed.

Conclusion: Immigration referrals are an important source for TB case finding. Improved communication

systems and focus on persons with suspicious X-rays and at high-risk groups will improve outcomes.

PS-81904-20 Descriptive statistics on the implementation of a TB control programme in children at Davao City, Philippines

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Aim: To assess the accomplishments of the advanced implementation of the TB Control Program in Children utilizing the DOTS strategy in Davao City, Philippines from August 2006 to December 2007.

Methodology: This descriptive study involved twenty one DOTS facilities. Quarterly reports were validated through records review, on site visits and interview of health staff. Data gathered were encoded in the computer using Microsoft Excel and were analyzed using proportions.

Results: There were 215 TB cases treated in August until December, 2006 of whom 210 were pulmonary and 5 extra-pulmonary. On the other hand, in CY 2007, only 184 TB cases were treated with 167 pulmonary and 14 extra-pulmonary. The treatment outcome of pulmonary TB cases evaluated in 2006 showed an 88% (185/210) treatment success, 1% (2/210) treatment completed and 11% (23/210) default rates. Likewise, the treatment outcome of the extra-pulmonary TB cases showed 80% (4/5) treatment success with 20% (1/5) treatment completed rates. Enabling factors included the local purchase of anti-tuberculosis drugs, supportive local chief executives, dedicated and innovative health staff, regular supervisory visits by the CHD and City NTP Coordinators and the participation of other government agencies. Availability of the PPD solutions and the creation of a Pediatric TB Diagnostic Committee were some of the challenges identified. **Conclusion:** The accomplishments of the advanced implementation of the TB Control Program in Children using the DOTS strategy in Davao City, Philippines have shown remarkable and promising results, thus must be sustained and scaled up. The availability of logistics has been crucial for better program coverage.

PS-81932-20 Applying active case finding in targeted risk groups for TB detection in urban Tomsk, Russia

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Introduction: TB cases are concentrated in recognized risk groups, but are often not detected early, leading

to progressive disease and transmission, adversely affecting the health of the entire population. Finding TB among high-risk population is most challenging. Active case finding has been suggested as one of the ways to detect TB at earlier stage so that they can be successfully treated and transmission interrupted.

Aim: To apply active case finding strategy to detect TB among high-risk population in the Tomsk city. It is believed that establishing a targeted program to actively find TB cases among high-risk population will result in an increase of TB notification rate.

Methods: In 2006 a special program to find TB among high risk population was launched in one of the city's general health care center (polyclinic #2). Health care workers established a list of all population from the catchment area and selected people from high risk groups for screening. Healthcare workers together with volunteers screened high risk population for TB symptoms, collected sputum samples and refer them for chest fluorography. Positive results were confirmed by Tomsk TB service.

Results: In 2005 total TB case notification rate for Tomsk city was 74.5 (per 100 000) and 61.6 in Polyclinic #2. In 2006, after running an active case finding program for 12 months, case notification rate in Polyclinic grew up from 61.6 to 123.8 (per 100 000), compare to the city, where case notification decreased from 74.5 to 71.0. Among all new TB cases detected in 2006 in the Polyclinic #2 (22 of 24 (91.6%)) were from the high-risk population.

Conclusions: Active case finding targeted to risk group population detect many new cases and significantly increases TB case notification.

PS-81942-20 Analysis and results of DOTS smear-positive patients in prisons of Republic of Armenia, 2003–2006

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Setting: The Ministry of Justice, with support of the ICRC, started to implement DOTS in prisons at the end of 2002.

Objectives:

- To reduce morbidity and mortality from TB
- To prevent the development of drug-resistant TB
- To reduce and ultimately stop the transmission of TB infection within the prison system through the WHO recommended DOTS strategy.

Methods: Diagnostic and case finding capacity developed over the years by introducing entry screenings, regular mass population screenings, passive case finding supported by Health Education activities for prisoners and prison staff. Early case detection and treatment is ensured through decentralisation of treatment

at penitentiary institution level and improved links between civilian laboratories and prisons.

Results: From 2003 to 2007, TB notification rate has decreased 3.2 times (from 4336 to 1324/100 000), for smear positive cases (SS+) the decrease is 6.6 times (2722 to 412/100 000), TB specific mortality has decreased 3 times; no deaths from TB have been recorded since 2006. New SS+ cases among all SS+ cases detected has increased from 27.4% in 2003 to 46.2% in 2007.

Multidrug resistance (MDR) among all new cases reported in 2003 was 2.8, 0 in 2004, 6.1% in 2005, 3.1% in 2006 and none in 2007. Higher MDR rates were detected among previously treated cases (16.7% in 2003, 7.5% in 2004, 10.7% in 2005, 25% in 2006 and 4.1% for 2007).

Treatment outcomes for new SS+ cases

	2003	2004	2005	2006	Total
Cured	20 (65%)	9 (50%)	7 (37%)	8 (57%)	44 (54%)
Completed	0 (0%)	1 (6%)	1 (5%)	2 (14%)	4 (5%)
Died	0 (0%)	2 (11%)	0 (0%)	0 (0%)	2 (2%)
Failed	6 (19%)	3 (17%)	3 (16%)	1 (7%)	13 (16%)
Defaulted	5 (16%)	0 (0%)	8 (42%)	3 (21%)	16 (20%)
Transferred					
Out	0 (0%)	3 (17%)	0 (0%)	0 (0%)	3 (4%)
Not evaluated	0%	0%	0%	0%	0%
Total	31	18	19	14	82

Conclusion: DOTS in prisons of RA have proven to be efficient in improving the treatment success rate of new SS+ cases (from 65% to 71%).

PS-82117-20 Knowledge, attitude and practice of TB infection control measures in TB-HIV laboratory settings in Nigeria

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Background: Emphasis on laboratory diagnosis for TB has resulted in laboratory workers becoming exposed to a 4 fold increase in the number of infectious specimen processed in the last 10 years. However inappropriate infection control measures at these laboratories predispose the Health Care Workers (HCW) to TB and MDR-TB in an environment with a high HIV prevalence. A review of the laboratory design and practices and their conformity with appropriate infection control measures is imperative to determine best approach to TB prevention in the laboratories.

Method: Questionnaires structured to capture administrative, environmental and physical protection measures were used to access the knowledge, attitude and practice of laboratory personnel in 11 AIDS-Relief (AR) supported sites in Nigeria in addition to oral interviews and facility tours across 3 geopolitical zones in Nigeria.

Result: Analysis of results revealed that all the laboratories had no TB infection control policies. A designated sputum collection spot was not available in any of the facilities and no structured timing for sputum smear collection processing and examination was documented or practiced. A third of the facilities had separate lab dedicated to TB diagnosis. 60% of these separate TB labs had poorly ventilated spaces with an average area of 6 sq m served by a single window of an average dimension. Poor work flow system was observed in all the TB lab with no clear delineation of various laboratory services and also poor methods of sputum container disposal using same waste bins as other laboratory consumables that are not emptied daily. Final disposal in most of the facilities are in open areas burnt occasionally while the rest burn theirs in incinerators.

Conclusion: TB infection control knowledge, attitude and practice at TB-HIV laboratories are poor necessitating an emergency plan to implement the administrative, environmental and personal protection measures in all of them.

PS-82263-20 Mainstreaming MDR-TB management to the National TB Programme in the Philippines: milestones and lessons learnt

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Background and setting: The Philippines, an MDR-TB-priority country, with 5098 estimated MDR-TB cases yearly. Through the Global Fund, the Green Light Committee-approved MDR-TB program initiated by the Tropical Disease Foundation (TDF) will have treated 3200 MDRs by 2011. Scaleup is needed for MDR-TB control.

Objective and methods: To describe mainstreaming of MDR-TB management into the National TB Program (NTP) through private-public partnership.

Discussion: In October '06, a Memorandum of Understanding was signed by key partners, the Department of Health, National TB Reference Laboratory (NTRL), Center for Health Development–Metro Manila (CHD–MM), Lung Center of the Philippines (LCP), MM local government units and TDF. Subsequently, consultative meetings enabled discussions on MOU operationalization. Tools and procedures underwent simplification tailored towards program use. With technical assistance, the NTP drafted the National Implementation Guidelines for Programmatic Management of Drug-resistant TB (PMDT); TDF developed training modules in August '06–March '08. Phased programmatic patient decentralization began in '07, with an operations research on drug delivery at the periphery. Second-line drug (SLD) storage was moved from TDF

to the regional warehouse which eventually did SLD delivery to MDR-TB facilities. September and thereafter marked NTRL doing culture, soon to lead the country's laboratory network, LCP becoming an accredited culture center; public/private PPMD units set up as MDR-TB treatment centers. Healthworkers trained by TDF address human resource needs.

Conclusion: The stepwise integration of PMDT in the NTP through private-public partnership has made MDR-TB services more accessible to patients. Lessons learned include the value of consultative meetings, building upon existing DOTS systems, simplified tools and procedures, phased implementation, transition time, and technical and financial support from partners.

PS-82308-20 Management of alcohol use disorders among TB patients in Tomsk, Russia

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Background: Alcohol use disorders (AUDs) are associated with poor tuberculosis (TB) treatment outcomes. In the Former Soviet Union, AUDs pose a substantial barrier to TB care because of high rates and limited resources to diagnose and treat addictions. We started a program to integrate alcohol diagnosis and care into TB services in Tomsk, and here describe our early achievements.

Methods: Starting October 2005, we implemented a brief diagnostic instrument (the AUDIT questionnaire) for universal screening for AUDs. We hired several psychologists and addictions specialists, established referral procedures, and introduced new evidence-based treatment options (i.e. psycho- and pharmacotherapy, social support, and referral to Alcoholics Anonymous groups).

Results: From October 2005 through May 31 2007, 1077 of 2063 patients (52.5%) completed the AUDIT at initiation of TB treatment. Of the patients tested, 51.5% had an AUDIT score >8 (defined as 'at risk' for alcohol dependence or abuse), and of these 23.1% had not been diagnosed with an alcohol problem previously. Of the 612 patients with AUDIT >8 and/or diagnosis of AUD, 38.1% were successfully referred to an addictions specialist; referral rate increased in correlation with AUDIT score ($P < 0.0001$). AUDIT administration decreased from 61.9% to 53.1% over time ($P = 0.08$) while the rate of specialist referral remained stable ($P = 0.45$).

Conclusions: We successfully implemented a program to manage AUDs in Siberian TB facilities. Challenges included on one hand difficulties in recruiting specialists given their fear of TB, and on the other hand low

referral rates due to precontemplative stage of patients with AUDs, stigma associated with addictions care, and low quality of physician-patient communication, with both addictions specialists and regular TB physicians.

PS-82345-20 Contact investigation by nurses of the Sputnik initiative in Tomsk, Russia

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Background: Detection of new cases of active tuberculosis among contacts of known patients remains an important method of case identification. While the TB notification rate among contacts of known TB cases in Tomsk is high (49 per 1000 contacts in 2007), more intense case finding could result in the discovery of more patients in this high risk group. We examined the ability of 'Sputnik,' a new program for patient-centered TB care among a challenging subset of TB patients in Russia, to increase the number of TB cases detected among contacts.

Methods: Patients were referred to the Sputnik program if they refused TB treatment or took less than 70% of required doses. A Sputnik team (two nurses and a driver) located patients, established treatment partnerships, and provided DOT at the patients' convenience. In addition to standard methods of contact tracing, the team actively asked anyone they encountered at Sputnik patients' houses during daily DOT work whether he/she had been recently examined for TB, and referred the unexamined for diagnostic procedures. The proportion of contacts found with active TB was measured.

Results: 30 index patients were enrolled in the Sputnik program in 2007; adherence to medication was measured at 90% and treatment was successful in 97% (1 default). The mean age of patients was 34, 71% were males, 81% have alcohol and 39% drug dependence, 6.5% have psychiatric disorders, 10% were homeless; 74% were jobless; and 42% had been previously in prison. We identified 23 contacts of these patients and were able to diagnose two with active TB (9%); this translates to approximately 87 cases/1000 contacts which is substantially higher than the 49/1000 reported for Tomsk in 2007.

Conclusion: Although based on a small cohort of patients, this shows that active contact tracing through home-based DOT provides among high-risk TB patients additional opportunities for contact-tracing that will lead to higher TB case detection.

DRUG RESISTANCE/MDR-TB MANAGEMENT-II

PS-82016-20 Realisation of the programme for diagnosis and treatment of MDR-TB in Orel Oblast, Russian Federation

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Goal: To evaluate the results of the implementation of the MDR-TB control program in Orel Oblast from November 2002–December 2005.

Materials and methods: 200 MDR-TB patients registered for treatment from November 2002 to December 2005.

- Z-N microscopy of the sediment of processed sputum
- Cultures were performed using two solid medias: L-J and FINN II
- Drug susceptibility testing of strains used the absolute concentration method on solid nutrient L-J media determined by indirect method to H, R, E, SM, KM, CM, OFX, PTH, CS, PAS.

Results: The following treatment outcomes were received:

- Treatment success (as per WHO definition)—119 patients (59.5%)
- Died—19 (9.5%)
- Treatment failure—30 (15%)
- Defaulted—26 (13%)
- Transferred out—6 (3%)
- Average total duration of the intensive phase—7.8 months.
- Average total duration of the entire course of treatment—20.1 months.
- Culture conversion in MDR-TB patients reached 70.0%.
- 7 of the 30 MDR-TB patients who failed chemotherapy developed XDR-TB (23%); 5 of them have died from TB.

Side effects were registered in 88% of cases. In 28.5% of cases, correction of side effects did not cause modification of the treatment strategy; in 53% of cases, dosage of the suspected drug was decreased or it was temporally discontinued; in 6.5% of cases, the drug was withdrawn.

Conclusions: Experience of the DOTS-Plus project in Orel Oblast shows that MDR-TB programs may be successfully implemented in oblast level health care facilities. To prevent further amplification of drug re-

sistance and development of XDR-TB cases, it is necessary to organize early detection of MDR-TB cases, timely initiate adequate chemotherapy and provide uninterrupted treatment of such patients.

PS-82031-20 Cohort analysis of cases enrolled in the public-private mix DOTS in a government treatment centre

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Setting: Lung Center of the Philippines, a government tertiary hospital with a Public-Private Mixed DOTS Clinic.

Objective: To describe and evaluate the outcomes of enrolled MDR-TB patients.

Design: A retrospective registry-based case study of 44 patients enrolled in PMDT at the Public Health Domiciliary Unit of the LCP, Quezon City, Philippines from January 1–December 31, 2005. Factors which have an effect on treatment outcome were investigated. Poor treatment outcomes were defined as those who died, defaulted and failed.

Results: Of the 44 patients, 26 (59.1%) were males and 18 (40.9%) females, all of Asian ethnicity, with age range of 35–54 years, a third residing within the catchment area of the treatment center. Most patients belonged to the lower economic bracket and had prior history of more than 2 treatments either under DOTS or non-DOTS strategy twelve patients (27.3%) exhibited 5-drug resistance, of which the majority had ethambutol resistance next to isoniazid and rifampicin. Sputum culture conversion was attained by the majority, 78% on the 2nd month of treatment. This cohort had an XDR-TB rate of 3 (7%). Nonetheless, treatment success was found in 35 (79.5%), failure in 1 (2.2%), default in 2 (4.5%), death of 6 (13.6%).

Conclusion: The integration of MDR-TB management at this PPMD unit yielded a high success rate similar to or higher than those from other settings treating MDR-TB.

PS-82114-20 Community-based treatment of MDR-TB and HIV in rural KwaZulu-Natal

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Setting: The rapidly evolving multidrug-resistant tuberculosis (MDR-TB) epidemic in KwaZulu-Natal

(KZN) is associated with a 65% case fatality rate in HIV co-infected patients (pts). In 2006, ~ 2,500 cases were found in KZN, exceeding provincial TB referral hospital bed capacity. Nosocomial transmission has been implicated, making community-based treatment (CBT) compelling. We have successfully implemented home-based, integrated treatment for drug-susceptible TB and HIV; such treatment for MDR-TB has not been tested in rural, high HIV-prevalence areas.

Objective: To create an integrated, CBT program for MDR-TB and HIV in rural South Africa.

Method: Nurses, community healthcare workers (CHWs) and family members were trained to provide twice-daily, home-based, MDR-TB and HIV treatment by directly-observed therapy. Program implementation involved: 1) training of doctors, nurses and CHWs in MDR-TB-HIV co-infection management, including use of second-line and injectable TB drugs (SLDs), 2) establishing a reliable supply of SLDs, 3) linking to provincial referral laboratory to ensure TB culture and drug-sensitivity testing, 4) creating a pt education curriculum on MDR-TB-HIV co-infection and treatment. Outcome measures include feasibility, survival, and culture conversion.

Results: The program successfully commenced CBT with 10 nurses in 5 injection teams, 4 contact tracing teams, 130 CHWs, and one family member treatment supporter per patient. Of the first 20 patients, all are HIV positive, 45% female, mean age 34.5 years. 50% have no prior history of TB treatment but 65% are resistant to isoniazid, rifampin and streptomycin. Survival and 2-month culture conversion data analysis in progress.

Conclusions: CBT for MDR-TB-HIV co-infection is feasible and acceptable to health care staff, pts, and families. Study data will show if improved survival in co-infected pts and reduced nosocomial spread of drug-resistant TB in rural, high HIV-prevalence settings is possible.

PS-82180-20 Drug susceptibility testing in multidrug resistant tuberculosis contacts

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Introduction: Multidrug-resistant tuberculosis (MDR-TB) is an infectious disease that constitutes a public health problem. Its transmission mechanisms are favoured by certain conditions such as crowded living quarters and poor in-door air flow. In this way, a proportion of contacts of MDR-TB infected individuals (index cases) will develop the disease with similar resistance patterns.

Aim: Determine the prevalence of MDR-TB among the population of contacts of MDR-TB index cases.

Methods: We extracted all cases in the Peruvian MDR-TB registry approved for treatment between January

1997 and December 2007. Cases were included in the study if they fit all of the following criteria: older than 5 years of age; culture confirmed pulmonary TB with results for first-line Drug Susceptibility Test (DST); began Empirical Treatment Regimen (ETR) based on previous exposure to an MDR-TB index case.

Results: Of the 1346 cases entered registered as MDR-TB contacts, 793 (59%) had DST results for at least first-line drugs. Of these, 498 (62.8%) were DST-confirmed MDR-TB and 130 (16.4%) were susceptible to all first-line drugs. MDR-TB and pan-susceptible patients showed similar demographic profiles. Of the confirmed MDR-TB contacts, 219 (44.0%) had no history of previous treatment for tuberculosis. MDR-TB among contacts was equally distributed between sex (45.8% female, 95% C.I. = 41.4–50.1), and most cases (58.6%) were in the 20–44 age group.

Conclusion: A large proportion of MDR-TB contacts were also found to be MDR-TB, hence supporting the recommended strategy of initiating MDR-TB contact cases to anti-tuberculosis treatment with second-line drugs under ETR. Nonetheless, the resistance pattern of the contact patient should be evaluated with a DST in order to tailor the appropriate treatment regimen. Genotyping is not common for MDR-TB patients in Peru, but genotype analysis would add precision to our findings.

PS-82220-20 Building site networks for clinical trials in multidrug-resistant tuberculosis

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Background: The Global Plan to Stop TB, 2006–2015, calls for development of new anti-tuberculosis drugs as critical to global TB control. Multidrug-resistant (MDR) TB represents a growing global problem but also an opportunity for new TB drug development, including accelerated approval. Our goal was to establish a qualified site network for a large multinational clinical trial evaluating a new compound for MDR-TB.

Methods: Two criteria were used for identifying sites: 1) access to MDR-TB patients, 2) well established MDR-TB treatment program, with Green Light Committee approval as priority. We conducted on-site screening visits to evaluate infrastructure for Good Clinical Practice (GCP)/International Conference on Harmonisation (ICH) guidelines. For gap analysis, sites were assessed for hospital space, equipment, infection control measures, microbiology laboratory capacity, and staff. Local regulatory and ethics committee requirements were also evaluated.

Results: Queries among TB specialists and identification of GLC-approved programs yielded 17 potential sites across 10 countries. No sites were adequate in

all areas evaluated; the greatest gaps were in GCP/ICH experienced staff and clinical trial infrastructure, specifically for TB. Many sites lacked equipment to perform protocol-required procedures. Ultimately, 13 sites in 8 countries were selected. Individualized site plans were developed to provide coordinator resources through local clinical research organizations (CROs), laboratory equipment procurement, infection control upgrades, and GCP training.

Summary: To implement global MDR-TB clinical trials, conventional industry models fall short and shifting paradigms is necessary. Sponsors must partner with sites and gap-bridging plans must be tailored for site-specific needs and local regulatory and legal requirements. Quality clinical trial sites for MDR-TB are made, not found.

PS-82261-20 Extensively drug-resistant tuberculosis cases diagnosed in the Western Cape Province, South Africa

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Background: Extensively drug-resistant tuberculosis (XDR-TB) has the potential to threaten TB control efforts globally. Little data on XDR-TB is available in Africa. It is estimated that South Africa has 10 000 new MDR-TB cases annually. The Western Cape Province has TB rates of 1000/100 000, amongst the highest rates in the country. 861 new MDR-TB cases were identified in the province in 2007, the majority of these cases coming from the greater Cape Town Metropole (504). HIV-TB co-infection rates are variable but as high as 70% in some areas of Cape Town.

Methods: We reviewed the case records of all patients diagnosed with XDR-TB, defined as TB resistant to at least 4 drugs (isoniazid, rifampicin, a fluoroquinolone and an aminoglycoside) in the Western Cape region, between Nov 06 and January 08.

Results: 81 patients were notified with XDR-TB, including 2 children. Of the 79 adults identified 39 female, 40 male, ages ranging from 16–56 years (median 32) and 31 (39%) tested positive for HIV. 34 adult XDR-TB patients are presently being managed at a dedicated XDR-TB facility in Cape Town. 4 culture converted (5 consecutive negative cultures) and have been discharged, 4 are being treated in isolation within prisons, 4 have absconded from the XDR-TB facility and 33 (42%) have died (17 HIV positive, 15 HIV negative and 1 refused testing). 75 had a prior history of MDR-TB and 4 of drug-sensitive TB. 24 of the identifying sputum's were sent from a TB facility,

6 from prisons, 8 from secondary and tertiary hospitals and 43 from clinics.

Conclusion: The large number of XDR-TB patients being identified from TB and other hospitals (N = 30) as well as from correctional facilities. This is further exacerbated by long hospitalisation of these patients within TB facilities and highlights the importance of the implementation of, effective infection control measures within hospitals and prisons to prevent nosocomial transmission of these very resistant strains of tuberculosis.

PS-82328-20 Primary MDR-TB treatment outcomes among patients treated with standard regimen 1

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Setting: MDR-TB is an emerging problem in Lima Norte, where drug susceptibility tests (DST) are not routinely available. We describe treatment outcomes in a group that received Standard Regimen 1 (2HREZ/4H2R2) and were found to be primary MDR-TB (pMDR-TB) after starting treatment.

Methods: Patients were recruited from clinical trial that evaluated new methods for DST for first line drugs in health centers of Lima Norte between May 2004 and February 2006. Diagnosis of MDR was established based on DST results on samples taken before starting treatment.

Results: From 1192 non-previously treated TB patients, 1153 (96.7%) received Standard Regimen 1. Among non-previously treated TB patients, 61 (5.1%) were pMDR-TB, 46 (75%) started Standard Regimen 1. Mean age was 27.4 years (SD 8.6), 27 (59%) were male. Contact history with a TB case or MDR-TB case was reported by 27 (59%) and 10 (22%) of pMDR-TB cases, respectively. At six-month follow-up, 29 (63%) had failed and were ongoing a second treatment regimen, 9 (20%) defaulted, 4 (9%) were cured, 3 (7%) died and 1 was transferred. At 12-month follow up, 14 (33%) continued on treatment, 11 (26%) were cured, 10 (24%) defaulted, 3 (7%) died, and 4 (10%) were transferred. One of the four cases initially declared cured, relapsed after the first follow-up.

Conclusions: Primary MDR-TB patients who start Standard Regimen I have a high rate of failure. Early detection with rapid DST in high risk groups may improve overall management of MDR-TB in this setting.

PS-82343-20 Pulmonary surgical intervention for patients with extensively drug-resistant tuberculosis in Peru

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Aim: Pulmonary surgery has been shown to be an effective strategy in the treatment of multidrug-resistant tuberculosis (MDR-TB). Patients with extensively drug-resistant tuberculosis (XDR-TB) may particularly benefit from surgical intervention due to the difficulties in designing effective medical regimens.

Setting: A community-based TB treatment program in Peru.

Methods: We prepared a retrospective case series report of 35 XDR-TB patients who had surgical intervention between May 2003 and January 2007. Seventeen (49%) patients were diagnosed with XDR-TB within the first 30 days of treatment and eighteen (51%) had an XDR diagnosis later in treatment. We describe outcomes and culture conversion rates for these two types of XDR-TB surgical patients.

Results: The majority of patients were male ($n = 24$, 69%) with a median age of 27 (range: 17–57). All but one (97%) patient had baseline cavitory disease. Post-operative death occurred in one (3%) patient that was diagnosed as XDR after the first 30 days in treatment. Culture conversion without reversion was achieved in 22 (63%) patients. Of 30 patients with outcome information, 17 (57%) were cured, nine (30%) died, three (10%) failed treatment, and one (3%) defaulted. Thirteen (76%) patients with an early XDR diagnosis converted without reversion compared to nine (50%) diagnosed later. Eleven (79%) patients with early XDR diagnosis were cured, two (14%) died, and one (7%) patient failed compared to six (38%) cured, seven (44%) died, two (13%) failed, and one (6%) default among those patients with a later diagnosis. Ten (90%) of preoperative culture-positive patients with early XDR diagnosis achieved postoperative conversion compared to thirteen (76%) patients diagnosed later.

Conclusions: Surgical intervention is an effective strategy for patients with XDR-TB. Patients diagnosed with XDR within the first thirty day of treatment have better outcomes compared to patients diagnosed later in treatment.

PS-82347-20 Brazil's approach to DR-TB case management: tools for monitoring treatment outcomes

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Setting: Since 1999 a standardized treatment regimen of 18–24 months duration is available free of charge for all new DR-TB patients identified and managed by multi-disciplinary teams in 122 health facilities throughout all regions.

Methods: Follow-up data on 2616 nationwide DR-TB cases notified since 1994 have been collected and input into a new web-based management information system (MIS) for case analysis providing information on actual drug consumption, regimens used, resistance patterns, treatment outcomes, adverse effects, and co-morbidities. Current data are input at the peripheral level. Specific on-line modules are offered by the MIS tool for creating and assessing reports concerning various epidemiological information. Treatment outcomes are ascertained in cohorts and data can be extracted to show outcomes for any time interval.

Results: For 1250 DR-TB cases notified between January 2000 and December 2004, cure rates progressively increased from 40.2% to 61.9%, while deaths rates progressively decreased from 33.7% to 11.3%. Treatment failures and default rates varied around 15.7% and 7.4%, respectively. Considering the cases without regular follow-up information (around 16.4% in 2004) a proportional reduction in cure rates was observed.

Conclusions: A well-developed MIS system allows standardization and surveillance of DR-TB case management which in Brazil has resulted in major improvements in treatment outcomes including a significant decrease in the death rate. Surveillance is done through an online comparison of DR-TB program performance at all levels through use of case and medicine management indicators. While treatment compliance surveillance is required on a regular basis by reference health facilities, there is a continuing need to improve input of follow-up data and information quality. Such a MIS system will also provide data to the national TB control program for setting appropriate intervention priorities and future adjustments.

PS-82351-20 Timing of surgical intervention as a predictor of culture conversion for patients failing MDR-TB treatment

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Aim: Pulmonary surgery can be an effective adjuvant strategy in the treatment of multidrug-resistant tuberculosis (MDR-TB), yet the importance of timing of surgery is unclear.

Setting: A community-based treatment program for MDR-TB in Peru.

Methods: We conducted a retrospective cohort analysis of 138 MDR-TB patients who were failing treatment and who underwent pulmonary surgery between May 1999 and January 2007. Patients were considered probable failures if they were culture positive four months into medical treatment. Survival analysis was used to investigate the effect of surgical intervention within the first ten months of treatment on culture conversion without reversion (final conversion) and total time in treatment.

Results: Most surgical patients classified as probable failures had baseline cavitory disease ($n = 113$, 90%). The majority achieved final culture conversion ($n = 93$, 67%). Univariate analysis showed that surgery within the first ten months in treatment was associated with final culture conversion (HR = 2.2, 95%CI 1.3–3.6). After controlling for age, history of being cured of TB, number of drugs to which there was resistance, and baseline body mass index, having surgery within the first ten months of treatment was still associated with final conversion (HR = 3.6, 95%CI 2.0–6.4). Kaplan-Meier survival analysis showed that patients who had surgery within the first ten months in treatment converted ten months faster ($P = 0.002$) and were discharged from MDR-TB treatment nine months sooner ($P = 0.046$).

Conclusion: For MDR-TB patients who are failing treatment and are surgical candidates, having surgery within the first ten months in treatment is associated with final culture conversion, faster conversion and shorter MDR-TB treatment duration. These results have implications for decreasing the length of infectious periods and for TB program costs.

PS-82358-20 XDR-TB: reported cases in Brazil

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Setting: The decentralized surveillance system for management of MDR-TB cases currently in use in Brazil allows the registration of sensitivity tests results performed for diagnosis and during the treatment. Given that the WHO had established up to date definition for XDR-TB it was possible to search for these types of patients at the information system's database.

Methods: The resistance patterns were extracted through direct consultation at the database's records.

Results: From January 2000 to March 2008, 2480

MDR-TB cases were reported to the system and among them two patients were classified as XDR-TB cases. Both were men, 16 and 25 years old at the moment of diagnosis, with 3 or more previous TB treatments and had presented chest radiographies with cavity. The younger had presented resistance in vitro to rifampicin, isoniazid, pyrazinamide, ethambutol, ethionamide, streptomycin and ofloxacin, HIV test not performed and had died during the twentieth month of treatment. The older had presented resistance in vitro to rifampicin, isoniazid, ethambutol, ethionamide, streptomycin, amikacin, and ofloxacin, HIV negative and up to January 2008 were in treatment with favorable progression. **Conclusion:** The threat of XDR-TB requires an efficient surveillance system and a wide access to sensitivity tests for second line TB drugs. The Brazilian surveillance system, ongoing since 2000, is already able to identify XDR-TB cases and has been implemented to achieve best results.

PS-82359-20 Case series of HIV-positive patients with MDR-TB

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Background: Treatment of MDR-TB in HIV-infected individuals is challenging due to adverse events and poor treatment outcomes.

Methods: We conducted a case series of 111 HIV-positive patients treated for MDR-TB in Peru between July 1996 and December 2005. We retrospectively collected data from three sources: health center patient charts, nongovernmental organization (Socios En Salud Sucursal Peru-SES) records/databases, and patient interviews.

Results: We interviewed 83 (75.5%) participants, reviewed health center records for 99 (89.2%) and reviewed SES records for all but one case (99.1%). Only 69 (62.1%) received HAART. 85.6% experienced a presumed adverse reaction to TB and/or HIV medications. Most frequent were neuropathy 18.9%, hepatotoxicity 10.8%, GI intolerance 32.4%, rash 21.6% and anemia 36.9%. At the time of analysis, 33 (30.0%) were cured of their TB, 11 (10.0%) were in treatment, 59 (53.6%) had died, and 7 (6.4%) had defaulted from treatment. 44.1% of deaths were attributed to TB. An updated analysis including ARV-related outcomes will be presented at the IUATLD Conference in October 2008.

Conclusion: In our cohort of HIV and MDR-TB co-infected patients, adverse events were common and mortality was high.

PS-82364-20 Surgical treatment for multidrug-resistant tuberculosis in Peru

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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 and January 2007, a team of surgeons from the Peruvian Ministry of Health performed pulmonary surgery on 335 patients. We describe the types of surgical procedures performed and summarize the clinical characteristics and evolution of these patients.

Results: A total of 385 surgical interventions were performed on 335 patients. Most cases were male (60%) and the mean age was 31.3 years. Patients were resistant to a mean of 6.5 drugs. Cavitary lesions were the most common (91.7%) and lobectomy was the most commonly performed surgical procedure (67.8%). Postoperative morbidity occurred in 11.6% of cases. Bronchopleural fistula, empyema and prolonged air leak were the most common postoperative complications. Patients were followed post-operatively for a maximum time of 79.3 months and culture conversion was achieved in 252 (75.2%) 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-82366-20 Case series of pregnancy during MDR-TB treatment

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Background: Management of MDR-TB patients during pregnancy remains controversial. Few data on drug safety and management approaches are available.

Methods: We conducted a case series of 38 women identified to be pregnant while receiving treatment for confirmed MDR-TB in Peru between July 1996 and December 2005. We retrospectively collected data from three sources: health center patient charts, nongovernmental organization (Socios En Salud Sucursal Peru) records/databases, and patient interviews.

Results: We interviewed 31 (81.6%) participants, reviewed health center records for 28 (73.7%) and reviewed SES records for all cases. At the time of analysis, 21 (58.3%) were cured, 4 (11.1%) were in treatment, 8 (22.2%) had died, and 3 (8.3%) had defaulted from treatment. Of those interviewed, 29 (93.6%) stated the pregnancy had been unplanned, and 28 reported receiving prenatal care. MDR-TB treatment was temporarily suspended in 44.7%; injectable therapy was stopped 50% of the time. 8 women reported prenatal complications including 5 spontaneous abortions; 3 had complications during labor, including fetal loss in one case. Of the children, 3 had latent TB, 1 was treated for MDR-TB and no congenital abnormalities were observed.

Conclusion: In our cohort of women treated for MDR-TB during pregnancy, we observed acceptable outcomes for women and their children and did not observe any congenital defects.

PS-82372-20 XDR-TB in the national mycobacteria reference laboratory of Peru

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Setting: The National Reference Laboratory Mycobacteria of Peru (LRN) receives all strains of MDR-TB from six health regions and isolates from patients with risk factors for MDR-TB from the rest of the country.

Objective: To report patients diagnosed with XDR-TB and their major epidemiological features, diagnosed in the LRN between January 2005 and December 2007.

Methods: Since 2005, LRN has been conducting the susceptibility testing to ten anti-tuberculosis drugs by the method of proportions in 7H10 agar, technical transfer and controlled by the Massachusetts State Laboratory Institute, USA. We reviewed the LRN's electronic databases in order to determine the number of tests and patients with criteria for XDR-TB and their more important epidemiological features.

Results: Between 2005 and 2007, 7949 susceptibility tests against second-line drugs were done in the LRN. In 141 tests belonged to 81 patients, the standard XDR-TB criteria were detected, of whom 32% were women and the average age for women and men was the same, 31 years, the interval ranged from age 6 months (contact with his mother with XDR-TB) and 71 years old, 16% were under 18 at the time of diagnosis. The origin of these patients was Lima (capital) in an 89%, and the rest of the coastal departments surrounding Lima. Information was obtained on history of previous treatment in only 40 patients, of whom 3 cases were classified as new and the rest as previously treated.

Conclusion: XDR-TB in Peru has been emerging as a threat to public health, mainly to the economically productive population. We are implementing control measures proposed by WHO. However, the isolation measures have not been implemented and the cases of primary infection with highly resistant strains are more frequent.

PS-82408-20 Clinical outcomes in a cohort of pulmonary MDR-TB patients in a highly prevalent area

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Setting: Lima Norte has one of the highest TB and MDR-TB rates in Peru. We report treatment outcomes in a cohort of MDR-TB patients identified in 53 health centers through 5 consecutive diagnostic trials conducted in that area.

Objective: Determine the frequency of the treatment outcomes in MDR-TB patients.

Methods: From May 2004 to March 2007, recently TB diagnosed cases were tested to susceptibility to first line drugs. Positive patients were treated according to the National TB program guidelines. Clinical outcomes were defined using WHO definitions. Failures, deaths and relapses (a new episode of TB confirmed by a positive culture after cure) were grouped as unsuccessful treatment outcomes (UTO).

Results: Among 2373 TB suspects, 1895 (78%) were culture positive, 184 (9.7%) MDR-TB patients were enrolled, mean age was 37.9 years (SD: 20.2), 63% were male. Non-previously treated (*n*-PT) accounted for 108 (59%) of the MDR-TB patients. Additional resistance to first-line drugs was found in 154 (84%) and to second-line drugs in 22/59 (37%), 1 patient had XDR-TB. The most common additional resistance was to streptomycin (70.6%) and to ethambutol (35.3%). Most common initial regimens were: standard regimen I (2HREZ/4H2R2) in 96 (57.8%) patients, standardized-MDR/WHO regimen in 29 (17.5%), and individualized regimen in 21 (12.7%). Follow up was completed in 169 (92%), mean time of follow up was 25 months (SD: 11.9). At the end of follow up, 60 (35.5%) were still ongoing treatment. Among those with known outcome, 44 (40%) cured, 30 (28%) abandoned, 14 (12%) were transferred and 22 (20%) had UTO.

Conclusions: Cure rates in this setting are lower than expected. Use of inappropriate TB drugs in standardized empirical regimens, ethambutol for instance, accounts for these findings. Since more than half of MDR-TB patients presented as primary MDR, universal drug susceptibility test should be encouraged to improve the outcomes.

PS-82450-20 High death rates associated with multiple MDR-TB cases in households

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Introduction: In our clinical practice we noted some households in which MDR-TB cases were likely to die from their disease. We hypothesized that the death rate would be higher in houses with multiple cases of MDR-TB than in houses with only one MDR-TB case.

Methods and Setting: A poor community with a high rate of unemployment and crowding in the Western Cape, South Africa, where the incidence of TB >1000/100 000 per year. The files of all the MDR-TB patients who started treatment from 1996 to 2007 at the clinic were investigated.

Results: There were 83 patients (48 males, 35 females) of whom 5 were HIV positive (6%). These 83 patients lived at 63 addresses—51 addresses had a single MDR-TB case and 12 addresses had multiple cases of MDR-TB. Of the 83 MDR-TB cases, 33 (40%) died. There were 51 addresses with a single MDR-TB case and of these 13 died (25%). At the 12 addresses with multiple MDR-TB cases, 20 of the 32 died (63%). All 5 HIV positive cases died of whom 2 were in multiple- and 3 in single-case households.

Conclusion: MDR-TB cases living in the households where there are multiple cases are more likely to die than those living in a household where they are the only cases. Possible reasons that this may occur include poorer treatment adherence leading to transmission in the household, reinfection from one case to another or MDR-TB being a marker of adverse socioeconomic conditions.

PS-82461-20 Pharmacy management of second-line anti-tuberculosis medications in Lesotho

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Aim: To evaluate the effectiveness of a new national inventory and dispensing mechanism for second-line TB drugs.

Design: Lesotho, like many of the countries in southern Africa, has a growing problem of drug-resistant TB. MDR-TB patients have been identified in Lesotho for the past five years. Previously, identified cases of MDR-TB sourced through the National TB program had to acquire supplies that were distributed to their nearby hospitals and were administered without the aid of a treatment supporter. Furthermore, prescribing and administering of second line medications did not follow any standardized regimen.

Methods: In August 2007, all patients diagnosed with

MDR- or XDR-TB were enrolled in central registry of patients, and received a treatment protocol that included a standardized empiric regimen until DST results were available, and then an individualized regimen based on national recommendations afterwards. All second-line drugs were centralized in a national pharmacy. Second-line drug regimens were packaged in monthly kits and dispensed directly to patients or to district MDR-TB teams.

Results: Currently there are 110 patients receiving second-line TB drugs in Lesotho. 65 of these are receiving second-line drugs pre-qualified by WHO via the GLC mechanism. The remaining patients were previously started on treatment with South African drugs before the GLC mechanism was available; these drugs are also managed according to the same system. Central pharmacy staff is also responsible for monitoring prescription tendencies of clinicians throughout the country, and train district MDR-TB teams on how to handle second-line TB drugs. An electronic medical record has been created which contains details of all dispensed items and stock on hand.

Conclusion: Second-line TB drugs have been successfully centralized, with improved control over storage, dispensing, and prescribing. No stockouts of second-line TB drugs occurred during the study period.

TB-HIV PROGRAMME LINKAGES-II

PS-81994-20 Health care integration improves continuity of care and health service outcomes: a South African experience

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Setting: University Research Co., LLC (URC) works to expand care/support initiatives for TB, HIV and AIDS programs in South Africa. To improve TB-HIV integration, URC focuses on integration of services between different levels of care and strengthening referral networks. This paper relates how TB-HIV programs in 80 facilities in 5 provinces have been strengthened through URC interventions.

Methods: URC staff utilize a multi-pronged continuous quality improvement strategy to encourage the formation of quality teams at facility level and increase cross-referrals between HIV and TB centers. URC seeks to:

- Increase compliance with guidelines by providing training to healthcare workers to improve their understanding of TB-HIV, ongoing mentoring and support
- Increase recognition/awareness of the disease by promotion of increasing access to VCT for TB patients and early screening for TB amongst HIV-infected clients

- Improve the continuum of care by provision of appropriate prophylaxis for co-infected patients and early/appropriate referral for antiretroviral therapy (ART) for all HIV-infected patients.

Results: Data from supported facilities indicate significant improvements in TB screening of HIV-infected patients from 74% to 81% and a dramatic increase in HIV screening of TB patients from 42% to 100%. There has also been a corresponding increase in the provision of cotrimoxazole prophylaxis from 32% to 100% for co-infected patients and an improvement in new patients screened for TB before ART initiation from 42% to 99% over a 2 year period.

Conclusion: To improve TB-HIV integration, it is imperative that models of care are developed to provide holistic care for each patient at each visit. Facility staff should be trained to provide both TB and HIV care to their patients, thereby limiting delays in cross-referral practices and initiation of treatment. Equally important is national level TB-HIV monitoring and surveillance system strengthening.

PS-82019-20 'Three Ones Plus' country-based information, dialogue and advocacy partnership platforms for TB and HIV

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Issues: Structures to achieve effective collaboration in national responses to TB-HIV are often irrelevant to civil society (CS) stakeholders. Unless national responses are founded on genuine CS participation and partnership, their contribution will not be fully harnessed, nor communities' needs addressed.

Description: Three Ones Plus focuses on the country level, from inception to implementation, with open and ongoing consultation with, and direct participation of, in-country stakeholders. National Partnership Platforms (NPP) for information and experience exchange helps to increase unity among CS and focuses on critical advocacy opportunities. This facilitates monitoring of national TB-HIV targets and increases accountability and transparency. NPP combines documentation of local knowledge, translation of information, capacity building among those affected to write and analyze, ensures high quality dialogue, media outreach and innovative information and social networking tools.

Lessons learned: Country-based information, dialogue and advocacy platforms on TB-HIV have improved the quality of information; increased genuine dialogue around priority issues and created a 'readiness' to mobilize around emerging and neglected advocacy issues. Investing time and resources to ensure shared vision and responsibilities according to each partners' scope of work and expertise is critical to each NPP. Innovative solutions developed for one country can be shared with and adapted by others.

Next steps: In-country partners provide bases for initiation and establishment of NPP. Once established, they ensure that neglected issues and marginalized populations continue to input into the NPP and national advocacy. Ongoing inter-country/regional/global linkages are also developed and maintained. NPP promotes emergence of a strong national voice that strengthens regional responses and ensures that those affected are heard in regional/global discussions.

PS-82022-20 La prise en charge croisée TB-VIH : enjeux historiques, Cameroun, Sénégal

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Objectifs : A l'heure où différents Etats africains affirment leur engagement de principe dans la prise en charge conjointe de la tuberculose et du sida, il s'agit de prendre au sérieux le fait que celle-ci ne va pas de soi pour les acteurs. L'objectif est de comprendre en quoi et comment la construction dans le temps long de la lutte contre la tuberculose (et son incorporation plus récente à des programmes) est susceptible de s'articuler aux expériences et pratiques de la lutte contre le sida, dans un contexte renouvelé par l'accès élargi aux antirétroviraux.

Méthodes : Dans le cadre d'une recherche pluridisciplinaire (anthropologie, économie, histoire) en cours, comparant les cas du Cameroun et du Sénégal, nous nous intéressons ici à la construction des programmes, du double point de vue de l'évolution des façons de penser la maladie et des pratiques qu'elles suscitent. Nous prenons appui sur le dépouillement d'une documentation écrite locale et internationale couplé à la conduite d'entretiens avec des acteurs des programmes et des professionnels de santé.

Résultats : En matière de tuberculose et de VIH, les acteurs estiment participer à des programmes distincts, sinon longtemps concurrentiels. Or force est de constater que la prise en charge de ces deux maladies sociales s'est trouvée confrontée à des enjeux comparables. Mais les façons dont ils ont été appréhendés et affrontés sont conditionnées par les contextes historiques dans lesquels ils sont apparus, pesant à leur tour sur les positionnements présents des acteurs.

Conclusion : Pour dépasser les seules injonctions au rapprochement des prises en charge de la tuberculose et du VIH, il importe de saisir les contraintes pesant sur les acteurs et leurs façons de faire : des contraintes à la fois localement déterminées et historiquement construites. C'est en les explicitant que l'on peut faire émerger un cadre commun d'action pour les professionnels engagés dans la lutte contre ces deux pathologies.

PS-82035-20 How can monitoring and evaluation systems be used for improvement of TB-HIV integrated care in 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 system that reflect the TB-HIV collaborative indicators. This project was conducted to review existing TB and HIV recording and reporting tools and to design new tools based on the outcomes of the review and indicators for TB-HIV collaboration.

Methods: Recording and reporting tools for TB and HIV programmes were reviewed in one of the sub-districts of Sisonke district, KZN province. The review included assessment of completeness and accuracy of the information recorded. The first ten rows (each row = one client folder) in the registers were checked from Sept 06, except the TB register. For the latter, the review period was the 2nd/3rd quarter of 2005 to allow assessment of treatment outcomes.

Results: All reviewed registers had inaccurate and missing information, particularly the TB registers which had 88% folders with missing data including TB treatment outcomes. TB registers were not designed to record the HIV status of TB patients, CPT, IPT and ART start date. Neither Pre-ART nor ART registers were designed to record IPT or CPT. After the review, a new patient's clinical chart as well pre-ART and ART registers were designed to integrate components of TB-HIV integrated care. A 6 week pilot was conducted to assess the acceptability of the new M&E system. Then after TB-HIV indicators were monitored and reported on a monthly and quarterly basis from Sept 07 to date.

Conclusions: M&E system that record key elements for TB-HIV integrated care is essential to foster the implementation and measure TB-HIV collaborative activities. This helped health workers to provide a comprehensive care to TB and HIV patients and TB and HIV programme managers and the district management team to monitor closely the provision of TB-HIV integrated care and measure the quality of care. 'What is not recorded is not provided neither measured'.

PS-82046-20 Reducing the gap between HIV and TB programmes: the Brazil Global Fund Initiative Tuberculosis-HIV coinfection

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Background: Tuberculosis (TB) and HIV programs are well structured in Brazil where TB is the most fre-

quent opportunistic infection among HIV-infected persons. However, given these programs verticality, the management of TB-HIV co-infections remains a major problem and, thus, a priority for the Global Fund Project (GF) implemented in the 11 metropolitan regions (MR) with highest TB burdens.

Objectives: Contribute to the implementation, monitoring and evaluation of 1) diagnosis of HIV-infection among TB cases; 2) diagnosis of TB infection and disease among HIV-infected subjects, in order to improve early care for TB-HIV co-infected persons.

Methods: The GF TB-HIV program is based on the joint involvement of TB and VIH programs and NGOs who coordinates their activities through periodic meetings of FG-created Metropolitan Committees.

Results: GF-sponsored posters and folders campaigns focus on the benefits of early diagnosis of HIV-TB co-infections. NGOs play a major role, in particular through GF-funded operational programs concerning primarily information, education, communication and adherence to treatments. With the states, GF organizes workshops and monitoring visits for TB and HIV physicians and nurses to improve their awareness of co-infection, their clinical skills (diagnosis, curative and prophylactic treatments) and train them to perform, on their own, HIV rapid diagnostic tests, with emphasis on the operational difficulties of program implementation at local level. A panel of indicators was developed for program monitoring and evaluation. In 10 months, among other activities, guidelines were edited, 26 workshops were organized, 360 physicians and nurses trained, 205 health managers and NGOs members reached.

Conclusions: The FGP contributed to reduce the gap between the TB and HIV vertical programs at federal state and municipal levels for their mutual benefits and that of HIV-TB co-infected persons.

PS-82064-20 An inadequate response: the UK government and the TB-HIV co-epidemic

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Background: Despite the strong relationship between TB and HIV, efforts to control the two diseases remain largely independent of one another. The WHO, G8, Commission for Africa and other bodies have called for a collaborative response to address TB-HIV co-infection. However, the global health community, including national governments, are slow to integrate their responses to TB and HIV.

Methods: Results UK evaluated the extent to which the UK Government is implementing recommendations on TB-HIV by a) analysing Department for International Development (DFID) policies on TB-HIV; b) surveying DFID offices in high TB burden countries (HBCs) regarding their support for TB-HIV activities at country-level.

Results: DFID's policy statements relating to TB recognise the importance of coordinated planning and implementation of TB and HIV programmes to scale-up treatment of TB among HIV-infected people and to increase enrolment onto antiretroviral therapy. However, neither TB nor TB-HIV co-infection are addressed in the UK's AIDS strategy. DFID could also do much more to support the implementation of collaborative TB-HIV activities at the country-level. Of the 18 HBCs in which DFID has a bilateral presence:

- Only two country offices are providing direct support for collaborative TB-HIV activities; and
- Five offices address TB-HIV co-infection indirectly through assistance to national TB and/or HIV programmes.

Conclusion: The need to address TB-HIV co-infection as part of the AIDS response is still not a clear priority for DFID and strong support for collaborative activities—and TB control in general—is lacking in many countries where DFID operates. Results UK recommends that the UK Government could make its policy on TB-HIV co-infection more consistent by addressing TB and TB-HIV in its updated AIDS strategy and by reflecting policy recommendations in its bilateral activities at country-level.

PS-82068-20 An inadequate response: UK civil society and the TB-HIV co-epidemic

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Background: Tuberculosis (TB) kills up to half of all AIDS patients worldwide and many people infected with HIV in developing countries develop TB as the first manifestation of AIDS. Civil society organisations (CSOs) play a key role in delivering basic services and advocating for more resources yet they have not fully embraced the need to tackle TB and HIV in a collaborative way. HIV and TB communities often work in isolation instead of joining together to fight what is, in many parts of the world, a dual epidemic. **Methods:** In 2005 and 2006, the WHO Stop TB Department brought together representatives from UK-based CSOs to discuss the importance of integrating TB into the HIV/AIDS response. To assess whether UK civil society had taken on board the need to address the two diseases in a collaborative way, Results UK surveyed 100 UK-based CSOs engaged with global health issues and evaluated the extent to which TB-HIV now features in their work.

Results:

- 40 UK-based CSOs completed the survey. Of those:
- 100% of respondents said that their organisation works on HIV/AIDS
- Only 52% were currently engaged in activities to address TB-HIV (of which 10% in a minor way)
- 44% of organisations said that TB was not included in their work at all.

Lack of capacity and the desire to maintain a narrow focus were the two most common reasons cited for not engaging in TB-HIV activities. Organisations that are addressing TB-HIV reported a positive impact on the lives of individuals and communities.

Conclusion: Whilst there is widespread acknowledgement of the close relationship between TB and HIV, the UK's HIV community in particular has not prioritised the urgent need to address the TB-HIV co-epidemic. All CSOs concerned with fighting HIV/AIDS or TB should incorporate TB-HIV into their policy and activities.

PS-82129-20 Resource requirements for the implementation and scale-up of TB-HIV collaborative services in Ethiopia

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Issues: About 60% of HIV positive patients in Ethiopia are co-infected with tuberculosis (TB). Ethiopia initiated TB-HIV collaborative activities in 2005 and is now scaling-up the number of sites providing TB-HIV services. However there is currently no reliable data on costs and financial resources required. This study provides a detailed costing of the national TB-HIV programme, and estimates the financial resources required to sustainably implement and scale-up TB-HIV services in Ethiopia through to 2015.

Description: A resource needs model (RNM) for TB-HIV was developed, based on the TB planning & budgeting model from WHO and the Resource Needs Estimation methodology for HIV/AIDS from UNAIDS. The model presents the financial resources required for interventions to decrease the burden of HIV among TB patients, interventions to decrease the burden of TB among people living with HIV and programme level interventions such as monitoring & evaluation and training. For each intervention, the resources required are estimated by combining information on the people in need, target coverage and the unit cost of the intervention. Estimations on the people in need were derived from demographic and surveillance data. Unit costs were obtained from a facility based costing study and through extensive consultations with relevant stakeholders. The costs and projections were validated during a national TB-HIV workshop.

Next steps: As the organization of TB-HIV services are quite recent in Ethiopia, the model consists of interventions currently implemented and interventions that will be implemented in the future. Therefore the model will need to be updated with information based on field practice for those TB-HIV interventions not

yet in place. Continued resource mobilization and commitment by all stakeholders will also be necessary in controlling and reversing the TB and HIV co-epidemic and a comprehensive human resource plan should be developed.

PS-82155-20 Regular supervision as model of improving HIV counselling and testing among TB patients in Nelson Mandela Metro

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Background: The rate of counseling and testing for HIV among TB patients remains low despite training and understanding of the importance of TB-HIV activities. The national rates of uptake for HIV counselling among TB patients in 2006 was 59.5% with 41% of TB patients testing for HIV. In spite of numerous training activities, staff at health facility level still needs to be mentored and monitored in order to effectively implement the collaborative activities in TB-HIV. Supervision of the TB program needs considerable technical expertise. PHC Supervisors are a valuable resource in complementing this important function. Regular supervision of primary health care staff is essential for ensuring that the TB-HIV collaborative activities are implemented in order to ensure the delivery of quality health service.

Method: Quarterly supervisory visits are conducted in Nelson Mandela Metro using the District Rapid Assessment Tool. The tool facilitates rapid assessment of the implementation of the TB Program and elements of TB-HIV activities at facility level. Because the facility staff is actively involved during the assessment, they are able to identify contributory factors to low uptake of counseling and testing among TB patients. Their understanding of the reasons behind the challenges enables them to develop practical and sometimes innovative interventions that are within their capabilities. In this way, supervision is not seen as a threatening exercise and this keeps the staff motivated.

Results: Improvements in HIV counseling and testing among TB patients from 30% to 89% between Q1 2007 to Q3 2007. TB patients who tested for HIV during this period improved from 12% in Q1 2007 to 30% in Q3 2007.

Conclusion: Regular supervision following training on TB-HIV collaboration ensures that staff implement the TB-HIV activities. The feedback on performance ensures that staff is motivated to improve with each round of supervision. The supervision process also motivates staff.

PS-82200-20 The role of technical working groups in strengthening collaborative TB-HIV activities in Ethiopia

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Background: Ethiopia started collaborative TB-HIV activities in 2002, by establishing a central coordinating body, but actual implementation was started in 2004 on a pilot basis. As of December 2006, about 338 public health facilities were implementing TB-HIV activities. However, the implementation pace remained slow until mid April 2007 when a Technical Working Group (TWG) composed of major partner organizations was formed. Here, we describe the results achieved following the establishment of the TWG.

Achievements and challenges: Since its establishment, the TWG has: 1) contributed to resource mobilization by developing funding proposals; 2) developed national joint plan of action for collaborative TB-HIV activities; 3) developed, revised and/or reached at a consensus on national policies and guidelines including implementation guideline, harmonized TB-HIV training materials, and a national framework for TB-HIV surveillance. At outcome level, the TWG has registered the following results: 1) Number of TB-HIV implementing sites have been expanded to over 340 new sites just in one year; 2) over 25% of TB patients got tested for HIV, a remarkable increase from 2% at baseline. However, the level of collaboration at lower level, especially in the area of recording and reporting patient data remains weak. This is more so from the HIV side where the number of HIV patients screened for TB remains largely unreported, leading to the undermining of the national effort.

Conclusion: National TWGs are important for strengthening TB-HIV collaboration at program level. A more meaningful collaboration and greater results, however, require more cooperation at patient management level.

S-82243-20 Streamlining internal TB referral systems in selected primary health care facilities in South Africa

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Introduction: The Counseling and Testing (CT) project of University Research Co., LLC, is funded by the CDC to provide technical assistance to the South African National HIV and AIDS Counseling and Testing program to achieve the WHO global targets of universal access to Counseling and Testing.

Background: Establishment and strengthening of internal referral systems as one of the strategies to improve counseling and testing in the health care facilities is envisioned to increase uptake in high volume services such as TB. Clients accessing TB services are offered CT and are referred appropriately for further care and support services.

Objective: To increase uptake of CT in PHC facilities through improving internal referral system for clients accessing TB services.

Method: Mopani District managers and the 20 PHC facilities in Limpopo Province, realized the need to track clients that are offered and referred for CT to minimize missed opportunities for access to services for TB clients. An internal referral slip was designed so that a client can move between consulting rooms accessing services and still be tracked. Health care workers were then trained on how to use the internal referral slip and correctly categorize the client that has been referred internally and the subsequent recording of the client in the TB registers.

Results: Following the training and the use of an internal referral slip for counseling and testing there was an improvement from 28% to 34% of the HIV and TB clients who were seen at the facility, referred and counseled and tested was observed in the two quarters from January to June 2007.

Conclusion: The development of internal referral systems and concurrent training on implementation of the referral system in Mopani District has improved the uptake for counseling and testing for TB, Antenatal Care (ANC), STI and Family Planning clients.

PS-82282-20 The role of PITC in TB-HIV service integration in South Africa

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Setting: South Africa is faced with the challenge of concurrent TB and HIV epidemics and has one of the highest burden of HIV and TB in the world. TB-HIV co-infection is estimated at between 40 and 60%. However, TB and HIV counselling and testing (C&T) services remain fragmented at primary health care (PHC) facilities. This results in missed opportunities for diagnosis and early referral for further care of patients. Integrating provider initiated Counselling and Testing (PITC) into TB services can serve as an entry point for early TB diagnosis in a high-risk co-infection population.

Objectives: To enhance TB-HIV service integration through PITC based technical support to Health care workers (HCWs).

Methods: URC is collaborating with the National and Provincial Departments of Health in South Africa to expand access to and uptake of HIV C&T. A major strategy is to introduce a PITC based project in five

provinces focusing on HCWs. Technical support is provided at primary health care level to HCWs, including lay counsellors, professional nurses and doctors, aimed at reducing stigma and integrating CT into TB clinical services. HCWs are provided training and on site mentoring in data management systems, HIV testing quality assurance (QA/QC), record management and clinical protocols, in order to ensure that HIV positive patients have access to TB care, and TB services have the capacity to offer CT.

Results: HCWs trained in principles and practice of PITC in the supported provinces increased from 151 to 757 between 2006 and 2007. Following implementation of the program, referral from TB services to CT increased from 40% to 49% in all provinces. There was also a concurrent improvement in the number of newly diagnosed HIV positive patients screened for TB.

Conclusion: With good quality technical support and coordination, health worker driven PITC is effective in increasing the uptake of HIV CT in TB services and increasing referrals to early TB care and treatment.

PS-82293-20 Scaling up of TB-HIV collaborative activities in Ethiopia

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Introduction: Ethiopia is highly affected by the TB-HIV co-epidemic. The country ranks 8th among high burden countries in terms of estimated TB cases. The adult HIV prevalence is 2.1%. The TB-HIV initiative was launched in 2004 in 9 pilot sites and subsequently scaled up at national level. During the last months, intense efforts have been made by the Federal Ministry of Health, Regional Health Bureaus and implementing partners to scale up and strengthen TB-HIV Collaborative Activities across the country.

Results: Coordination at national level is ensured by TB-HIV Advisory Committee (THAC), composed by representatives of National TB and HIV Programmes, WHO and main stakeholders providing TB-HIV service. The THAC, with the support of TB-HIV Technical Working Group (TWG), addresses regularly the bottlenecks and constraints in implementation of TB-HIV collaborative activities. In 2007, a master plan with identification of priority areas and mapping of funds has been developed by TWG. The number of TB-HIV implementing sites has progressively expanded to more than 400. TB-HIV clinical, programmatic and training tools have been revised and standardized. Massive training of general health workers, laboratory technicians, counselors and program managers has been conducted in all Regions. Repeated rounds of supervision and mentoring are carried out with strong contribution of Regional Health Bureaus and

partners. Monitoring and evaluation of TB-HIV activities has also been strengthened and the flow of data is now rapidly increasing. As results of these efforts, TB-HIV data collected in the last six months show a dramatic and encouraging increase in the provision of TB-HIV service at ground level.

Conclusion: The strengthened and enhanced commitment and collaboration between TB and HIV Programmes at central level and the active involvement of all Regions and implementing partners allowed reaching promising results in the implementation of TB-HIV activities in Ethiopia.

PS-82357-20 TB prevention among HIV-infected people in public health clinics: strengths and weaknesses

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Background: THRio is an ongoing study, with a primary objective to provide TB prophylaxis to HIV infected people in order to prevent TB among those patients. This study has been developed in 29 health clinics, throughout Rio de Janeiro city, where over 15 000 people living with HIV are treated by a broad health professional team with different levels of knowledge about TB and AIDS.

Aims: The present qualitative study was designed to investigate experiences at four participating clinics of the study during the implementation of the intervention. We identified strengths and weaknesses and specific aspects concerning the ongoing TB prevention activities at the selected clinics.

Methods: Four health clinics were selected according their performance of IPT prescription (the best and worst performing clinics pre and post intervention). Interviews with physicians (7 HIV specialists and 3 TB specialists) and two Focus Groups (6 nurses and 6 local health administrators) were carried out.

Results: The main results were: 1) the lack of the doctors' knowledge about the protocol of TB prevention in HIV patients was the first difference identified in understanding the varying performances in the clinics; 2) the complexity of HIV treatment and HIV patients' lifestyle adversely affected TB prevention for those patients; 3) potential adverse effects of IPT were an important issue for the physicians and they were very concerned about that; 4) fragmented responsibilities, lack of integration among TB and HIV services and lack of management tools were the primary problems at the local level.

Lessons learned: To increase the sustainability of TB prevention for people living with HIV in the public health clinics, we need: new communication strategies for physicians; specific strategies and tools to mobilize local management; and novel and more broad training models for health professionals.

PS-82460-20 Assurance de qualité des comptages de CD4 au laboratoire TB en RD Congo

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Contexte : Le projet IHC de L'Union introduit dans 12 centres pilotes le comptage manuel des CD4 au laboratoire de la TB, où le microscope est souvent seul équipement disponible. Comme pour la TB, l'assurance de qualité (AQ) est un enjeu essentiel. A la différence de la tuberculose il n'est pas possible de fixer des lames de CD4 et de les acheminer vers un laboratoire de référence.

Méthode : La méthode se fonde d'une part sur la conformité de la procédure avec les spécifications du fabricant, évaluée par supervisions du laboratoire provincial de référence, et d'autre part sur une double lecture en aveugle du même échantillon, réalisée par deux techniciens différents du même centre. Les perceptions des laborantins sont recueillies lors des supervisions et d'une enquête indépendante.

Résultats : Le principe est bien compris et accepté par un personnel familier avec la tuberculose. La charge de travail est acceptable, mais appelle rétribution. Fin 2007, le laboratoire de référence juge la procédure conforme, et la concordance est bonne. Les résultats fin juin 2008 seront présentés.

Conclusion : Dans un contexte où l'infrastructure est limitée, l'AQ du comptage manuel des CD4 élargit la qualité du laboratoire et permet d'offrir aux cliniciens des résultats fiables. La rotation des personnels de santé ne pose pas de problème tant qu'un technicien performant reste pour former son nouveau pair. La rémunération adéquate de services de laboratoire gratuits pour le patient constitue un enjeu de la qualité.

VACCINES/DRUG DEVELOPMENT/ CLINICAL TRIALS AND TB TREATMENT/ OTHER

PS-81470-20 Genome wide proteomics of Mycobacterium thymidine kinase (TK) vs. other taxa TK

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Aim: With TB affecting about a third of the global population, diagnosis and treatment still challenging

and the evolution of resistance to currently available chemotherapy options, there is an urgent need to develop novel alternatives. Understanding the molecular metabolism of the tubercle bacilli relative to its host and other microbes may offer insights into new interventions. Here, we aimed to explore how the unique proteomics of mycobacterium thymidine kinase may be exploited to the diagnostic and therapy advantage.

Methods: Comparative genome-wide proteomics.

Materials: 226 aa Human TK2 = |O00142|; 214 aa Myc-TK = |O05891|; a genome-wide protein databases of 874 (17 mycobacterium) microbe and BLASTP algorithms.

Interventions: Both human and myc-TK were queried against the cluster of 874 microbe inclusive of 17 *Mycobacterium* spp. Individual myc-TK and hum-TK were fed in the protparam tool to model physicochemical parameter.

Results: Whereas about 12% (100) of all 857 microbial deoxynucleoside kinases dNK other than the 17 mycobacterium had up to 36% similar amino acid alignment as in Human TK (81 of 226 aa), and the remainder (78%; 757) up to 64% divergent from Human TK (145 of 226aa), myc-TK was found to be up to 95% divergent from human TK (214 aa). Protparam modeled differences in physicochemical parameters of the human and myc-TK.

Conclusions: This, unique proteomics of myc-TK, is being further explored to develop a novel class of thymidine analogues as TB chemotherapy, and a diagnostic for differentiating between active and latent TB.

PS-81689-20 The DarDar prime-boost TB vaccine trial in HIV infection: final results

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Objective: To determine the efficacy of a multiple dose series of an inactivated whole cell mycobacterial vaccine for the prevention of HIV-associated tuberculosis (TB).

Methods: HIV-infected subjects in Tanzania with a CD4 count >200, BCG scar and no evidence of active tuberculosis were randomized 1:1 to receive a 5 dose intradermal series of heat-inactivated *Mycobacterium vaccae* vaccine or placebo beginning in 2001. All subjects had baseline in vitro lymphocyte proliferation and interferon gamma immune response assays (IRAs) to 4 mycobacterial antigens, and repeat assays after immunization. Subjects were followed every 3 months to detect disseminated TB (dTB) or pulmonary TB (pTB) and to assess vaccine safety.

Results: Follow-up will be complete in mid-2008 and final results presented. Over 9000 doses of *M. vaccae* or placebo were administered and subjects were followed for a median of 3 years. There were no adverse effects on HIV viral load or CD4 count. Baseline IRAs showed that 94% of subjects had demonstrable in vitro responses to mycobacterial antigens and were therefore primed for boosting. Over 7 years of the study 9% of subjects died and 12% were lost to follow-up, including many who returned to their home villages for terminal care. TB endpoints have included 20 cases of dTB and >150 cases of pTB meeting a rigorous study definition of definite or probable TB. A new syndrome of subclinical TB was identified based on positive sputum cultures in the absence of symptoms or chest X-ray findings.

Conclusions: Prime-boost TB vaccine efficacy trials can be conducted safely and effectively with excellent compliance in an HIV-infected population. Rates of TB endpoints are high and permit expeditious assessment of TB vaccine efficacy. Lessons applicable to other TB vaccine trials will be presented.

PS-82132-20 A rapid, single step bioluminescence technique for the determination of viability of BCG vaccine

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Aim: To develop and validate a simple, rapid ATP-based bioluminescence assay as a method to determine viability in the quality control of *Mycobacterium bovis* BCG vaccine.

Background: Colony forming unit (CFU) enumeration by viability plating on solid media is the classical quality control method for stating the viable proportion of bacilli in BCG vaccine. An alternative method of quantification of cellular ATP by a bioluminescence technique as an indication of viability has been investigated by a number of groups, with superior results compared to viability plating. However, mycobacteria such as BCG have complex cell walls, making removal of cellular ATP difficult, and heating and complex chemical lysing methods are often employed to facilitate removal of ATP. We have sought to simplify the approach in favour of a single step procedure to determine BCG viability.

Methods: Serial dilutions of 20 BCG formulations (10⁹ cfu/ml) were prepared in Middlebrook 7H9 media supplemented with OADC. Cellular ATP content was extracted and quantified using the Bactiter-Glo kit (Promega) in a single 5 minute step. CFU enumeration of the dilutions was done by viability plating on Middlebrook 7H10 solid agar media.

Results: A strong linear correlation between the ATP

content and BCG viability was found over a broad range from 10^2 – 10^9 cfu/ml. The coefficient of variation of ATP method was 2–10%, much less than the 23–27% of the viability plating method. The lower limit of detection of the ATP kit was $1-7 \times 10^2$ cfu/ml. **Conclusion:** The bioluminescence technique studied here demonstrated a simple and rapid method of quantifying BCG viability with good reproducibility and high detection sensitivity, as demonstrated by low detection limits. We conclude that the bioluminescence technique is a good alternative to CFU enumeration on solid media in the quality control of BCG vaccine preparations.

PS-82338-20 Standardising microbiology laboratories for participation in multi-country clinical trials for treatment of MDR-TB

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Background: Clinical trials of new anti-tuberculosis drugs base efficacy on microbiologic endpoints, including sputum culture conversion. Most TB labs use procedures specified by The Union, WHO, and US CDC, focusing on diagnosis of new cases and drug susceptibility testing (DST) of recurrent cases. Standardizing microbiologic methods for clinical trials presents new challenges to the TB laboratory.

Objective: 1) To evaluate current lab methods/practices at each trial site; 2) to assess capacity (facility and staff); 3) to establish standardized operating procedures to achieve quality and reliable efficacy measures and ensure comparability across sites participating in a multi-country clinical trial.

Methods: 1) Developed questionnaire to determine current lab practices and capacity, 2) visited site to view physical layout of labs, and 3) defined procedural aspects critical to microbiologic endpoints and created a study lab manual.

Results: Ten labs in 7 countries were visited. Topics discussed included: staffing, quality assurance/management, biosafety, lab methods, equipment/supplies, and recording/reporting. Findings varied among labs, specifically in biosafety, quality standards, documentation, and reporting results. Critical issues requiring standardization were 1) maintenance of integrity of the sputum specimen from collection to processing, 2) preservation of viable organisms during decontamination, 3) inoculum volume and type of media for cultures, and 4) DST methods for 1st and 2nd-line drugs. Quantitative cultures were dropped from the protocol in favor of MGIT time-to-positivity due to problems in standardizing techniques. Labs were well prepared, yet most needed additional internal quality control/assurance processes.

Summary: To obtain reliable and comparable results for international MDR-TB clinical trials, microbiology labs should standardize lab procedures, equipment, and results reporting. Site-specific plans should be generated to address individual needs and capacity.

PS-82459-20 Efficiency of Russian combined antituberculosis drug LOMEComb in treatment for the new-onset pulmonary tuberculosis

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It has been carried out multicenter clinical study of efficacy of combined antituberculous drug LOMEComb with the fixed doses (Lomefloxacin—200 mg, isoniazid—135 mg, pyrazinamide—370 mg, ethambutol hydrochloride—325 mg and pyridoxine hydrochloride—10 mg) in a combination with rifampicin and kanamycin at 120 patients (first group) in comparison with treatment by separated mono drugs isoniazid, rifampicin, pyrazinamide and ethambutol at 120 patients (second group) at treatment for the new-onset pulmonary tuberculosis patients with positive swabs of expectoration. The study was done in regions with primary MDR level exceeded 5%. The drug resistance was 45.8% in patients in the first group and 43.3% at patients in the second group. In first group patients there were: monoresistance—8.3%; polyresistance—23.3% and MDR—14.2%. In second group these parameters were accordingly: 9.2%, 21.6% and 12.5%. It has been reached negative reaction of expectoration in 3 months of an intensive phase of chemotherapy at all 120 patients of the first group (100%), and at 65 patients in the second group (54.2%). At patients of first group negative reaction of expectoration in 100% was at patients with mono- and polyresistance and in 40.8%—with MDR. While at patients of the second group these parameters have made, accordingly: 100%, 20.8% and 0.0%. Removable undesirable reactions in first group were 13.3% and in second group—14.2%.

PS-81321-20 Phase I Clinical Trial of LL-3858 (Sudoterb), a potential candidate for the treatment of MDR tuberculosis

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Aim: To determine safety, pharmacokinetics, tolerability of oral LL-3858, in single and multiple dose escalation Phase I trial.

Design: Randomized, double-blind, placebo-controlled, parallel group, dose escalation studies in healthy adult male volunteers under fed and fasting conditions.

Methods: In total, 156 healthy volunteers were randomized and evaluated. Seven single doses, from 50 to 1000 mg were evaluated. Thereafter, five multiple (15 days) doses were evaluated up to 600 mg. Lastly, single dose fed study was conducted with 400 mg. LL-3858 extracted from human plasma samples was measured using Liquid Extraction method, quantified using LC-MS/MS and pharmacokinetic profile was estimated using WinNonlin software. Safety was evaluated from medical history, physical examination, continuous ECG monitoring and periodic recordings, ophthalmoscopy, blood, urine and stool examination.

Results: LL-3858 was well tolerated up to 400 mg on multiple dosing. 600 mg was the maximum tolerated dose. The reported adverse events include mild abdominal pain, increased appetite, loose stools, nausea and vomiting, headache, drug rash, QTc prolongation, raised SGOT or SGPT or creatinine phosphokinase. Dose linearity in C_{max} and AUC was observed up to 800 mg single dose and 400 mg multiple doses. 1/2 increased with increasing dose/days. Saturation kinetics was achieved with 600 mg (multiple dose study). No signs of accumulation occurred. Food decreased rate of absorption and increased extent of absorption.

Conclusion: LL-3858 was better absorbed under fasting conditions. Doses below 600 mg appear to be safe and well tolerated. Plan to evaluate early bactericidal activity of LL-3858 in sputum positive tuberculosis patients.

PS-81438-20 Molecular characterization of rifampicin- and isoniazid-resistant *M. tuberculosis* isolates from Ethiopia

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Background: Molecular techniques for the detection of mutations in the regions of gene (s) that encode targets of anti-tuberculosis drugs are rapid and sensitive methods to detect the presence of resistance markers and are especially useful to detect MDR (multidrug-resistant) strains. No such study has been conducted in *M. tuberculosis* isolates from Ethiopia.

Objective: To detect mutations in the *rpoB* and *katG* genes associated respectively with rifampicin (RIF) and isoniazid (INH) resistance in *M. tuberculosis* isolates from Ethiopia.

Materials and Methods: Twenty one (21) RIF resistant and 9 susceptible strains were used for analysis of *rpoB* mutations, while for *katG* mutation analysis, 41 INH resistant and 9 susceptible *M. tuberculosis*

strains were used. Rifampicin and INH susceptible reference *M. tuberculosis* strain H37Rv (ATCC 25618) was used as a control while analysis of both genes.

Results: Mutations were identified among 85.7% (18/21) of RIF resistant strains in codons 516, 526 and 531 of *rpoB* gene, and the most common mutation was the Ser531→Leu (TCG→TTG) substitution. Mutations in *katG* gene were identified among 73.2% (30/41) of INH resistant strains in the codons 315 and 463, and the most common mutation was the Ser315Thr (AGC→ACC) substitution.

Conclusion: All identified *rpoB* and *katG* mutations were missense mutations, while no mutation was found among all susceptible control strains in both genes. All RIF resistant strains were MDR, while all INH resistant strains with no identified mutations of *katG* gene in the analyzed regions were mono-resistant to INH.

PS-81565-20 The depressive syndrome as a response to the TB treatment in MDR-TB patients

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Aim: To assess depression in primary or secondary MDR-TB patients upon initiating the treatment with second-line TB drugs.

Design: This is a retrospective survey conducted on patients from the MDR-TB (multidrug-resistant tuberculosis) Center in the Marius Nasta Institute of Bucharest between 2005 and 2007.

Methods: From the total number of patients, admitted and psychologically assessed, 67 patients showed symptoms compatible with depression, the Beck questionnaire for depression being subsequently applied in this case.

Results: From the total number of patients assessed, 58% had no depression, with a score of 4.21 ± 2.96 ($P < 0.0001$), 13% had a slight depression, with a score of 12.22 ± 0.83 ($P < 0.0001$), 16% had moderate depression, with a score of 18.48 ± 1.69 ($P < 0.0001$), and 13% had severe depression, with a score of 27.78 ± 3.53 ($P < 0.0001$).

Conclusion: MDR-TB patients present a high risk of depression compared to the general population, mainly as a consequence of the treatment with TB drugs that are known to cause depression. The risk of depression increases as other drugs with depressive side effects are added to the treatment (second-line TB drugs), requiring strict psychological and psychiatric supervision of patients in MDR-TB centers.

PS-81772-20 Real-time PCR for the detection of fluoroquinolone resistance in *Mycobacterium tuberculosis*

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Background: A fluoroquinolone (FQN) is the drug of first choice for the treatment of multidrug-resistant tuberculosis therefore, a rapid and effective test to detect FQN-resistance before treatment is urgently needed. FQNs inhibit the function of the DNA gyrase, encoded by the *gyrAB* genes of *Mycobacterium tuberculosis* and mutations in the Quinolone Resistance Determining Region (QRDR) of *gyrA* have been shown to account for 60–70% of FQN-resistant isolates. A Real-time-PCR (RT-PCR) test was developed to detect the most common mutations in this region. **Methods:** *gyrA* sequencing data from 40 FQN-sensitive and 42 FQN-resistant (ofloxacin 2 µg/ml) clinical isolates was used to develop the RT-PCR test. Three Locked-Nucleic-Acid probes were used to detect mutations at codons 90, 91 or 94 which accounted for 97% of the FQN-related mutations in QRDR of *gyrA*. A set of 131 consecutive isolates from retreatment patients from Pham Ngoc Thach Hospital, resistant to either isoniazid or rifampin, was used to evaluate the RT-PCR and estimate the resistance rate.

Results: Sequencing data showed that all 40 FQN-sensitive isolates were wild-type in the QRDR. Among 42 FQN-resistant isolates, 10 were wild-type, 20 carried single mutations and, surprisingly, 12 were heterogeneous containing both wild-type and mutated populations. Of these 12, 4 contained a mutation at 2 resistance-associated alleles. The RT-PCR test identified all wild-type and single mutation isolates correctly and 12/16 mutations in heterogeneous isolates. Five percent of isolates (7/131) from retreatment patients were identified as FQN-resistant by RT-PCR and confirmed by sequencing.

Conclusions: This RT-PCR assay is a quick, simple test to screen for FQN resistance with 100% specificity. FQN resistance is estimated at >5% in retreatment patients in Southern Vietnam. Studies to determine other FQN resistance mechanisms are vital to improve molecular diagnosis and treatment.

PS-82017-20 Patient population structure in early bactericidal activity studies, 2005–2008

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Objective: To review the population structure of new, uncomplicated, drug-susceptible, smear positive pulmonary tuberculosis (TB) patients that were recruited during the period 2005 to 2008 for early bactericidal activity (EBA) studies of novel anti-tuberculosis agents at two sites in Cape Town, South Africa.

Design and Methods: All studies were performed on a hospital ward with 24-hour care. Patient demographics, symptoms, laboratory values of blood, serum and urine samples, radiographic appearance, sputum characteristics, mycobacterial speciation and drug susceptibility patterns, the frequency of serious adverse events and treatment compliance were reviewed.

Results: 202 patients were recruited for 5 studies with 5 to 14 days of investigational product intake. Patients had a mean age of 27 to 37 years, a mean weight of 50 to 59 kg, and a mean height of 161 to 167 cm. 60% were male, and 57%–66% were black. 98.7%–100% had an abnormal CXR compatible with TB. All patients had at least 1+ positive (WHO IUATLD) sputum at enrolment. 98.1%–100% of *M. tuberculosis* isolated at screening were susceptible to all first-line anti-tuberculosis agents. No patient developed resistance to the investigational drug given in monotherapy. The study completion rate was between 89% and 100%. The most frequent reasons for withdrawal were haemoptysis and positive urine drug screens.

Conclusion: EBA studies with novel antituberculosis agents are carried out in young, predominantly male, smear-positive patients with relatively low body weight. With the currently used selection criteria and 24-hour hospital care EBA studies are safe. No resistance development was observed under up to 14 days of monotherapy.

PS-82095-20 Impact and benefit of rapid diagnosis of MDR-TB through the Genotype® MTBDRplus assay in South Africa

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Conventional culture-based diagnoses of MDR-TB take up to 3 months, during which TB transmission continues and patients are often given inappropriate

treatment, leading to worsening morbidity, poor response to treatment, amplification of drug resistance, and increased mortality. The Genotype® MTBDRplus test for rapid diagnosis of MDR-TB is being investigated in South Africa in a demonstration project to determine effectiveness under TB Control Program conditions and for impact on and benefit to patient management and outcomes. To report on the impact and benefit to patient management and TB Control Program of rapid diagnosis of MDR-TB. At the mid-stage of the project, 2247 sputum specimens from suspects at risk of drug resistance were evaluated for MDR-TB by the MTBDRplus test and MGIT. Patients diagnosed with MDR-TB were managed according to standard policy. We followed patients up to determine clinical response to treatment and calculated diagnosis TAT and period from diagnosis to treatment initiation. Accuracy for MDR-TB diagnosis was 99%. TAT by the MTBDRplus assay was considerable shorter compared to MGIT. Several weak steps have been identified in patient management which contribute to delays in referral for treatment initiation. Acceptance of and trust in the test by clinic staff is high, as is expectations of benefits to the TB Control Program. Interim clinical indicators of MDR-TB patients will be reported on. Weak areas in patient follow up and referral are risk areas that may cancel benefits gained by rapid diagnosis of MDR-TB. Control Programs need to revise policies once new diagnostics are implemented.

PS-82149-20 The feasibility of implementing a modern tuberculosis laboratory in rural Zambia

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Background: In Macha Mission Hospital, tuberculosis (TB) is diagnosed using the direct smear method. Recently, a new TB laboratory was built implementing liquid TB culturing and PCR-reversed line blot assays. We here present data on the feasibility of implementing these facilities in a remote rural setting.

Methods: Between April and June 2007 all patients suspected of TB Macha Mission Hospital were included in this study. Sputum samples were sent for direct smear microscopy (Ziehl-Neelsen) and TB culture using the Mycobacteria Growth Indicator Tube (MGIT) culture system. In case of growth a direct smear was performed to confirm acid fast bacilli. Isoniazid (INH) and rifampin (RIF) susceptibility testing were subsequently performed using liquid media again. Finally, all positive cultures were genotyped by PCR-reversed line blot assay to identify *Mycobacterium tuberculosis* complex and non-*M. tuberculosis* complex mycobacteria (NTM).

Results: 451 samples from 166 patients were collected: 115 (25.2%) samples in 68 patients were culture positive. Of the 115 positive cultures, only 48 (42%) were positive by direct smear microscopy. Genotyping demonstrated that 30 (51.7%) were *M. tuberculosis* complex and 28 (48.3%) were NTM (10 results are still pending). Drug susceptibility testing revealed that of the *M. tuberculosis*-strains 26 (86.6%) were sensitive to INH and RIF, while 4 (13.4%) were resistant to INH but sensitive to RIF. NTMs were found to be resistant to both INH and RIF in 9 (32.1%) of the cases.

Conclusion: This study show the feasibility of implementing liquid TB culturing and PCR-reversed line blot assay facilities in a remote rural setting in Zambia. Liquid TB culturing has a two times higher sensitivity compared to the direct smear method, while genotyping showed that nearly half of cultured mycobacteria were NTMs. *M. tuberculosis* resistance to INH was 13.4%; NTMs were found resistant to both INH and RIF in 32.1% of the cases.

PS-82298-20 Does the presence of isoniazid during the intensive phase of TB treatment affect the risk of hepatotoxicity?

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Background: Some have suggested that isoniazid (INH), while hepatotoxic itself, may decrease the risk of liver injury during multidrug therapy including rifampin (R) and pyrazinamide (Z).

Objectives: To compare hepatotoxicity among patients on INH-containing therapies to that of patients on other therapies during the first two months of TB treatment.

Methods: Patients with smear-positive pulmonary TB received INH and/or moxifloxacin (M), in combination with R, Z, +/- ethambutol (E) given either 3 or 5 days/week in Tuberculosis Trials Consortium Studies 27 and 28. Serum AST and bilirubin were measured at baseline and biweekly during 2 month intensive phase therapy. Patients reporting hepatitis B or C virus infection or alcoholism were categorized as having a history of liver disease. Hepatotoxicity was defined as AST level $>3 \times$ normal accompanied by nausea, vomiting or jaundice or AST level $>5 \times$ normal.

Results: Of the 764 study patients, 22 (2.9%) developed hepatotoxicity. Associations between patient and regimen characteristics and the occurrence of hepatotoxicity are shown in the table below. In multivariate analysis controlling for type and frequency of intensive-phase regimen, both HIV infection and history of

liver disease were significant risk factors for hepatotoxicity. Patients with hepatotoxicity more often discontinued study therapy than patients without hepatotoxicity (64%, 14/22 vs. 16%, 116/742, $P < 0.0001$).

	Univariate		Multivariate	
	P value	Odds ratio (95%CI)	P value	Odds ratio (95%CI)
Treatment factors				
INH v. no INH	0.25	1.90 (0.70–6.62)	0.58	1.41 (0.42–4.72)
Daily vs. thrice-weekly	0.11	0.49 (0.20–1.19)	0.17	0.50 (0.19–1.35)
Demographics				
Enrolled in North America	0.06	2.33 (0.97–5.63)	0.39	—
Age ≥ 35 years	0.004	3.54 (1.49–8.41)	0.06	—
Non-Hispanic Black race	0.10	0.49 (0.21–1.15)	0.71	—
Social factors				
Non-injection drug use	0.08	2.72 (0.89–8.32)	0.82	—
Clinical factors				
History of liver disease	<0.0001	13.3 (4.38–40.6)	<0.0001	17.2 (5.36–55.2)
HIV positive	0.05	2.52 (1.01–6.31)	0.04	2.76 (1.05–7.22)

Conclusions: The presence of INH was not associated with a lower risk of hepatotoxicity among patients on R- and Z-containing intensive phase regimens. When controlling for intensive-phase regimen, patients infected with HIV and those with a history of liver disease are at increased risk of liver injury during TB treatment.

PS-81280-20 Computer pattern recognition of *Mycobacterium tuberculosis* in MODS culture

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Aim: To create a computer program that can correctly identify *Mycobacterium tuberculosis* growth in microscopic-observation drug susceptibility (MODS) cultures using only free computer software programs. **Design:** Controlled laboratory study.

Methods: MODS *M. tuberculosis* cultures and non-*M. tuberculosis* cultures were digitally photographed and put through a series of image processing procedures. Logistic regression was used to make an algorithm to identify specific morphological characteristics and geometrical relationships typical to *M. tuberculosis*. This algorithm was then challenged to identify a series of *M. tuberculosis* and non-*M. tuberculosis* digital micrographs.

Results: The pattern recognition algorithm demonstrated a high sensitivity and specificity for identifying *M. tuberculosis* growth in MODS compared to atypical mycobacteria and other bacterial growth.

Conclusion: This pattern recognition algorithm was effective at identifying typical *M. tuberculosis* growth

in MODS and may be useful for removing human error in MODS reading, as a teaching tool, for creating a high-throughput system, or as a way for remote laboratories without experienced laboratory technicians to accurately diagnose tuberculosis.

PS-81641-20 Situation analysis of TB-HIV co-infection in Tajikistan

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Background: The breakdown of the Soviet Union and the Civil War (1992–1997) damaged the already weak economic structure and seriously affected the existing health care system. *M. tuberculosis* is one of the major health problems in the country, and notified cases increased rapidly from 32 per 100 000 population in 1996 to 86 per 100 000 in 2006.

Objective: To assess the TB-HIV situation in Tajikistan and identify main bottlenecks for integration and coordination of TB and HIV services.

Methods: Desk reviewed was organized to analyze information available for the TB-HIV co-infection in Tajikistan. The data of HIV-TB patients was collected from Dushanbe TB Center and the national HIV/AIDS center.

Results: In total, 874 TB cases were registered in 2007 in Dushanbe. Of these 76 (8, 7%) TB patients were tested. More than 13% had been diagnosed HIV+. VCT was offered to the TB patients.

Conclusion: Although Tajikistan is in its early stage of HIV epidemic and main driver of the HIV epidemic in Tajikistan is intravenous drug users, however this situation analyze showed that rather high level of HIV prevalence among TB patients.

Recommendation: The country should: 1) develop a collaboration mechanism of services TB and HIV; 2) improve access to TB diagnosis among vulnerable groups; 3) implement TB prevention measures among HIV cases; 4) provide HIV testing and counseling for TB patients; 5) implement prevention methods of HIV and ART therapy; 6) provide social support to TB patients with HIV status.

PS-81928-20 Keeping the colour of AFB from fading

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Aim: To know whether putting on coverslip to TB smears will keep the AFB from fading.

Background: The National Tuberculosis Reference Laboratory conducts trainings on Direct Sputum Smear Microscopy and Quality Assurance on TB. The NTRL uses panels of slides for cross-reading during trainings

and uses xylene to de-oil and clean the slides. Frequent use of the said chemical causes the AFB to fade and eventually alter the reading of the standardized smears. Moreover, prolong exposure to xylene while cleaning the slides can be hazardous to the laboratory personnel.

Methods: Five coded panels of stained smears (10 slides per panel), comprising different grades of positivity, were mounted with coverslip using entelan medium and read at monthly intervals for one year. The reading results and the color of AFB were checked and assessed.

Results: The AFB maintains its color, i.e., red against blue background. But the reading scale of the smears changes when the coverslip was mounted on it. The readings become one grade level lower compared to its original reading when the smears were not yet mounted with coverslip.

Conclusion: Smeared slides with coverslip maintains the color of AFB through time. Aside from the slides can be easily cleaned every after the reading practice, the exposure of the laboratory personnel to xylene will be minimized. However, smeared slides with coverslip should be read and standardized again before these are used for training.

PS-81931-20 Rapid detection of resistance to rifampicin on *M. tuberculosis* isolates in CAR using ARMS-PCR

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En République Centrafricaine, l'incidence de la tuberculose (TB) est estimée à 549 pour 100 000 habitants et le nombre cas de tuberculose pharmacorésistante est de plus en plus croissant. Au regard de cette situation alarmante, la mise en oeuvre d'un outil de détection rapide des cas de TB à bacilles multirésistants (MR) est d'une importance capitale afin de contrôler la transmission de la maladie. Nous avons évalué une technique de détection rapide de la résistance à la rifampicine, l'ARMS-PCR (système de mutation réfractaire par amplification) en opposition au séquençage et une technique d'hybridation sur bandelette, le Genotype MTBDRplus (Hain, Lifescience). Il s'agit d'une étude prospective sur les ADN provenant d'expectorations de patients chroniques, en rechute, en échec thérapeutique, et en reprise de traitement. L'ARMS-PCR a été réalisée à Bangui (Centrafrique), le séquençage et MTBDRplus à l'Unité de Génétique Mycobactérienne-Paris. Sur 54 ADN, le test de sensibilité phénotypique a révélé 20 cas MDR (multidrug-resistant) et l'ARMS-PCR a montré 70% (14/20) de multirésistance vs 90% (18/20) par le séquençage et le MTBDRplus ; deux échantillons étant révélées sensibles par les différentes techniques. La sensibilité de notre technique est de 80% (16/20 détections) avec

une concordance de 93% avec le séquençage vs 100% (20/20 détection) et une concordance de 90% pour le MTBDRplus. Une mutation portant sur le codon 526 du gène *rpoB*, différente des mutations déjà caractérisées sur d'autres collections MDR de Centrafrique, a été retrouvée à 42% (3/7) mais elle n'a pas été détectée par les amorces utilisées dans notre série. La prévalence de la TB-MR est de 37% (20/54) parmi les patients de notre étude, nous comptons augmenter la puissance de notre technique en générant des amorces spécifiques du nouveau type de mutation et solliciter à termes des molécules de 2^{de} ligne auprès du Comité Feu Vert.

PS-82311-20 Mutation in *katG* gene and spoligotypes of INH-resistant *Mycobacterium tuberculosis* isolates in South America

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Setting: Transmission of isoniazid (INH) resistant *M. tuberculosis* strains with a mutation at amino-acid position 315 of *katG* ($\Delta 315$) appears to transmit as efficiently drug-susceptible strains. Few study have evaluated spoligotype lineages associated with $\Delta 315$. **Objective:** We evaluated 224 INH-resistant *M. tuberculosis* isolates from South America for mutations in the *katG*, *ahpC* and *inhA* genes and correlated these with spoligofamilies.

Results: The bigger spoligotypes families were LAM, Haarlem and T respectively with 46.4%, 16.0% and 14.3% of the isolates. Mutations in $\Delta 315$ were observed in 178 (79.5%). Mutations were observed also in *oxyR-ahpC* in 20 (8.9%) isolates; in the *inhA* regulatory region in 22 (9.8%) isolates and in *inhA* in 3 (1.3%) isolates. The $\Delta 315$ mutation was identified in 81 (77.9%) LAM isolates, in 34 (94.4%) Haarlem isolates, and in 22 (68.7%) T isolates. Of the 4 Beijing strains, 3 presented the $\Delta 315$ mutation. There was an association with $\Delta 315$ mutation and the occurrence of Haarlem genotype ($P = 0.01$), but not when compared to other genotypes. Association with *ahpC* or *inhA* mutation and different genotypes was not found.

Conclusions: The data indicate that a screening for the presence of the $\Delta 315$ mutation may be useful in South America to establish appropriate anti-tuberculosis therapy, to monitor the drug resistance pattern and, possibly to be used as a marker for higher transmissibility of INH-resistant *M. tuberculosis* strains.

POLICY AND PROGRAMME IMPLEMENTATION: OTHER—III

PS-82191-20 Organisation of the bio-safety programme at the Swedish National Reference Laboratory for tuberculosis

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To ensure a safe working environment at our bio safety level 3 (BSL 3) laboratory for tuberculosis and mycobacteriology, it is important that both the facility with its equipment and the local safety procedures and legislation are at high professional level. Before this laboratory became functional, a clear organizational system was established to ensure that the different tasks carried out in the facility have a high level of bio safety. The laboratory is managed by a laboratory supervisor with the over all responsibility for developing, up-dating and maintaining standard operating procedures for the bio-safety work and making sure that all processes carried out in the laboratory is done in a high bio safety standard. All new staff members and students/visiting researchers are introduced to our bio safety program and participate in a yearly exercises to react correctly in terms of bio safety in emergency situations. All incidences/accidents are reported, analysed and followed up to make sure so that risks are constantly reduced to the minimum levels. We also arrange courses in bio safety for different categories of staff members at the institute. Everyone working in the laboratory is given a grade of classification reflecting their experience and level of responsibility.

PS-82197-20 Surgery for MDR-TB patients: challenges in a programmatic setting and working towards sustainability

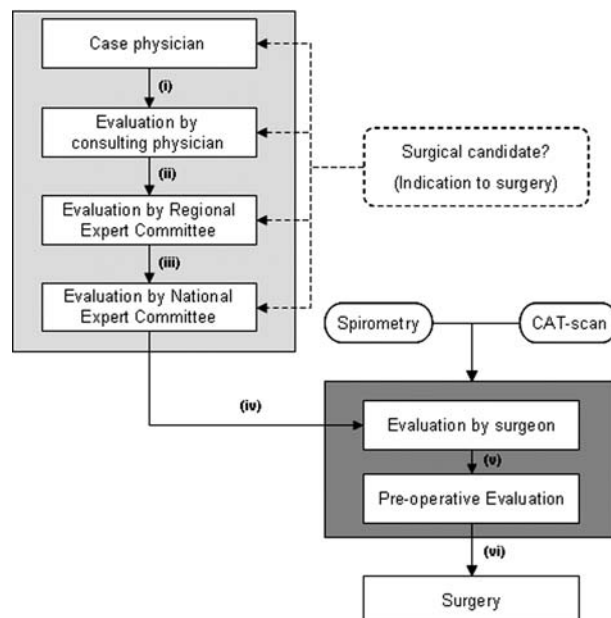
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Introduction: In Peru, the process through which patients with multidrug-resistant tuberculosis (MDR-TB) undergo surgical intervention involves public and private institutions working to meet the financial, personnel and infrastructure needs for surgical procedures. To ensure and encourage sustainability, the Peruvian National TB Program (NTP) has begun to assume the responsibility of case management for MDR-TB surgical candidates.

Aim: To describe the management process followed in Peru that identifies a surgical MDR-TB candidate, approves surgery and manages the patient throughout initial evaluation to completion of surgery.

Results: Indication for surgery by the National Expert Committee (CERN) triggers the financial and administrative processes (shown in Figure) necessary to care for surgery candidates. Personnel from the Peruvian MDR-TB Unit (UT) in coordination with international Non-Governmental Organizations (NGO) organize and finance CAT-scans and spirometries for patients. One day of each week, candidates are convened in groups to have CAT-scans and spirometries. The NGO or UT personnel then attach the results to the medical file that is sent to one of seven qualified surgeons for evaluation. Patients deemed suitable for surgery after a preoperative evaluation the personnel coordinate with one of two public hospitals or two private clinics in Lima, depending on several factors including patient deterioration and availability of operating rooms (OR). Funding has thus far mainly been private but we have identified mechanisms of government funding that reduce costs by 66% and increase awareness of MDR-TB amongst local health personnel.

Conclusion: Surgery in a resource-limited setting like Peru involves numerous players to provide needed infrastructure, resources and expertise. Though OR availability has been a serious limitation, the opening and renovation of three ORs will increase surgery capabilities in the public setting.



PS-82252-20 Mise en oeuvre du contrôle de qualité des médicaments antituberculeux au Burkina Faso

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Introduction : Depuis quelques années, le Burkina Faso a constaté une augmentation constante du taux d'échec au traitement. Face à cette augmentation, le programme a estimé nécessaire d'évaluer la qualité des médicaments antituberculeux.

Objectif : Contrôler la qualité des médicaments antituberculeux au niveau du magasin central, régional et au niveau des centres de traitement.

Méthodologie : Des échantillons de (RHZE) 150/75/400/275 mg, (RH) 150/150 mg, (EH) 150/400 mg, E 400 mg, ont été prélevés dans toutes les régions sanitaires. Une fiche détaillée comportant la désignation, la description du produit, son origine de fabrication, le lieu de prélèvement ainsi que les conditions de stockage accompagnait chaque échantillon. Le Laboratoire National de Santé Publique du pays a réalisé les analyses selon les méthodes habituelles des pharmacopées internationales. Paramètres analysés : identification et dosage du principe actif et dissolution et uniformité de masse du comprimé. Les échantillons étaient non conformes lorsqu'ils ne répondaient pas, aux spécifications de la pharmacopée de référence.

Résultats : 32 points de stockage, soit 138 échantillons d'antituberculeux ont été contrôlés. Tous les lots étaient conformes aux spécifications. Six échantillons de EH 400/150 mg avaient une dissolution de l'ethambutol proche de la limite inférieure de l'intervalle, le risque que ces comprimés présentent une mauvaise biodisponibilité après stockage prolongé est élevé.

Conclusion : Le contrôle n'a pas révélé de non-conformité de lots. La qualité du stockage est de bonne qualité. La qualité des quadruples combinaisons d'antituberculeux ne serait donc probablement pas à l'origine de l'augmentation des retards de négativation au deuxième mois de traitement, et des échecs élevés qu'enregistre le pays.

PS-82272-20 Lutte contre la tuberculose : mise en place du contrôle de qualité externe des lames au Burkina Faso

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Cadre : Un réseau de 109 laboratoires de microscopie de la tuberculose au Burkina Faso.

Objectif : Faire une présentation analytique des résultats des contrôles de qualité externe des lames réalisés en 2005 et 2006.

Schéma : La technique de coloration est le Ziehl-Neelsen à chaud. Le contrôle de qualité repose sur la méthode de collecte et de relecture des lames-frottis réalisés par les laboratoires du réseau. Le contrôleur régional fait la relecture En aveugle. Les lames « litigieuses » sont relues en aveugle par deux techniciens du LNR. Le contrôle de qualité est validé s'il y a une concordance entre ces deux techniciens.

Résultats : La majorité des laboratoires a reçu 4 contrôles en 2006. La concordance globale des résultats de contrôle s'est améliorée de 92% en 2005 à 95% en 2006. Les erreurs de lecture ont baissé de 8% en 2005 à 5% en 2006. Les erreurs majeures ont diminué de 41% entre les 2 années.

Conclusion : Le contrôle de qualité externe des lames se met progressivement en place au Burkina Faso avec un début d'amélioration de la qualité du travail des laboratoires polyvalents du réseau.

PS-82275-20 Improving natural ventilation in hospitals to reduce nosocomial tuberculosis risk in a low-resource setting

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Background: Nosocomial tuberculosis transmission remains an important public health problem, exacerbated by HIV and drug-resistant TB. Natural ventilation is a low-cost environmental control measure that should be more widely implemented in TB and HIV control programmes where climate permits.

Aims: To measure the effect of simple architectural modifications in hospital settings in a high TB-burden region on a) improving natural ventilation, b) reducing TB transmission risk; and to use this data to estimate cost-effectiveness.

Methods: Room ventilation was measured using a carbon dioxide tracer-gas technique in four waiting rooms and two consulting rooms pre- and post-modification in two hospitals in Lima, Peru. Modifications included additional windows for cross-ventilation (2 rooms); removal of glass from un-openable windows (2 rooms); sealed skylight raised on 1 m supports to permit air entry (1 room); re-building of waiting-room in the open air (1 room). TB transmission risk for a health-care worker on a 12 hour shift was estimated using the Wells-Riley model of airborne infection.

Results: Following the infrastructure modifications, room ventilation in the four waiting rooms increased from mean 5.5 to 15; 11 to 16; 10 to 17; and 9 to 66 air-changes/hour. In the two consulting rooms, ventilation increased from mean 3.6 to 17; and 2.7 to 12 air-changes/hour. Median TB transmission risk calculated for all rooms was reduced from 79% to 30%. The modifications were cost free in two rooms, cost less than US\$100 in two other rooms, and cost US\$1000 and US\$7000 each in the remaining two rooms.

Conclusions: Simple modifications to hospital infrastructure, such as the installation of skylights or additional windows to facilitate cross ventilation, considerably increased measured natural ventilation, and were highly cost-effective in reducing modelled TB transmission risk.

PS-82291-20 Introduction of provider-initiated C&T to improve HIV testing uptake in South Africa

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Setting: The escalation of HIV within sub-Saharan Africa has reached epidemic proportions, with over 4 million infected individuals reported in 2007. Despite this, it is postulated that only 25% of the population are aware of their HIV status, due, in part, to limited provision of VCT within health care facilities. URC has been working through a CDC-funded C&T program to expand HIV uptake in health care facilities in five provinces. The strategy is to train health care workers in introducing PITC as referred to in the HIV & AIDS National Strategic Plan for South Africa. **Objectives:** The C&T project works with the National and Provincial Departments of Health in expanding access to and uptake of HIV testing in health care facilities in South Africa. Following on a baseline study conducted in 2006, it was found that untrained and inexperienced staff contributed to the low C&T uptake.

Methods: URC staff members conducted PITC trainings in the five provinces, conducted over two to three days, targeting all health cadres including doctors, professional nurses, facility managers, lay counselors. Pre- and post training evaluations were done to assess participant knowledge. Attendance registers were kept to monitor attendance. Site visits and mentoring was done to all facilities to ascertain if implementation was taking place following training.

Results: An improvement of 20% in HIV uptake was observed in those facilities where health care workers were trained in PITC. Health care workers were also more confident in implementing HIV services. Wide-scale training for all health care workers in South Africa is seen as the strategy to address the pandemic.

Conclusion: Provinces are encouraged to adopt own-

ership of the program to ensure sustainability ensuring that more clients have access to counseling and testing services.

PS-82303-20 Challenges face enhancement of NTP performance in developing countries: case study of Sudan

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Introduction: Sudan ranks third among TB highest incidence countries in EMRO. The ARI of TB is %1.8. In 1993, the ministry of health with the IUATLD and WHO launched NTP. Since then the program started to develop to reach its full expansion in 2002. NTP set DOTS components in place, however, after completion of the expansion phase the program start to face problems in increasing the detection and the cure rates.

Methodology: Using vertical analysis, causal analysis and operational analysis factors affecting NTP performance analyzed.

Results: The analysis revealed that the performance of the health system is one of the key factors influencing NTP. Geographical and financial access to services, poor quality of care, lack of patient centered care and poor health staff/patient communication are factors that influence utilization and flow of patients to the public services thus the detection of TB cases. Moreover, the weak system capacity to hire and maintain skilled motivated workforce, coupled with top down planning lead to absence of input from first line practitioners. Lack of integration of the different levels of care together with absence of system gate keeper leads to lack of system dynamism in response to community needs in term of effective policies and strategies. **Conclusion:** Improvement of the productive capacity of the health system is crucial to ensure a meaning outcome of NTP in Sudan.

PS-82316-20 Implementation of an electronic medical records system for TB management and control in Mississippi, USA

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Background: Mississippi (MS) was one of the first states in the United States to implement a DOTS program in 1986. MS consists of 82 counties divided into

9 districts. District TB nurse managers in consultation with district health officers and TB consultants, manage TB suspects and cases. The state TB consultant at the health department central office in Jackson, MS, reviews all complicated TB cases, HIV cases and cases based on clinical diagnosis. The EMR software was acquired to facilitate timely communication because of the geographic distance and required personnel time in preparation of paper charts and chest films for reviews, thereby improving TB management and control. **Goal:** To implement a statewide EMR system in all 9 districts of MS.

Methods: Initial site visits, discussions, acquiring computers, training personnel, integrating information technology services and pilot rollout in District III in 2003, preceded statewide access in 2004.

Lessons learned: The EMR has been used for daily management of suspected and confirmed TB patients in MS. The central and district level chart reviews are done in real time since data entered in a distant county is seen simultaneously at county, district and central levels. Communication and management delays are minimized. Prior treatment histories and contact investigation records for new suspects or cases are also updated and maintained in a timely fashion. **Challenges:** Some of the challenges included: inadequate system checks for installation of personal computers at county levels; reluctance to transition to a new system; insufficient computer skills of the TB program personnel; time constraints of nursing personnel secondary to competing job duties with other public health programs; recruiting and training data entry clerks.

Conclusion: MS is one of the few states in United States to implement a unified EMR for TB program management that provided real-time management of TB patients.

PS-82319-20 Operational research on tuberculosis with qualitative approach in the State of Sao Paulo, Brazil

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Introduction: The State of Sao Paulo with its 41 million inhabitants, registers about 18 000 tuberculosis (TB) cases per year. This is the highest contingent of the country with an incidence rate of 38.7 cases per 100 000 inhabitants, a number that has been decreasing for the last three years. The Regional TB Plan 2006–2015 from Pan American Health Organization (PAHO) has been followed by the Sao Paulo State's Tuberculosis Control Program (TCP). One of the six additional components is to promote and to make easier operational research in TB conceived as a tool

that may contribute to the implementation/acceleration/expansion of DOTS.

Objective: To describe operational research performed by SP/TCP during 2007.

Method: It is a descriptive study using data from all researchers registered by authors at the SP/TCP in 2006/2007. Operational research can be classified as quantitative as qualitative into their respective methodologies. It was made the 'I Course on TB Operational Research' promoted by Sao Paulo State's TCP and ICOHRTA Project. It has worked with quantitative method but it was also introduced the qualitative method as a tool to answer much of questions related to TB. SP/TCP has began partnership projects with USAID and DAHW Foundation. Four researches are already going on with support of these partnerships with an innovator method—Collective Discourse (CD) (see Figure) which using a discourse strategy, allows capturing a pool of social representations to mold imaginary data.

	Title	Authors	Municipality	Method
1	Social representation of DOT in TB patients and healthcare workers in the municipality of Guarulhos, Brazil	Souza Pinto, V; Galesi, VMN; Lefevre, AMC; Lefevre, F	Sao Paulo	CD
2	Social representation of incentives in TB patients under DOT and healthcare workers in the municipality of Guarulhos, Brazil	Braz, MIPS; Galesi, VMN; Lefevre, AMC; Lefevre, F	Sao Paulo	CD
3	The profile of patient with TB diagnosed at General Hospital in the municipality of Guarulhos	De Paula, RAC; Galesi, VMN; Lefevre, AMC; Lefevre, F	Sao Paulo	CD
4	The profile of patient with TB diagnosed at Benedito Montenegro Hospital in the municipality of Sao Paulo	De Paula, RAC; Galesi, VMN; Lefevre, AMC; Lefevre, F	Sao Paulo	CD
6	The perception of manager and user about TB-HIV co-infection related to TB and AIDS programs of Sao Paulo State	Souza Pinto, V; Goldgrub, N; Marques, EA; Figueiredo, DP	Sao Paulo	TB QUALI
7	History of deaths by tuberculosis	Nakazaki, RMD	Sao Paulo	—

DOT - Supervised Treatment for TB; DC - Collective Discourse; TB/HIV - Tuberculosis and HIV; TB QUALI - qualitative approach for researches on tuberculosis and AIDS

Figure Operational Research on Tuberculosis—qualitative approach

Results and Conclusion: In the Figure are demonstrated operational research with qualitative approach. Operational research is one of the priorities of SP/TCP and according PAHO there's not a clear conscience regarding the role of investigations for effective TB control and operational research is not a priority into TCPs. The SP/TCP since 1998 in accordance with National TCP and PAHO/World Health Organization adopted DOTS strategy. With DOTS many unsolved questions must be answered and operational research were the way to answer them by CD.

PS-82324-20 Proposal for the introduction of a monitoring system for tuberculosis cases in Brazil's border regions

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Aim: Brazil shares borders with 10 countries in Latin America. Between 2001 and 2007, there were 200 cases of tuberculosis (TB) registered amongst non-residents treated in Brazil, which could result in Brazilians being infected with unidentified strains.

Design: Introduce a system which facilitates the identification of TB cases in non-residents in Brazil, enabling early diagnosis, contact tracing, treatment compliance and follow-up, an increase in cure rates and a consequent reduction in the risk of multi-resistant strains being introduced to the country.

Methods: Create and introduce a TB notification form (bilingual) and information exchange with neighbouring countries (to be opportune and accurate), standardize laboratory diagnosis and strain identification and systematize treatment in Brazil and the country of origin.

Results: With the SMTF, we hope to identify the full magnitude of TB in border regions, identify non-resident cases early and offer treatment in both the locality of diagnosis and in their country of origin, facilitate contact tracing, increase the rates of supervised treatment, reduce treatment default rates, avoid the introduction of multi- or extremely resistant strains to Brazil and neighbouring countries and strengthen the TB surveillance system in vulnerable areas.

Conclusion: The SMTF is a tool which will assist in the diagnosis of TB in border regions, allowing the sanitation authorities of different countries to improve the provision of treatment to their citizens and reduce migration to neighbouring countries. The identification of strains will be of great value in both monitoring their distribution in countries involved, and in developing a shared database which would enable the study of case profiles and TB trends in affected regions.

PS-82376-20 Monitoring and evaluation as a tool to support policy decisions

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Setting: The Brazilian Global Fund TB Project, through the use of M&E tools, intent to strengthen the use of the information to help and support policy makers.

Objectives: Strengthen the use of the National Surveillance System as a tool to support the allocation of activities efforts and funds.

Methods: To construct an M&E network including the Ministry of Health, local governments and the civil society. This network intends to show the value of the information use. It will help to construct a new M&E culture, which will not include M&A as controller. The M&E network will be used as a strategy to provide human resources training in how to use the information, share experiences and spread best practices.

Results: The M&A network was created in January

of 2008. The 57 municipalities covered by the project adopted the network as a strategy.

Conclusions: The M&E network will provide a new way of information use through the practical application of it. The network will be an important influence to strengthen the use of the National Surveillance System among the policy makers and the civil society citizens.

PS-82380-20 Increasing TB representation and prioritisation on Global Fund to Fight AIDS, TB and Malaria

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Rationale and Aim: Despite the GFATM's intentions and guidelines and individual CCM policies mandating the inclusion and empowerment of civil society organizations and proportionate representation for all three diseases, many CCMs lack sufficient space for meaningful civil society participation, particularly within the TB community. TB stakeholders would benefit from a presentation of lessons learned, best practices, and challenges to enabling and empowering participation in CCM structures and processes.

Methodology: Participants would learn from the documented successes of ACTION partners in Kenya and other groups who have helped increase TB civil society representation on their CCMs and more broadly improve TB prioritization, the functioning of the CCM, and GFATM grant effectiveness.

Results: As one example, efforts in Kenya resulted in designated seats for TB representatives, greater transparency and accountability around GFATM grants, and increased awareness and collaboration among HIV/AIDS and malaria communities.

Conclusions: Targeted advocacy can be effective in increasing TB representation within CCMs, offering the potential for the submission of robust TB proposals and greater accountability of TB grants, as well as an enabling environment for TB and broader global health advocacy.

PS-82382-20 Sector-wide approaches to TB control in Africa: an analysis of design and impact

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Aim: To assess how TB is represented within sector-wide approaches to health (SWAp) in several sub-Saharan countries, the efficacy and impact of SWAp on TB control, and potential challenges and lessons learned from addressing TB through a SWAp.

Design: Literature review, analysis of 4 African health SWAp through policy documents, incorporating information gleaned from discussions with technical experts.

Methods: The authors analyzed SWAp program and

outcome documents to determine 1) the extent to which TB control indicators were included within the SWAp design, 2) how pooled budget resources were tracked to TB activities, and 3) impact of the SWAp on TB control, including disease outcomes.

Results: Data to be available in summer 2008. Initial findings show that SWAps vary in the degree to which TB indicators are included as well as impact and outcomes.

Conclusion: As donors shift from project-based to policy-based aid provision, and place increasing focus on health systems strengthening efforts, it is critical that disease-specific interventions for TB and TB-HIV continue unabated and are included within SWAps design and implementation. Challenges arise in funding disease-specific interventions within a SWAps framework, including the tracking of resources provided through budget support to budgets and outcomes for specific diseases. Having quality country-based systems for financial tracking, sound policies, and political will are critical for implementation.

PS-82388-20 Evaluation of sputum smear microscopy quality in tuberculosis laboratories: The Global Fund Project-Brazil

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Introduction: The External Quality Assurance Method is projected to improve the trustworthiness and effectiveness in the laboratory services, in a continued form. The focus is on the identification of laboratories where there may be serious problems resulting in poor performance. In 2007, Ministry of Health, Brazil and The World Health Organization elaborated the AFB (acid-fast bacilli) Smear Microscopy External Quality Control Protocol as a Global Consensus. The protocol was implanted in laboratories of 57 cities assisted by The Global Fund Project, enclosing the areas with 45.0% of cases in Brazil.

Objective: To evaluate the implantation and results of the AFB (acid-fast bacilli) Smear Microscopy External Quality Control Protocol.

Methods: A number of 22 professionals of these areas were trained for the implantation and execution of the related protocol. The activities included a fully functional blinded rechecking of the sputum smear slides. A number of 143 laboratories were evaluated, with 11 241 slides blinded rechecked. Microsoft Excel, 2003 software was used to the database construction.

Results: From 11 241 analyzed sputum smear slides, 54 (0.48%) demonstrated false-negative result and 33 (0.29%) demonstrated false-positive result. The State of Rio Grande do Sul appeared as the major number of false-negative cases, 17 (1.64%). The State of Rio de Janeiro appeared as the major number of false-positive cases, 13 (1.47%).

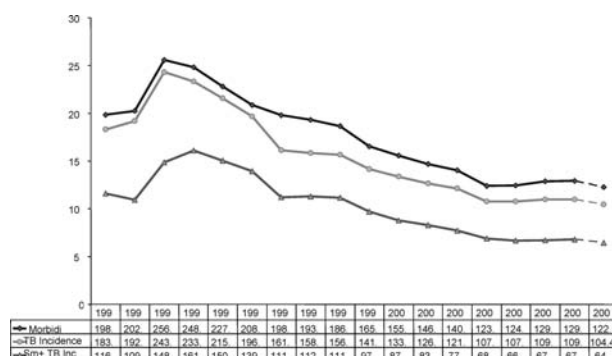
Conclusion: It was demonstrated an elevated number of false-negative and false positive results. The laboratories' staff need to be trained and capacitated in order to assure the quality improvement of laboratory services.

PS-82390-20 The impact of health reform in the Peruvian national tuberculosis programme

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Introduction: Peru is among the ten countries with the largest burden of tuberculosis (TB) in the Americas and among the countries contributing 75% of the region's burden. Peru is defined as being in Stage 3, with an estimated TB incidence above $50 \times 100\,000$ inhabitants and more than 90% DOTS coverage. Between 1994 and 2004 countries in this group saw a 28% decrease in incidence rate with Peru making the largest contribution. However, the impact of the reform caused a weakening of managerial, logistic and technical capacities resulting in a decrease in case detection, determining a hidden prevalence. Between 2001 and 2004, an estimated 13 000 smear positive TB cases went undiagnosed. The loss of leadership, difficulties in logistics to guarantee diagnostic and treatment supplies, reduced training, monitoring and evaluation resulted in a reversal of the epidemiological situation achieved in the 1990's.



Results: Since the second half of 2004 the advantages of health reform such as equality in the delivery of health services and quality and efficiency in public spending, are also a priority of the NTP. In the context of DOTS strategy, the political commitment strengthens integral health care; multidisciplinary teamwork; diagnosis and medication availability; training of health workers; social, technical and financial sup-

port. This resulted in an increase of 16% of examined respiratory symptomatic cases, uncovering the accumulated prevalence from previous years. Between 2005 and 2006 all TB-related indices went up followed by what is a real epidemiological decrease in 2007.

Conclusion: The process of health reform and decentralization is a great opportunity to improve TB control, as long as there is a strong national program in place where DOTS is firmly implemented, as is the case of Peru. Beginning in 2007 we expect to see, each year, a decrease in the morbidity rate of between 5–6%, expecting a morbidity rate of $55 \times 100\,000$ by 2011.

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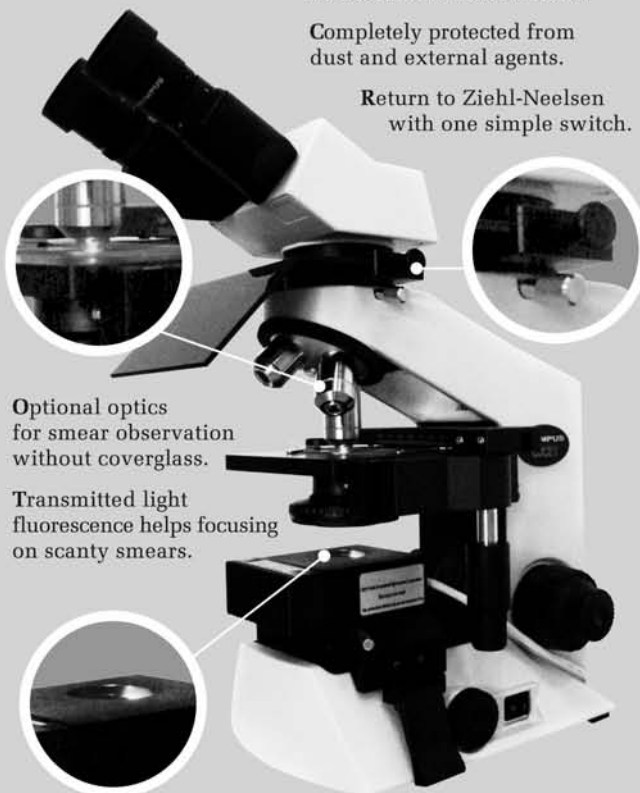
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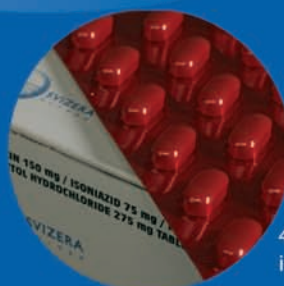
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