MANAGEMENT OF THE CHILD WITH COUGH OR DIFFICULT BREATHING

A Guide For Low Income Countries

Second Edition

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International Union Against Tuberculosis and Lung Disease
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PREFACE

Maintaining and restoring the lung health of children is an important priority. Lung diseases are one of the main killers of children under the age of 5 years and one of the most frequent reasons why they make use of health services.

Acute respiratory infections (ARI) are the most frequent challenge to lung health and are, by any measure, an enormous problem. They affect primarily young children and old people; they are among the most frequent causes of deaths from lung disease globally; they are a prime cause of death in young children, so much so that the overall mortality rate in young children is a good indication of the size of the problem of acute respiratory infection in that community.

In spite of these facts, the majority of serious ARIs are curable; some are also preventable. The tools and methods are available to reduce this enormous problem and yet it remains stubbornly unresolved. This is primarily because those affected by it are the most vulnerable with the least access to modern health care. It is small children living in the poorest communities who most often suffer and die from this condition. Furthermore, the ability to reach these vulnerable individuals is a challenge rarely solved. The International Union Against Tuberculosis and Lung Disease (The Union) has achieved success in addressing similar challenges in the management of tuberculosis. The mandate of this voluntary non-governmental organization is to address the “big” challenges to lung health at a global level: surely ARIs are one of them.

ARIs are so frequently encountered as to be considered one of the key problems with which the health service must deal. For this reason, tackling them has to be part of the core activities of every level of the health service and every health worker must have knowledge of their causes, prevention and management. Hence the need for a guide, which conveys in simple language appropriate to health workers at all levels the key elements of the management, cure and prevention of ARIs especially in infants and young children.
The guide focuses on pneumonia (the most serious form of ARI) in children (the most vulnerable group). It incorporates the technical approach to the management of pneumonia in children developed very elegantly by the World Health Organization and proposes a management system (including information, supply and evaluation systems) based on The Union’s experience in dealing with tuberculosis in low-income countries.

It goes on to discuss management of asthma and tuberculosis in children, diseases that are ‘uncovered’ when the large burden of acute diseases is systematically cared for.

The guide is as simple as possible (many complementary materials exist for reference) and provides the information needed by the most basic level of the health service to address the problem of pneumonia in children. Through this, The Union hopes to help all those engaged in dealing with this large problem to acquire the skills and knowledge to achieve success against this most formidable of threats to the health and survival of the world’s children.

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Definitions of Terms

Acute: new condition. Acute cough: lasting less than 21 days.
Acute ear infection: lasting less than 14 days.

Acute respiratory infection: an acute infection of the ear, nose, throat, larynx, trachea, bronchi, bronchioles or lung.

Acute lower respiratory infection (ALRI): acute infection of the epiglottis, larynx, trachea, bronchi, bronchioles or lung.

Acute upper respiratory infection (AURI): acute infection of the nose, pharynx (throat), middle ear.

Antibiotic: drugs that kill bacteria or stop their growth. They do not kill viruses (also referred to as antimicrobial).

Antimalarial: drugs that kill malaria parasites.

Asthma: a condition marked by repeated attacks of wheezing in which the airways narrow due to bronchospasm (tight muscles around the airways). (Also called wheezy bronchites, although this term should be avoided).

Bacteria: a kind of microorganism or germ that is killed by antibiotics.

Breathing rate: number of breaths per minute. Same as respiratory rate.

Bronchi: the large air passages of the lungs.

Bronchioles: the smallest air passages of the lungs.

Bronchiolitis: a viral infection of the bronchioles of the lungs which causes a swelling and narrowing resulting in wheezing. It can kill infants because of hypoxia or because pneumonia develops.

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Bronchitis: an infection of the bronchi, generally caused by viruses in young children.

Bronchodilator: drugs which help to open the air passages when the wheezing is caused by tight muscles around the airways.

Bronchospasm: a tightening (spasm) of the muscles around the airway, which narrows the airway and causes wheezing.

Chest indrawing: when the lower part of the chest (lower ribs and lower sternum) go in when a child breathes in. It is a sign of severe pneumonia, a wheezing condition, or croup.

Childhood: under age 5; that is, 0-59 months of age.

Chronic cough: cough more than 21 days.

Chronic ear infection: ear draining more than 14 days. (also called chronic otitis media.)

Cold: an acute viral infection of the upper respiratory tract (also called common cold).

Convulsions: a sudden loss of consciousness with uncontrolled, jerky movement. It can be caused by high fever, meningitis, hypoxia, cerebral malaria, epilepsy, and other conditions. (Also called fits).

Croup: narrowing of the larynx, trachea or epiglottis which interferes with air entering the lungs. It can be caused by a viral or bacterial infection.

Cyanosis: blue, purple, or grey skin colour due to hypoxia.

Dehydration: loss of a large amount of water and salt from the body.

Diphtheria: an acute, contagious bacterial infection marked by a grey, adherent membrane on the throat. It may cause death from laryngeal obstruction or cardiovascular toxic effects. It is a vaccine-preventable disease.
Epiglottis: the cartilaginous structure shaped like a lid overhanging the entrance to the larynx and serving to prevent food from entering the larynx and trachea while swallowing.

Epiglottitis: bacterial infection of the epiglottis, causing severe croup.

Epinephrine: a bronchodilator which is injected subcutaneously to relax bronchospasm (also called adrenaline).

Fast breathing: a child age 12 months up to 59 months who is taking 40 breaths per minute or more has fast breathing. A child age 2 months up to 12 months who is taking 50 breaths per minute or more has fast breathing. A young infant age less than 2 months who is breathing 60 breaths per minute or more has fast breathing.

Feedback: information provided by others on the way a person is doing something. For example, a manager is giving feedback when he informs his staff of work they are doing well or makes suggestions for improvements.

Foreign body: an object that is not normal to the place where it is found. For example, a bean that a child inhaled into his airway.

Grunting: short sounds that a child makes at the beginning of expiration. A sign of severe pneumonia.

Hypothermia: low body temperature (less than 35.5°C or 96.0°F).

Hypoxia: not having enough oxygen in the body.

Infant: a child less than 1 year old (0-11 months). A young infant is less than 2 months old (0-8 weeks).

Jaundice: a sign of disease in which parts of the body, such as the eyes, turn yellow.
Kwashiorkor: a disease of severe malnutrition that results from a lack of protein. A child who is anaemic may have an enlarged liver, a generalized swelling of the body, and thin, sparse hair.

Laryngitis: infection of the larynx which causes hoarseness or croup.

Larynx: a part of the airway which is between the epiglottis and trachea. It is also called the voice box.

Marasmus: the most common form of severe malnutrition, with wasting away of the fat and muscle until the child has a “skin and bones” appearance.

Mastoiditis: infection of the mastoid bone (behind the ear).

Measles: an acute viral infection with fever, characteristic rash, and conjunctivitis. It can cause stomatitis, which interferes with feeding. Pneumonia and diarrhoea are common complications. Measles is a vaccine-preventable disease.

Metered-dose inhaler: a small hand-held canister of pressurized salbutamol with a spray valve.

Morbidity: illness.

Mortality: death.

Nasal flaring: widening of the nose as the child breathes in. A sign of very severe pneumonia.

Nebulizer: a device for pressurizing a liquid into vapor or spray.

Otitis media: infection of the middle ear, the space behind the eardrum.

Parenteral: not taken orally but rather by injection such as under the skin (subcutaneous), into the vein (intravenous) or into the muscle (intramuscular).
Pertussis: a respiratory infection caused by the pertussis bacteria. A child coughs many times without breathing in. When the child breathes in again, he makes a noise called a whoop. Children may vomit frequently during bouts of coughing. Pertussis is a vaccine-preventable disease (also known as whooping cough).

Pharyngitis: an infection of the throat.

Pharynx: throat.

Pneumonia: an acute infection of the lungs. It is classified according to severity based on clinical signs.

**In the child age 2 months up to 5 years:**

**Very severe pneumonia:** cough or difficult breathing with chest indrawing and one or more danger signs.

**Severe pneumonia:** cough or difficult breathing with chest indrawing.

**Pneumonia:** cough or difficult breathing with fast breathing but no chest indrawing.

**In the young infant age less than 2 months:**

**Severe Pneumonia:** cough or difficult breathing with fast breathing AND/OR chest indrawing.

**Very severe pneumonia/very severe disease:** cough or difficult breathing with fast breathing AND/OR severe chest indrawing plus any one of these clinical signs can mean very severe pneumonia or very severe disease:

- Stopped feeding well
- Convulsions
- Abnormally sleepy or difficult to wake
- Stridor in calm child
- Wheezing

XVI
Fever or low body temperature
Severe respiratory distress
Grunting
Head nodding
Central cyanosis

**Respiratory distress:**
discomfort from not getting enough air into the lungs

**Respiratory rate:**
same as breathing rate.

**Sepsis:**
the condition that is a result of the invasion of bacteria or their toxins in the blood stream. (Also called septicaemia and blood poisoning)

**Sterile:**
free from living microorganisms, including viruses and bacteria.

**Stomatitis:**
inflammation of the mouth.

**Streptococcal sore throat:**
throat infection caused by the streptococcal bacteria.

**Stridor:**
a harsh noise when the child breathes in. It occurs when there is a narrowing of the larynx, trachea, or epiglottis. Stridor can be due to croup or a foreign body.

**Throat abscess:**
an infection of the throat which develops a collection of pus.

**Timer:**
a simple device allowing the accurate measurement of a time interval.

**Trachea:**
a tube that takes air from the larynx to the bronchi. (Also called the windpipe.)

**Tuberculosis:**
a chronic infections disease caused by a mycobacteria that can cause a chronic cough. It most often harms the lungs but can also cause fever, weight loss, and infection of lymph nodes. (Also known as TB.)

XVII
Virus: one of a group of minute infections agents or germs that cannot be killed by antibiotics.

Wheeze: a soft, musical noise when the child breathes out. It may be caused by a swelling and narrowing of the small airways of the lungs or by a contraction of the smooth muscles surrounding the airways in the lung.

Whooping cough: see pertussis.

Wick: a long point of rolled, absorbent cotton cloth for drying an ear that is draining.

Young infant: a child age less than 8 weeks.
1. Introduction

Cough and/or difficult breathing are common problems in children below 5 years of age. The causes range from a self-limited illness, such as a cold, to life-threatening diseases such as severe pneumonia or tuberculosis. One of the leading causes of death in young children in developing countries is acute respiratory infections (ARIs). According to most recent WHO estimates of the distribution of causes of childhood deaths ARI infections alone are responsible for 18.1% of childhood deaths globally.\(^2\) The percentage of children dying from pneumonia varies from 15 to 26% depending on the region of the world and the under 5 mortality rates. The largest part of these deaths were due to pneumonia (including neonatal pneumonia), either as underlying cause or as a result of infections complicating measles, pertussis or AIDS. Other contributing factors associated with a large number of pneumonia deaths are low birth weight and severe malnutrition.

In the past two decades, an increase in paediatric HIV infection has had a substantial impact on childhood morbidity and mortality worldwide. HIV infection is common in children whose mothers are infected and convey the virus through vertical transmission. It is reported that at the end of 2003 the estimated number of children under 15 years living with HIV was 2.1 million in the world, and as high as 1.9 million in sub-Saharan Africa.\(^3\) During the course of their HIV disease 90% will at sometime develop a respiratory disease. HIV-infected children are particularly susceptible to opportunistic pulmonary infections which constitute a major cause of the morbidity/mortality in these children.\(^4\) The frequency of tuberculosis and respiratory viral– infections are found to be increasing in HIV-infected children. The global incidence of tuberculosis has been growing over the last decade with the number of childhood cases increasing at a rapid rate. In 2000 it was

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estimated that there were 8.3 million new cases of TB worldwide of which 884,019 (10.7%) were in children.

The total mortality rate in children in any community is a reliable indicator of the amount of ARI mortality because ARI accounts for such a high proportion of all deaths. Thus by studying the infant mortality rate (IMR), population figures and number of deaths in the under five population it is possible to get an idea of the distribution of ARI by region and country. The WHO has developed a list of priority countries based on their reported infant mortality rates. Target countries are those with an IMR over 40 per 1000 live births. Approximately 57% of the world’s children live in such countries; another 27% live in countries with IMR between 20 and 40 and only 16% in countries with an IMR less than 20. The highest death rates for ARI are seen in Africa, especially Sub-Saharan countries, followed by Asia (excluding China) and then by the Eastern Mediterranean, Latin America, China and the Western Pacific, and with much lower rates in North America and Europe.

ARIs cause one of the most frequent illnesses in children under 5 years throughout the world with an average of 4 to 9 episodes per child annually. The high incidence of ARIs is reflected in the use of health care services: up to 60 per cent of all paediatric outpatient visits and 20 to 40 per cent of paediatric hospitalizations in low income countries are patients with ARIs.

A large proportion of ARIs is due to respiratory viruses, which cause mild, self-limiting illnesses for which there is no cure. Many children with such illnesses are treated with over-the-counter cough and cold remedies which are of no benefit, can be potentially harmful and are a drain on financial resources. On the other hand, the majority of cases of pneumonia are caused by primary or secondary bacterial infections, which are susceptible to short-term treatment with low-cost antibiotics. There is, however, considerable inappropriate use of antibiotics in the treatment of ARIs, that is primarily due to virus infections, which leads to increase in prevalence of drug resistance and a waste of family resources.

Common microorganisms associated with ARIs include respiratory viruses, measles virus, *Bordetella pertussis*, *Streptococcus pneumoniae* and
During the 1970’s and early 1980’s studies carried out in developing countries consistently demonstrated that *S pneumonias* and *H influenzae* were the most frequent bacteria isolated in samples taken from children hospitalized with a diagnosis of pneumonia - 55% of untreated cases of community acquired pneumonia. Although Pneumocystis jiroveci (previously Pneumocystis carinii) pneumonia and pulmonary lymphoid hyperplasia/lymphoid interstitial pneumonitis are common conditions in HIV positive children, bacterial pneumonia is much more frequent than those opportunistic infections.

The ideal approach to diagnosis of pneumonia would be to identify the causative microorganism in each individual case so that appropriate treatment could be prescribed. A bacterial cause of pneumonia in children can usually only be established by lung (or pleural fluid) aspiration or blood culture. Blood cultures are positive in only a small proportion of children even with severe pneumonia, and obtaining specimens from lung or pleural aspiration is usually not feasible in most routine situations. Clinical and radiological findings are unreliable means of determining the cause of childhood pneumonias. Clinical information, such as leucocyte count and the level or evolution of fever, is inaccurate in defining the cause of pneumonia in children.

Faced with children presenting with cough or difficult breathing, in hospitals with limited diagnostic facilities, health workers must be able to reliably identify those children with serious respiratory disease, especially life threatening pneumonia. Standard case management has been developed that accurately identifies pneumonia and classifies its severity in children based on a limited number of clinical signs. It ensures that those requiring antibiotics receive the appropriate antibiotic at the appropriate dose. In low-income countries, and especially in those with high infant mortality rates (IMR), as many as half of pneumonia cases in children attending health services may be of bacterial origin. Simple clinical signs, without chest x-ray or laboratory examinations, are effective in diagnosing almost all of these cases of pneumonia. The affected children can be effectively treated using a set of standardized treatment regimens based on the severity of the pneumonia determined by these simple clinical signs.
The reduction in the death rate due to ARIs, particularly in children hinges, according to the WHO, upon a programme strategy containing three elements: case management, immunization, and the modification of risk factors. The WHO Child Adolescent Health Division (CAH) has responsibility for the standard case management strategy, including the management of acute respiratory infections, in particular pneumonia, while the Expanded Programme of Immunization (EPI) is responsible for vaccinations including those addressed at preventing acute respiratory infections specifically measles, pertussis and diphtheria. The ARI Programme supports the efforts made by other programmes, such as Nutrition, Mother and Child Health (MCH), Environmental Health and Smoking Cessation in the prevention of risk factors of pneumonia.

The WHO established a global ARI Programme in 1982 to promote the early detection in the community and treatment of ARI, in particular pneumonia. Scientific studies subsequently showed that a reduction of mortality from ARI by approximately 50 percent could be attained using standard case management. The ARI Programme’s specific aims are to:

1. reduce the mortality from pneumonia among children under five
2. reduce the inappropriate use of medications for the treatment of ARI
3. reduce complications of acute upper respiratory infections

Later in the 1990’s, WHO promoted the integration of the ARI Programme together with the Programme for the Control of Diarrhoeal Diseases into a single case management programme — Integrated Management of Childhood Illnesses (IMCI) comprising the most common illnesses and conditions that are the most frequent causes of childhood mortality in low-income countries.

The IMCI guidelines for care of sick children at outpatient services are integrated into a single clinical algorithm on the basis of a syndromic case management approach.

Such an integration into a single algorithm is not feasible for inpatient care at first referral level (district) hospitals, where a disease-specific case management approach has to be followed, and the use of stethoscope, radiology and laboratory tests is included where necessary.
2. The target audience

This Guide addresses the need for high-quality care of children admitted to first-level referral facilities with serious lung disease, with an emphasis on pneumonia.

The Guide is meant to describe the best practice for the ‘usual’ patient. It does not intend to provide a text for the specialist or the ‘unusual’ patient under the care of experienced clinicians. For this, numerous specialist textbooks are available. A standard case management approach is described that provides high-quality care for the majority of patients. Other approaches to diagnosis or methods of treatment may be equally effective (or more appropriate in a certain minority of patients). These are not described in this text, as the aim is to describe best practice for the majority of patients (the ‘usual case’) under the care of the primary health care provider.

‘Unusual’ cases should be referred to the specialist or experienced clinician who is acquainted with the specialist textbooks. The fact that certain approaches to diagnosis and/or treatment are not described in this Guide does not imply any judgment about their quality or indications.

The Guide is aimed specifically at the manager responsible for ARI or IMCI activities at the basic management unit level (ARI or IMCI Coordinator). For purposes of this document, the term ‘basic management unit’ is that level of the health service, serving a population of from 50,000 to 150,000 inhabitants usually including the first level referral hospital. The Guide is designed for health workers at the first level of referral in the health system, this may include doctors, clinical officers, medical assistants and senior nurses who are managing cases of cough or difficult breathing in children under 5 years of age at outpatient services, and severe pneumonia and very severe pneumonia/disease in children below 5 years of age, admitted to the inpatient paediatric ward at first level referral hospitals (district) in developing countries.

High-quality inpatient management of severe and very severe pneumonia/disease in young children needs to meet minimal requirements, which are:

1. The ability to perform certain essential laboratory tests such as
   - blood smear examinations for malaria parasites,
   - estimations of haemoglobin or packed cell volume,
   - blood glucose,
   - blood grouping and cross matching,
   - basic microscopy of CSF and urine,
   - microscopy for diagnosis of tuberculosis
2. The availability of essential drugs for the care of seriously ill children. The rationale for choosing the basic management unit as the ‘building block’ of the service is:
   - it is the most peripheral unit to have fully organized local government and administration;
   - it is the level of health care management where plans and budgets are prepared;
   - it is the level where health care programme implementation is coordinated with local government and other sectors;
   - it has a first level referral health facility, with beds, and capable of giving inpatient care;
   - it is the most suitable level at which bottom-up and top-down planning can be coordinated;

3. The aim of the Guide

The purpose of this Guide is to provide practical direction for low-income countries on development of a management framework, including information system by which to implement high-quality child lung health (CLH) services throughout a country, within the context of the IMCI approach, based on the WHO standard case management strategy.

This Guide will have a particular emphasis on inpatient case management of severe and very severe pneumonia, as this is the major cause of mortality presenting with cough or difficult breathing.

Integrated within the Guide are both outpatient and inpatient management guidelines developed by the Department of Child and Adolescent Health WHO and UNICEF5,6.

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4. The objectives of the Guide

4.1 to promote accurate recognition and classification of the severity of serious respiratory disease in children, especially pneumonia;

4.2 to set out a plan of treatment based on the severity of the case;

4.3 to define the functions of different levels of the health service in the management of these cases;

4.4 to identify essential materials and supplies for standard case management;

4.5 to identify patients presenting with cough or difficult breathing who have treatable conditions other than pneumonia;

4.6 to propose a functional basis for planning training, supervision and communication activities;

4.7 to propose an information system which will strengthen the management of supplies and provide the basis for monitoring and evaluation of the effectiveness and efficiency of services;

4.8 to initiate routine monitoring and evaluation which will improve management systems and permit any modifications to the programme that may be indicated to function within the constraints of field realities.
II. WHAT IS ARI IN CHILDREN?

1. Operational definitions

**Young infant:** A young infant, for purposes of this guide, is 0 to 8 weeks of age.

**Child:** The generic term child means a child aged under 59 months; a young infant (<2 months of age) is a category of child, as is a infant aged 2 to 11 and a child 12 to 59 months, and specified as such where the distinction is necessary for purposes of case management.

**Acute Respiratory Infection (ARI):** According to the World Health Organization (WHO, 1991)7 ARI is any infection of acute onset, affecting the ear, nose, throat, larynx, trachea, bronchi, bronchioles or lungs. It ranges from the common cold, ear infections, sore throat, bronchitis to bronchiolitis and pneumonia. Common microorganisms associated with ARI include respiratory viruses, measles virus, *Bordetella pertussis*, *Streptococcus pneumoniae* and *Haemophilus influenzae*. It was estimated in the 1990s that globally pneumonia causes 70 percent of ARI-related deaths, measles pneumonia 12 percent, pertussis 8 percent, AIDS/ARI 3.5 percent, otitis media complications 1.5 percent and other conditions, mainly croup and bronchiolitis, 5 percent.

WHO has developed a system of categorization, which is based on the ability to differentiate the degree of severity of the illness. The classification system identifies three groups for assessing a child presenting with ARI. They are:

<table>
<thead>
<tr>
<th>Cough or difficult breathing</th>
<th>Sore throat</th>
<th>Ear problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia:</td>
<td>Streptococcal Sore Throat</td>
<td>Mastoiditis</td>
</tr>
<tr>
<td>— very severe</td>
<td></td>
<td>Acute ear infection (acute otitis media)</td>
</tr>
<tr>
<td>— severe</td>
<td></td>
<td>Chronic ear infection (chronic otitis media)</td>
</tr>
<tr>
<td>— non-severe</td>
<td>Retropharyngeal or Peritonsillar Abscess</td>
<td></td>
</tr>
<tr>
<td>Wheeze</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough or cold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic cough (more than 21 days)</td>
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</tbody>
</table>

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Those with cough or difficult breathing who are identified as having pneumonia are categorized by the degree of severity of the illness as follows: very severe pneumonia; severe pneumonia; or pneumonia.

2. Factors associated with pneumonia

While microorganisms are the most important cause of pneumonia in children, several important aspects of the child’s environment (risk factors) and of the child’s makeup (endogenous modifiers) have been identified.

2.1 Aspects of the environment that increase the chance of getting pneumonia:

2.1.1 Exposure to indoor air pollution, including environmental tobacco smoke

In many low-income countries traditional ways of cooking and heating using solid fuels are common. Cooking is often done indoors in poorly ventilated rooms leading to high levels of pollution due to smoke. The occurrence of pneumonia increases in direct relation to the amount of time a child spends exposed to this type of pollution. Young infants carried on the backs of mothers are especially at risk while their mothers do the cooking.

Children exposed to tobacco smoke from people around them who smoke are more likely to develop pneumonia; the more people who smoke in the household of a child, the more likely it is that the child will develop pneumonia.

2.1.2 Crowding

Crowding of any sort increases the possibility of respiratory infection because the number of microorganisms in the air the child breathes is much greater when larger numbers of people are crowded into small spaces.

2.1.3 Chilling

When the climate in the community where the child lives has two seasons (warm or cool; dry or wet), a child is more likely to develop pneumonia in the cool or wet seasons. When a young infant becomes chilled, the infant is at a much greater risk to develop pneumonia.
2.2 Aspects of the child’s makeup (host factors; endogenous modifiers) that increase the chance of getting pneumonia:

2.2.1 Sex

There is a slight difference in the frequency and severity of ARI affecting the lower respiratory tract between girls and boys: it is more common and the symptoms are more severe in boys especially in younger age groups.

2.2.2 Age

Pneumonia occurs more frequently among infants below 1 year of age and decreases steadily with age during childhood. Infants are more likely to die from pneumonia. The younger the child the more likely the pneumonia will lead to death.

2.2.3 Low birth weight

Infants below 2.5 kilograms at birth are more prone to infections and more likely to die from pneumonia during the first year of life than infants with normal weight at birth.

2.2.4 Breast-feeding practices

There is a marked difference in occurrence of pneumonia between infants who are breast-fed and those who are not. Not only is pneumonia more common, but a higher proportion of infants die of the disease if they are not breast-fed.

2.2.5 Malnutrition

Children who are severely and chronically malnourished are up to 10 times more likely to develop pneumonia and die of it than well-nourished children.

2.2.6 Micronutrient deficiency

Rickets, a condition caused by deficiency of vitamin D, is associated with a high incidence of pneumonia.
2.2.7 **HIV infection**

Children infected with the human immunodeficiency virus (HIV) are much more likely to develop and die from pneumonia because of the reduced immunity caused by the HIV.

2.2.8 **Previous infections**

Children with a history of previous exposure to, and infection with, respiratory viruses are much more likely to develop bacterial pneumonia.

2.2.9 **Low immunization coverage**

Infectious diseases such as measles and whooping cough also increase the occurrence of, and death from, pneumonia. Pneumonia is more frequent where children are less likely to get diphtheria, pertussis and tetanus (DPT) and measles vaccines. In such situations, the frequency of pneumonia in children could be reduced by 10-20% through immunization with these vaccines. Additional important reductions can be achieved through immunization with the *Haemophilus influenzae* type b vaccine and the new pneumococcal conjugate vaccine for children.

2.2.10 **Chronic non-infectious illness**

Children with congenital abnormalities or chronic debilitating conditions such as cerebral palsy, Down syndrome, severe gastro-oesophageal reflux or congenital heart disease are at increased risk of recurrent pneumonia.
1. The elements of case management

1.1 Standard case management

The WHO advocates standard case management for children with ARI in low income countries as defined below.

**Case management defined**

Correct case management is the cornerstone of programmes for the control of acute respiratory infections. Case management involves:

1. Early recognition of pneumonia by health workers using signs of fast breathing and chest in-drawing.
2. Prompt referral to hospital for injectable antibiotic treatment and other intensive care, for severe and very severe cases.
3. Antibiotic treatment at home with recommended drugs, for cases of pneumonia which are not severe.
4. Supportive home care for the vast majority of acute respiratory infections which do not require antibiotics.

1.1.1 Case management process for inpatient care

The case management process for *inpatient care* includes the following sequenced steps:

- General assessment of the child or young infant
- Directed history/examination
- Differential diagnoses
- Treatment
- Supportive care
- Monitoring the child’s progress
- Counselling and discharge from hospital

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Every child should be fully assessed. **History and examination** should consist of both a general paediatric history and examination and a specific search for symptoms and signs that are relevant to the presenting problems of the child. The nutrition of the child should be assessed and the immunization status checked. For all under-2-year-olds and very low weight-for-age children, their ability to feed should be evaluated.

This Guide focuses on the directed history/examination for the child who has cough or difficult breathing, which must include appropriate **laboratory investigations**.

### 1.1.2 The appropriate use of antibiotics

Since it is usually not possible to identify the responsible microorganism under field conditions in low-income countries, the choice of antibiotics is based on a knowledge of the microorganisms which most commonly cause pneumonia. All children who develop pneumonia or acute otitis media should receive antibiotics active against *Streptococcus pneumoniae* and *Haemophilus influenzae*. Cheap, widely available antibiotics are very successful in treating these bacteria. Such antibiotics include cotrimoxazole and amoxycillin for outpatients, and chloramphenicol, gentamicin, and benzylpenicillin for inpatients.

### 1.1.3 Other elements of care (supportive care)

Supportive care at home consists of fluids, continued feeding, neutral environmental temperatures, clearing nose and upper airway passages, paracetamol for fever and relief of ear pain, and safe, soothing non-commercial throat and cough remedies such as a mixture of honey and water. Hospital supportive care may include oxygen treatment and fluid management, in addition to the measures recommended for home care.

### 1.2 Immunization

Immunization focuses upon the most important contributors to pneumonia among vaccine preventable diseases, i.e. measles, pertussis, diphtheria and invasive infections by *Haemophilus influenzae* type b and *Strepococcus pneumoniae*. High levels of immunization against these agents are essential.
elements in the overall strategy of reducing ARI. These vaccines are, or will be given, within the Expanded Program on Immunization (EPI).

1.3 Modification of risk factors

The CLH Programme can disseminate practical health education messages related to prevention of risk factors. Depending on local circumstances, messages should focus on the need to keep the child (especially the young infant) dry and warm; to avoid exposure to tobacco smoke and cooking/heating smoke, and to continue feeding and giving fluids during the illness.

2. Identifying pneumonia by clinical signs and symptoms

*The WHO has provided a rationale for pneumonia case detection using clinical signs and symptoms without auscultation or radiography: this forms the basis for empirical treatment of childhood pneumonia.*

Objectives of guidelines for the diagnosis of pneumonia include:

— to identify those children who require further examination for possible pneumonia (“entry criteria”): namely, children with an acute illness with cough or difficult breathing;

— amongst these children, to identify all (or almost all) cases of possible bacterial pneumonia, in order to ensure they receive appropriate antibiotic therapy;

— amongst these children, to identify cases of severe pneumonia at higher risk of death who would benefit from hospital care (parenteral antibiotics, oxygen, greater clinical expertise, and better nursing care).

The main purpose of the assessment is to decide on clinical management. For simplicity and ease in training the guidelines included the smallest number of criteria that would be adequate to make decisions about management.

Clinical studies that have compared clinical signs with a chest radiograph have shown that fast breathing and chest in-drawing can very efficiently identify those with pneumonia among young children with cough or difficult breathing who are not wheezing.
An increase in respiratory rate (rapid breathing) is one of the responses to low blood oxygen levels (hypoxia) and lungs that have become stiff because of inflammation. However, it can also occur if a child is frightened or upset, so it is essential that the child be calm when the respiratory rate is measured. The younger the child, the higher is the respiratory rate that is considered the normal range. Therefore, different levels for rapid breathing definition are used: 60 or more for young infants (0 to 8 weeks); 50 and more for children from 2 to 11 months old and 40 and more for children from 12 to 59 months old. Furthermore, because young infants are more likely to have respiratory rates that vary, the finding of an elevated rate must be checked by a second count after an interval to ensure that the child is calm.

Stiff lungs resulting from severe pneumonia cause chest in-drawing. Children who present with chest in-drawing are more likely to have severe pneumonia than children without this sign. Chest in-drawing also occurs in wheezing and obstruction of the upper airways (croup syndrome), in which case it is not a sign of severe pneumonia.

Because the respiratory rate can fall when pneumonia becomes more severe or the child is exhausted, the use of both signs is important to identify the greatest number of children with pneumonia.

Children who have either cyanosis or inability to drink or breastfeed, or any other danger sign (very severe pneumonia or very severe disease) are much more likely to die of their pneumonia. The presence of either of these signs in children with cough or difficult breathing indicates an urgent need for admission to hospital and intensive therapy including oxygen and broad-spectrum antibiotics given intravenously or by intramuscular injection.

3. Why have other clinical signs not been used for diagnosing cases of pneumonia?

Fever does not accurately identify the child with pneumonia. Although most children with pneumonia have fever, so do those with viral infections or malaria. In addition, some children with pneumonia do not develop a fever (especially malnourished children) or may not have a fever when seen in clinic if they have previously been treated. Fever alone is not an indication
for antibiotic therapy except in young infants in whom fever is more likely to mean serious bacterial infection.

Crepitations (or coarse crackles) are difficult to hear in young children. Although the finding of crepitations can be of value to some skilled clinicians, these experts frequently do not agree on the interpretation of chest noises in a child. Many clinicians, even after years of practice, mistake upper airway noises for crepitations. Auscultation is difficult to teach and since other, simpler clinical signs perform adequately for accurately identifying and classifying pneumonia, auscultation is not usually included in the training of health workers in ARI case management. Studies comparing the use of crepitations or fast breathing for the identification of pneumonia have consistently found that crepitations, even when identified by experienced paediatricians, are less accurate in identifying the child with pneumonia.
Every child should be fully assessed. *History and examination* should consist of both a general paediatric history and examination and an examination aimed at specific symptoms and signs relevant to the presenting problems of the child with cough or difficult breathing. The nutrition of the child should be assessed and the immunization status checked. For all under 24 months of age and very low weight-for-age children, their ability to feed should be evaluated. This chapter presents the key symptoms and signs to look for in children presenting with cough or difficult breathing. It focuses on specific symptoms and signs, which are particularly useful in deciding whether a child has pneumonia or another disease.

“Assess” means obtaining information about the child’s illness by asking the mother questions, looking at, and listening to the child. In this section you will be told what information to obtain about the child, and how to obtain it.

The steps for assessing a child are described in detail on the following pages. You will ask the mother questions about the child’s health. You will also look at and listen to the child for signs of difficult breathing and general signs of the child’s condition.

All information obtained by the following procedures should be recorded on the Pneumonia Inpatient Recording Form for hospitalized cases and on the standard clinical record in the outpatient services (see Appendix 6).

1. **The history**

When a child who comes to the health service with cough or difficult breathing the health worker should **ASK** the mother the following questions:

1.1 **What is the age of the child?**

It is important to know if the child is a young infant (0 to 8 weeks of age) because the clinical signs for pneumonia, meningitis and sepsis may include...
respiratory symptoms but may also be considerably more vague. Further assessment is quite different if the child is a young infant. In older children the age is important as the respiratory rate that indicates fast breathing is different in different age categories.

1.2 Does the child have a cough; if yes, for how long?

If the child has been coughing for more than 21 days, the cough is said to be ‘chronic’. Therefore ask the following questions:

- Does it occur at night?
- Does it come in spells or severe bouts ending with vomiting or whooping?
- Is there continuous fever?
- Is there close contact with someone who has sputum smear positive tuberculosis or pertussis?
- Is there a history of attacks of wheeze and a family history of allergy or asthma?
- Has the child choked on something or inhaled an object?
- Is the child likely, or known, to be HIV-infected?

1.3 Does the child have a fever and, if so, for how long?

Other diseases may cause fever especially if the child has had a fever for more than five days and especially in areas where malaria occurs. Special attention should be paid to children presenting with fever - ask the following questions:

- what is the duration of fever?
- is there history of:
  - skin rash?
  - stiff neck or neck pain?
  - headache?
  - pain on passing urine?
  - ear pain?
1.4 Does the child feed normally?

1.4.1 For the child aged 2 to 59 months — Is the child able to drink?

If the mother indicates that the child is not able to drink, she should be asked if this means that the child cannot drink at all, is too weak to drink, or vomits what has been drunk.

1.4.2 For the child aged 0 to 8 weeks - Has the young infant stopped feeding well?

Not feeding well means that the young infant is taking only half the normal amount as compared with the amount taken prior to the onset of the current illness. If the young infant has stopped feeding well this is a danger sign in this age group.

1.5 Has the child had convulsions?

Convulsions can be due to other diseases such as cerebral malaria or meningitis, or following a paroxysm of coughing caused by pertussis so these should be considered. A precise description of how the convulsions started is important i.e. did they start for the first time during the current illness. Did the child have convulsions during examination?

NOTE: In infants less than 6 months of age one of the major symptoms of whooping cough may be to stop breathing after a long spell of coughing, whereas with older children it is more likely to cause a dark bluish colour (cyanosis), vomiting or convulsions.

2. The physical examination

2.1 The health worker should LOOK AND LISTEN to the child for the following:

It is essential that the child be calm or sleeping when breathing is assessed to make a correct count of the respiratory rate as well as to observe for chest in-drawing, noisy intake of breathe (stridor) or a soft, musical noise on breathing out (wheezing).
2.1.1 Count the number of breaths in one minute

Lift the child’s clothing and look for breathing movement anywhere on the child’s chest or abdomen. If the child starts to cry or becomes upset, have the mother calm the child again before counting.

As children get older, their breathing rate normally slows down. Therefore, the level you will use to determine if a child has fast breathing will depend on the age of the child:

*A timing device is required.*

<table>
<thead>
<tr>
<th>If the child is:</th>
<th>There is fast breathing if you count:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 0 to 8 weeks</td>
<td>60 breaths or more per minute</td>
</tr>
<tr>
<td>Age 2 months to 11 months</td>
<td>50 breaths or more per minute</td>
</tr>
<tr>
<td>Age 12 months to 59 months&lt;sup&gt;10&lt;/sup&gt;</td>
<td>40 breaths or more per minute</td>
</tr>
</tbody>
</table>

There are 2 ways you can use to count a child’s breaths.

1. Use a timer that sounds after one minute (60 seconds). Count the child’s breaths for one minute.

   Use a watch with a second hand, or a digital watch. Ask another health worker to tell you when 60 seconds have passed so that you can watch the child’s chest. If you cannot find another health worker to help you, hold the watch level with and close to child’s chest where you can glance at the second hand while looking at the child’s chest to count the breaths.

Repeat the count in any child if you are unsure of the count (for example, if the child was very restless and it was difficult to watch the chest movement).

Repeat the count of a young infant EVERY time you count 60 breaths per minute or more. This is important because the breathing rate of a young infant varies widely. The young infant will occasionally stop breathing for a few seconds, followed by a period of very rapid breathing. This is why it is

<sup>10</sup> A child who is exactly 12 months old would have fast breathing if he breathed 40 or more times per minute
also important to count the young infant’s breathing for a full 60 seconds. Determine if a young infant has fast breathing in this way:

- A count less than 60 breaths per minute: the young infant does not have fast breathing.
- A count of 60 breaths or more: wait and recount the rate.
- A second count of 60 or more breaths per minute: the young infant has fast breathing.
- A second count less than 60 breaths per minute: the young infant does not have fast breathing.

If you have not already lifted the child’s clothing when looking for fast breathing, ask the mother to lift it now, before you look and listen for chest indrawing, stridor and wheeze. Before looking for these signs, make sure you know when the child is breathing IN and when the child is breathing OUT.

### 2.1.2 Look for chest in-drawing

Look for chest indrawing when the child breathes IN. The child has chest indrawing if the lower chest wall goes in when the child breathes in. Chest indrawing occurs when the effort required to breathe in is much greater than normal. In normal breathing, when the child breathes IN, the whole chest wall (upper and lower) and the abdomen move OUT. With chest indrawing, when the child breathes IN, the lower chest wall moves IN, while the upper chest wall and abdomen move OUT. If only the soft tissue between the ribs or above the collar bone (clavicle) goes in when the child breathes in (intercostal retractions), this is not chest indrawing.

Be especially careful when looking for chest indrawing in young infants. Mild chest indrawing is normal in young infants because their chest wall is soft. However, severe chest indrawing (very deep and easy to see) is a sign of pneumonia.

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*Chest indrawing as defined here is the same as “subcostal indrawing” or “subcostal retractions”.*
If there is any question about whether the child has chest indrawing, change the child’s position and look again. If the child’s body is bent at the waist, it is hard to judge the movement of the lower chest wall. Be sure the child is lying flat in the mother’s lap. If the chest indrawing is still not clearly visible, assume that the child does not have chest indrawing.

### 2.1.3 Look and listen for stridor

Stridor is a harsh noise made when the child breathes IN. This may be difficult to hear so the health worker should listen by holding their ear near the child’s mouth. *Stridor is caused by inflammation of the larynx, trachea or epiglottis and is the main clinical characteristic of croup.*

Sometimes you will hear a wet noise if the nose is blocked. Clear the nose, and listen again. Often, a child who is not very ill will have stridor only when the child is crying or upset, so be sure to look and listen for stridor when the child is calm.

The major causes of severe stridor are viral croup (caused by measles or other viruses), diphtheria, foreign body, and injury to the upper airway.

Bacterial tracheitis and acute epiglottitis are usually rare in developing countries. In a child who has a more chronic illness, a tuberculous abscess causing pressure on the child’s upper airway may cause stridor.

If stridor is present ask the following questions:

- Is there a recent history of:
  - measles?
  - acute respiratory infections which are usually caused by respiratory viruses?
  - history of choking or sudden onset of symptoms?
  - injury?
2.1.4 Look and listen for wheeze

Wheeze is a soft musical noise on breathing OUT. Clinical signs associated with wheeze include a longer time period and a greater effort than normal on breathing OUT. This may be difficult to hear so the health worker should listen by holding their ear near the child’s mouth. Wheeze occurs when the airflow from the lungs is obstructed by narrowing of the airways caused either by an infection, such as bronchiolitis or pneumonia, or an allergic response.

In the first 2 years of life, wheezing is mostly caused by acute viral respiratory infections such as bronchiolitis or coughs and colds. After 2 years of age, most wheezing is due to asthma. Sometimes children with pneumonia present with wheeze. It is important always to consider pneumonia as a diagnosis particularly in the first 2 years of life. In a child who has a more chronic illness, a tuberculous abscess causing pressure on the child’s airway may cause wheeze. It is important to find out if this is the first episode of wheezing. If it is not, i.e. more than one episode in a 12 month period, it may be caused by asthma.

If wheeze is present ask the following questions:

• is there a personal or family history of asthma?
• have there been previous episodes of wheeze?
• has wheezing been known to respond to bronchodilators?
• has there been a diagnosis of asthma or long-term treatment for asthma?

2.1.5 Is there head nodding?

Head nodding is a movement of the head that appears in time with inspiration indicating severe respiratory distress.

2.1.6 For the child 0 to 8 weeks of age - Look and listen for grunting

Grunting is the short gruff sounds that a child makes at the beginning of breathing OUT when he has difficult breathing.
2.1.7 Is there nasal flaring?

Nasal flaring means that, when breathing in, the sides of the nostrils flare outwards.

2.2 The health worker can now TOUCH the child to ascertain the following:

2.2.1 Is there evidence of central cyanosis?

The health worker should examine the tongue. If this appears blue, this may indicate a very low level of oxygen in the tissues and is a sign that the child is very ill and that immediate action is required.

You should also look at and listen to the child for other signs of the child’s general condition. To do this, you must touch the child to find out if certain signs are present. The child does not have to be calm to get the following information:

2.2.2 Is there fever present?

The health worker should feel for fever or low body temperature (or measure the axillary or rectal temperature). Measure the child’s temperature, if possible.

A rectal temperature of $>38^\circ$ C is a fever. Less than $35.5^\circ$ C is an abnormally low body temperature (hypothermia)$^{12}$.

If you do not have a thermometer, feel the child’s body to see if it is hot or too cold. Sometimes the hands and feet may feel cold if a child is not adequately wrapped. However, cold calves and armpits indicate the child is hypothermic (too cold).

**NOTE:**

*Low temperature is a very important sign in young infants. It may indicate a very serious condition.*

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$^{12}$ The Fahrenheit equivalent for 39.0$^\circ$ C is 100.4$^\circ$ F.

The Fahrenheit equivalent for 35.5$^\circ$ C is 96.0$^\circ$ F. The thresholds for axillary temperature readings are approximately 0.5$^\circ$ C lower. Be sure the thermometer is capable of reading below 36.0$^\circ$ C 96.8$^\circ$ F.
2.2.3 Is the child abnormally sleepy or difficult to wake?

An abnormally sleepy child is drowsy most of the time when the child should be awake and alert. Often the sick child will not look at the mother or watch your face when you talk. The child may stare blankly and may not appear to see.

Ask the mother if the child has seemed unusually sleepy or difficult to wake. A child who is difficult to wake may continue to sleep even with the mother’s voice or when you clap loudly. Even though a very young baby naturally sleeps a lot they should waken naturally with these disturbances, or when the mother begins to undress the child.

**NOTE:**

Unconscious, convulsing or slowly moving (lethargic) children need immediate treatment and admission to hospital. Children with febrile convulsions can often be sent home after recovery if other causes of convulsions such as meningitis or severe malaria are excluded. If it is not possible to exclude these causes then it may be safer to admit such children to a ward for observation.

2.2.4 How much does the child weigh?

Frequently in outpatient services the dose given depends on the child’s age. In hospital it should be more precise, using the actual weight to calculate the doses. You need to know the weight to give the right medication dose.

2.2.5 Does the child have severe anaemia?

Examine for pale colouration (palmar pallor, conjunctival pallor) as severe anaemia, which may be due to other conditions, such as malaria, can cause fast breathing and chest indrawing that may be a sign of heart failure. Such children often have an enlarged liver (hepatomegaly). If possible measure haematocrit (or packed cell volume) to confirm.
2.2.6 Does the child have severe malnutrition?

Check for severe malnutrition by looking at the child\textsuperscript{13}. Look for either:

- Severe marasmus, which is an extreme wasting away of fat and muscle so that the child looks like skin and bones, weight-for-length (or height) <70\% or -3SD or
- Kwashiorkor, which is identified by a generalized swelling of the body, swelling (oedema) in both feet, and thin, sparse hair.

2.3 Additional examination using a stethoscope

Listen to the chest with the stethoscope, noting the following:

- decreased breath sounds
- bronchial breath sounds
- crackles
- abnormal vocal resonance (decreased over a pleural effusion, increased over lobar consolidation)
- pleural rub
- wheeze

Raised jugular venous pressure is a sign of heart failure\textsuperscript{14}.

\textbf{NOTE:}

Remember to listen to the heart.

Infants with congenital heart disease often present with recurrent pneumonia and the clinical signs of cardiac failure overlap with those of severe pneumonia.

\textsuperscript{13} Other methods can be used to determine if a child is severely malnourished, such as measuring weight and height, or the circumference of the arm. Follow the policy of your national programme.

\textsuperscript{14} Raised jugular venous pressure is generally a very difficult sign to elicit especially in infants. Enlarged liver (hepatomegaly) or gallop rhythm are more useful.
Cough and difficult breathing are common problems in young children. This section provides guidelines for managing the most important conditions that cause cough, difficult breathing, or both in children aged 2 to 59 months. Management of cough or difficult breathing in children 0 to 8 weeks of age is described in Section VI.

In Section IV you learned how to assess the child. In this section, you will learn how to interpret the signs for a child aged 2 to 59 months. You will make a decision about how to classify the severity of pneumonia, and then identify the appropriate treatment.

“Classify” means making decisions about the type and severity of disease based on the signs and symptoms you saw during the assessment. You will then put each child into one of four classifications:

- Very Severe Pneumonia
- Severe Pneumonia
- Pneumonia (not severe)
- Cough or Cold

Each of these disease classification has a corresponding treatment regimen which you should follow after you have classified the child.

1. Inpatient care of pneumonia

Pneumonia is classified as very severe, severe or non-severe, based on the clinical features, with specific treatment for each of them (Box 1, Chart 1, pages 28 and 29). Antibiotic therapy is needed in all cases. Severe and very severe pneumonia require additional treatment to be given in hospital. This section will focus on those cases that require hospitalization — severe and very severe pneumonia.

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The child 2 to 59 months old
Assessment, classification and treatment

The first health care worker who encounters the child who is brought with cough or difficult breathing must make the assessment and classification of the condition to determine the course of action that is to be taken. The first section of Chart 1 indicates what major signs are to be sought.

The initial assessment must concentrate on 1) danger signs 2) chest in-drawing 3) fast breathing. These, and the means for assessing them, have been previously described. If there is neither danger signs nor chest in-drawing nor fast breathing present, the child can be safely assumed not to have pneumonia and managed accordingly on an outpatient basis.

If it is demonstrated that the child has fast breathing, such a child has pneumonia and must be managed accordingly. If no other signs are present, the child is classified as having pneumonia which is not severe and does not require admission to hospital. On the other hand, if signs of chest in-drawing are present, the child is classified as having severe pneumonia and, if in addition, there is evidence of danger signs (central cyanosis or the child is unable to drink / breastfeed, or convulsions, or lethargy or severe respiratory distress), such a child is classified as having very severe pneumonia. The second section of Chart 1 indicates the categories. This course will focus on the categories in the shaded areas requiring hospitalisation.

When the child is first seen, if there are convulsions, or the child is abnormally sleepy or difficult to wake, or if there is severe malnutrition, these are important signs of very severe disease. They may be due to pneumonia but they may also be due to other causes.

Any child who presents with cough or difficult breathing who has, in addition, these signs, must be admitted IMMEDIATELY to the hospital for further management.

No child with such a condition should be managed within the community. The third section of Chart 1 identifies the appropriate treatment for each category.
CHART 1

Diagnosis and treatment of children with cough or difficult breathing.

*Children 2 to 59 months*

Plus at least one of the following:
- central cyanosis
- unable to drink/breastfeed
- convulsions/lethargy/unconsciousness
- severe respiratory distress
- stridor in calm child

### Diagnostic features

<table>
<thead>
<tr>
<th>Very severe pneumonia</th>
<th>Severe pneumonia</th>
<th>Pneumonia</th>
<th>No pneumonia</th>
</tr>
</thead>
</table>

### Management

- treat fever, if present; treat wheeze, if present

<table>
<thead>
<tr>
<th>Admit immediately to hospital:</th>
<th>Treat as outpatient</th>
<th>Treat as outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>give antibiotic (chloramphenicol)</em></td>
<td><em>give antibiotic (benzylpenicillin)</em></td>
<td><em>give antibiotic (cotrimoxazole)</em></td>
</tr>
<tr>
<td><em>give oxygen to all children in this category</em></td>
<td><em>give oxygen if severe chest in-drawing or respiratory rate $&gt;70$/minute</em></td>
<td><em>return in 2 days for reassessment (sooner if not improved)</em></td>
</tr>
</tbody>
</table>
| *give supportive care* | *reassess by medical staff daily, nursing staff at least every 3 hours* | *assess and treat if present:*
| *reassess by medical staff twice daily, nursing staff at least every 6 hours* | | — ear problem
| | | — sore throat
1.1 Decide if the child has VERY SEVERE PNEUMONIA

To classify a child’s illness, you must follow the steps as they are presented in this section of the manual. The first step is to decide if the child should be classified as having Very Severe Pneumonia.

*Ask this question about EVERY CHILD you see with a cough or difficult breathing:*

*Does the child have any danger signs?*

You can tell if a child has very severe pneumonia by using the information from the assessment to decide if the child has a “danger sign.”

1.1.1 Diagnosis

To classify the child as having very severe pneumonia, the child with cough or difficult breathing must have the following signs:

- fast breathing:
  - age 2-11 months: \( >50/\text{minute} \)
  - age 12 to 59 months: \( >40/\text{minute} \)

- lower chest wall indrawing (lower chest wall goes in when the child breathes in; if only the soft tissue between the ribs or above the clavicle goes in when the child breathes, this is not lower chest wall indrawing)

- Plus at least one of the following:
  - central cyanosis
  - inability to breastfeed or drink, or vomiting everything
  - convulsions, abnormally sleepy or difficult to wake or unconsciousness
  - severe respiratory distress (e.g. head nodding, see page 23).
  - nasal flaring
  - grunting
  - stridor in a calm child
Any such child should be recorded as having **Very Severe Pneumonia** and be admitted to the hospital immediately

**Additional signs**

- chest auscultation signs of pneumonia:
  - decreased breath sounds
  - bronchial breath sounds
  - crackles
  - abnormal vocal resonance (decreased over a pleural effusion, increased over lobar consolidation)
  - pleural rub
- examine for severe pallor
- auscultate the heart.

*If possible:*

- Where Malaria occurs check malaria blood film and haematocrit or haemoglobin.
- Obtain a chest X-ray to identify / rule-out: pleural effusion, empyema, pneumothorax, pneumatocele, interstitial pneumonia and pericardial effusion.

1.1.2 **Treatment**

Admit the child to hospital *immediately*.

**Antibiotic therapy**

Intramuscular or intravenous *chloramphenicol* 25 mg/kg every 8 hours until the child has improved. Then continue the chloramphenicol by mouth (orally) 3 times a day for a total course of 10 days.
Use table 1 (following) to determine the correct dose for each child.

Table 1. Antibiotic Treatment for Very Severe Pneumonia – Child age 2 to 59 months

<table>
<thead>
<tr>
<th>WEIGHT (kgs)</th>
<th>CHLORAMPHENICOL</th>
<th></th>
<th>ORAL SUSPENSION*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intramuscular injection*</td>
<td>vial of 1g mixed with 3.2 ml sterile water to give 1g/4ml</td>
<td>125mg/5ml suspension (palmitate)</td>
</tr>
<tr>
<td>Give day 1 through day 5**</td>
<td>Give day 6 through day 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 mg per kg</td>
<td>25 mg per kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 kgs</td>
<td>75 mgs — 0.3ml every 8 hours***</td>
<td>75 mgs — 3ml every 8 hours***</td>
<td></td>
</tr>
<tr>
<td>4 kgs</td>
<td>100 mgs — 0.4ml every 8 hours</td>
<td>100 mgs — 4ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>5 kgs</td>
<td>125 mgs — 0.5ml every 8 hours</td>
<td>125 mgs — 5ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>6 kgs</td>
<td>150 mgs — 0.6ml every 8 hours</td>
<td>150 mgs — 6ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>7 kgs</td>
<td>175 mgs — 0.7ml every 8 hours</td>
<td>175 mgs — 7ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>8 kgs</td>
<td>200 mgs — 0.8ml every 8 hours</td>
<td>200 mgs — 8ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>9 kgs</td>
<td>225 mgs — 0.9ml every 8 hours</td>
<td>225 mgs — 9ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>10 kgs</td>
<td>250 mgs — 1.0ml every 8 hours</td>
<td>250 mgs — 10ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>11 kgs</td>
<td>275 mgs — 1.1ml every 8 hours</td>
<td>275 mgs — 11ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>12 kgs</td>
<td>300 mgs — 1.2ml every 8 hours</td>
<td>300 mgs — 12ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>13 kgs</td>
<td>325 mgs — 1.3ml every 8 hours</td>
<td>325 mgs — 13ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>14 kgs</td>
<td>350 mgs — 1.4ml every 8 hours</td>
<td>350 mgs — 14ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>15 kgs</td>
<td>375 mgs — 1.5ml every 8 hours</td>
<td>375 mgs — 15ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>16 kgs</td>
<td>400 mgs — 1.6ml every 8 hours</td>
<td>400 mgs — 16ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>17 kgs</td>
<td>425 mgs — 1.7ml every 8 hours</td>
<td>425 mgs — 17ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>18 kgs</td>
<td>450 mgs — 1.8ml every 8 hours</td>
<td>450 mgs — 18ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>19 kgs</td>
<td>475 mgs — 1.9ml every 8 hours</td>
<td>475 mgs — 19ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>20 kgs</td>
<td>500 mgs — 2.0ml every 8 hours</td>
<td>500 mgs — 20ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>21 kgs</td>
<td>525 mgs — 2.1ml every 8 hours</td>
<td>525 mgs — 21ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>22 kgs</td>
<td>550 mgs — 2.2ml every 8 hours</td>
<td>550 mgs — 22ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>23 kgs</td>
<td>575 mgs — 2.3ml every 8 hours</td>
<td>575 mgs — 23ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>24 kgs</td>
<td>600 mgs — 2.4ml every 8 hours</td>
<td>600 mgs — 24ml every 8 hours</td>
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<tr>
<td>25 kgs</td>
<td>625 mgs — 2.5ml every 8 hours</td>
<td>625 mgs — 25ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>26 kgs</td>
<td>650 mgs — 2.6ml every 8 hours</td>
<td>650 mgs — 26ml every 8 hours</td>
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</tr>
<tr>
<td>27 kgs</td>
<td>675 mgs — 2.7ml every 8 hours</td>
<td>675 mgs — 27ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>28 kgs</td>
<td>700 mgs — 2.8ml every 8 hours</td>
<td>700 mgs — 28ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>29 kgs</td>
<td>725 mgs — 2.9ml every 8 hours</td>
<td>725 mgs — 29ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>30 kgs</td>
<td>750 mgs — 3.0ml every 8 hours</td>
<td>750 mgs — 30ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>31 kgs</td>
<td>775 mgs — 3.1ml every 8 hours</td>
<td>775 mgs — 31ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>32 kgs</td>
<td>800 mgs — 3.2ml every 8 hours</td>
<td>800 mgs — 32ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>33 kgs</td>
<td>825 mgs — 3.3ml every 8 hours</td>
<td>825 mgs — 33ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>34 kgs</td>
<td>850 mgs — 3.4ml every 8 hours</td>
<td>850 mgs — 34ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>35 kgs</td>
<td>875 mgs — 3.5ml every 8 hours</td>
<td>875 mgs — 35ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>36 kgs</td>
<td>900 mgs — 3.6ml every 8 hours</td>
<td>900 mgs — 36ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>37 kgs</td>
<td>925 mgs — 3.7ml every 8 hours</td>
<td>925 mgs — 37ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>38 kgs</td>
<td>950 mgs — 3.8ml every 8 hours</td>
<td>950 mgs — 38ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>39 kgs</td>
<td>975 mgs — 3.9ml every 8 hours</td>
<td>975 mgs — 39ml every 8 hours</td>
<td></td>
</tr>
<tr>
<td>40 kgs</td>
<td>1000 mgs — 4.0ml every 8 hours</td>
<td>1000 mgs — 40ml every 8 hours</td>
<td></td>
</tr>
</tbody>
</table>

* Must not exceed 1.0 gram per dose
** Or until the child has improved.
*** Do not give chloramphenicol to premature neonate. For young infants, calculate the exact dose based on body weight rather than doses in this Table.
   For young infants <1 month old, the dose is 25 mg/kg every 12 hours.
Chloramphenicol is the antibiotic of choice but if this is not available, give benzylpenicillin (50 000 units/kg IM or IV every 6 hours) and gentamicin (7.5 mg/kg IM once a day) for 10 days.

**Failure to improve**

If the child does not improve within 48 hours, switch to the following: gentamicin (7.5 mg/kg IM once a day) and cloxacillin (50 mg/kg IM or IV every 6 hours).

When the child improves, continue cloxacillin (or dicloxacillin) orally 4 times a day for a total course of 3 weeks.

1.1.3 Oxygen therapy

Oxygen should be given to all children with very severe pneumonia. *Use of nasal prongs is the best method for delivering oxygen especially to young infants (see Appendix 1).* Face masks or head masks are not recommended. Oxygen supplies need to be available at all times.

Continue with oxygen until the signs of hypoxia (such as severe lower chest wall indrawing, breathing rate of >70/minute, head nodding, or cyanosis) are no longer present. The nurse should check every 3 hours that the prongs (or catheter) are not blocked with mucus and are in the correct place and that all connections are secure.

The best source of oxygen is an oxygen concentrator with a flow-splitter; alternatively oxygen can be obtained from oxygen cylinders. It is important that all equipment is checked for compatibility and properly maintained, and that staff are instructed in their correct use.
1.1.4 Supportive care

- If fever is present, give paracetamol. Give 10-15mg/kg/dose up to 4 times a day, to control high fever in a distressed child.

- If wheeze is present, give a rapid-acting bronchodilator (See section VII Asthma Management for guidelines on administration).

- For any thick secretions in the throat and in the nose, which the child cannot clear remove by gentle suction.

- For fluid maintenance ensure that the child receives the correct amount of fluids needed daily for the child’s age (see Appendix 2), Overhydration should be avoided.
  - Breastfeeding and oral fluids should be encouraged.
  - Only if the child cannot drink, should a nasogastric tube be inserted. Required fluids should be given in frequent small amounts. NB If oxygen is given by nasopharyngeal catheter at the same time as nasogastric fluids, pass both tubes through the same nostril.

- The child should be encourage to eat as soon as food can be taken.

1.1.5 Monitoring

The child should be checked by a nurse at least every 3 hours and by a doctor at least twice a day. A record should be kept of the respiratory rate, temperature, level of consciousness and ability to drink or breastfeed. Within two days, if there is no complication, there should be signs of improvement recorded.

- Reduction in respiratory rate
- Resolution of lower chest indrawing
- Reduction of fever
- Improved appetite and fluid intake
1.1.6 Complications

If there is no improvement after two days, or if the child’s condition has worsened, it is vital to look for complications or other diagnoses. If possible, obtain a chest X-ray. The most frequent complications are given below.

1.1.6.1 *Staphylococcal pneumonia.*

This diagnosis is suggested by the following:

- if the child’s condition rapidly worsens despite treatment,
- by chest X-ray appearance of a pneumatocele or pneumothorax with effusion, numerous Gram-positive cocci in a smear of sputum, or
- heavy growth of *Staphylococcus aureus* in cultured sputum or empyema fluid.

The presence of skin pustules or soft-tissue infection supports the diagnosis.

**Treatment**

*Cloxacillin* (50 mg/kg IM or IV every 6 hours) and *gentamicin* (7.5 mg/kg IM or IV once a day). When the child improves, continue cloxacillin orally 4 times a day for a total course of 3 weeks. **Note:** cloxacillin can be substituted by another anti-staphylococcal antibiotic such as oxacillin, flucloxacillin, or dicloxacillin.

1.1.6.2 Pleural effusion and empyema

A child with severe or very severe pneumonia may develop pleural effusion or empyema. Signs of fluid accumulation on examination:

- Dull percussion
- Breath sounds are reduced or absent over the affected area.
- Asymmetrical respiratory movement

A pleural rub may be heard at an early stage before the effusion is fully developed.

Chest X-ray findings may shows fluid on one or both sides of the chest heart displacement to unaffected side.

When empyema is present, fever persists despite antibiotic therapy and the pleural fluid is cloudy or frankly purulent.

Unless they are very small pleural effusions should be drained. If effusions are present on both sides of the chest, drain both. It may be necessary to repeat drainage 2-3 times if fluid returns.
If possible, pleural fluid should be analysed for protein and glucose content, cell count and differential count, by Gram and Ziehl-Neelsen staining, and bacterial culture and subsequent management based on the character of the fluid obtained.

**Treatment**

*Give chloramphenicol* (25 mg/kg IM or IV every 8 hours) until the child has improved. Then continue orally 3 times a day for a total of 4 weeks.

If the infecting organism identified is *Staphylococcus aureus* give *cloxacillin* (dose: 50 mg/kg IM or IV every 6 hours) and *gentamicin* (dose: 7.5 mg/kg IM or IV once a day) instead. When the child improves, continue with cloxacillin orally, 4 times a day. Continue treatment for a total of 3 weeks.

**Failure to improve**

If fever and other signs of illness continue, despite adequate chest drainage and antimicrobial therapy, assess for possible tuberculosis.

### 1.1.6.3 Tuberculosis

A child with persistent fever for more than 14 days and signs of pneumonia should be evaluated for tuberculosis. In infants TB can present as severe / very severe pneumonia and should be considered if infants do not improve on antibiotics. See section VIII on tuberculosis management.

### 1.1.6.4 HIV infection and pneumonia

Most episodes of pneumonia in HIV-positive children have the same etiology as in HIV-negative children and respond to the same treatment. However, in an infant with very severe pneumonia that does not respond to standard recommended treatment, a chest X-ray showing bilateral interstitial infiltrates or hyperinflation might suggest pneumonia due to *Pneumocystis jiroveci*, commonly known as PCP. Consider the possibility of *Pneumocystis* pneumonia in infants living in HIV-endemic regions whose pneumonia does not respond to standard treatment. *Pneumocystis* pneumonia occurs most frequently in infants less than 6 months of age and is often associated with hypoxia that responds poorly to oxygen therapy. Give IV or oral cotrimoxazole as crushed tablets (trimethoprim 5mg/kg/day, sulfamethoxazole 25mg/kg/day). The total amount should be divided into 4 doses given daily for 3 weeks. For example for a child weighing 4 kg they would require trimethoprim 20mg/day, sulfamethoxazole 100mg/day divided
into 4 doses which is a quarter of a paediatric tablet 4 times a day\textsuperscript{16}. However, if feasible, it is preferable to give intravenous cotrimoxazole. If the child has a severe drug reaction to cotrimoxazole, change to pentamidine, 4 mg/kg once a day, per IV infusion for 3 weeks.

1.2 Severe pneumonia

1.2.1 Diagnosis

- fast breathing:
  - age 2-11 months: \( \geq 50/\text{minute} \)
  - age 12 to 59 months: \( \geq 40/\text{minute} \)

- lower chest wall indrawing

Check that the child DOES NOT have signs of very severe pneumonia, such as:

- central cyanosis
- inability to breastfeed or drink
- vomiting everything
- convulsions, abnormally drowsy or difficult to wake or unconsciousness
- severe respiratory distress
- nasal flaring
- grunting (in young infant)
- stridor in a calm child

A chest X-ray \textit{rarely} gives information that will change the management of severe pneumonia and is therefore not recommended routinely.

1.2.2 Treatment

Admit the child to hospital.

Antibiotic therapy

\textit{Give benzylpenicillin (50 000 units/kg IM or IV every 6 hours) for at least 3 days or longer until sustained improvement is achieved.}

When the child shows sustained improvement, switch to oral \textit{amoxicillin} (15 mg/kg 3 times a day). Antibiotic treatment should be continued for 3 days after the child is well. The total course of treatment is \underline{at least} 5 days.

Use tables 2 and 3 for a guideline and to determine the correct dose for each child.

**Table 2  Antibiotic Treatment for Severe Pneumonia**  
**Child age 2 to 59 months**

<table>
<thead>
<tr>
<th>AGE</th>
<th>WEIGHT</th>
<th>BENZYLPCNILLIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Intramuscular injection</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vial of 600 mg (1 000 000 units); mix with 1.6 ml sterile water to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>give 1 million units/2ml (500 000/ml) 50 000 units per kg every 6 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Give day 1 through day 3 at least*</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>5 kg</td>
<td>250 000 units — 0.5 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>6 kg</td>
<td>300 000 units — 0.6 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>7 kg</td>
<td>350 000 units — 0.7 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>8 kg</td>
<td>400 000 units — 0.8 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>9 kg</td>
<td>450 000 units — 0.9 ml every 6 hours</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>10 kg</td>
<td>500 000 units — 1.0 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>11 kg</td>
<td>550 000 units — 1.1 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>12 kg</td>
<td>600 000 units — 1.2 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>13 kg</td>
<td>650 000 units — 1.3 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>14 kg</td>
<td>700 000 units — 1.4 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>15 kg</td>
<td>750 000 units — 1.5 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>16 kg</td>
<td>800 000 units — 1.6 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>17 kg</td>
<td>850 000 units — 1.7 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>18 kg</td>
<td>900 000 units — 1.8 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>19 kg</td>
<td>950 000 units — 1.9 ml every 6 hours</td>
</tr>
<tr>
<td></td>
<td>20 kg</td>
<td>1 000 000 units — 2.0 ml every 6 hours</td>
</tr>
</tbody>
</table>

* When the child has shown sustained improvement, switch to oral amoxicillin.
### Table 3 Antibiotic Treatment for Severe Pneumonia
Child age 2 to 59 months

<table>
<thead>
<tr>
<th>AGE</th>
<th>WEIGHT</th>
<th>AMOXICILLIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15mg per kg every 8 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Give day 4 through at least day 5 or longer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for 3 days after child is well)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral suspension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(125 mg/5ml suspension)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25mg/ml)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral tablet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(250 mg tablet)</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>5 kg</td>
<td>75 mg — 3 ml</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>6 kg</td>
<td>90 mg — 3.6 ml</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>7 kg</td>
<td>105 mg — 4.2 ml</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>8 kg</td>
<td>120 mg — 4.8 ml</td>
</tr>
<tr>
<td>2 to 11 months</td>
<td>9 kg</td>
<td>135 mg — 5.4 ml</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>10 kg</td>
<td>150 mg — ¾ tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>11 kg</td>
<td>165 mg — ¾ tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>12 kg</td>
<td>180 mg — ¾ tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>13 kg</td>
<td>195 mg — ¾ tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>14 kg</td>
<td>210 mg — ¾ tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>15 kg</td>
<td>225 mg — 1 tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>16 kg</td>
<td>240 mg — 1 tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>17 kg</td>
<td>255 mg — 1 tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>18 kg</td>
<td>270 mg — 1 tablet</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>19 kg</td>
<td>285 mg — 1½ tablets</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>20 kg</td>
<td>300 mg — 1½ tablets</td>
</tr>
</tbody>
</table>

### 1.2.3 Oxygen therapy

Oxygen should be given to any child with severe lower chest wall indrawing or a respiratory rate of ≥70/minute.
1.2.4 Supportive care

See above as described for very severe pneumonia.

1.2.5 Monitoring

The child should be checked by a nurse at least every 6 hours and by a doctor at least once a day. A record should be kept of the respiratory rate, temperature, level of consciousness and ability to drink or breastfeed. Within two days, if there is no complication, there should be signs of improvement recorded:

- Reduction in respiratory rate,
- Resolution of lower chest indrawing
- Reduction of fever
- Improved appetite and fluid intake

**Failure to improve**

If the child does not improve within 2 days (48 hours), or deteriorates, switch to *chloramphenicol* (25 mg/kg every 8 hours IM or IV) until the child has improved. Then continue orally for a total course of 10 days.

1.2.6 Complications

See above as described for very severe pneumonia.

1.3 If admission is refused for the child with severe pneumonia or very severe pneumonia/ disease

If the mother refuses admission for the child with severe pneumonia or very severe pneumonia/disease, *even though the health worker has made every effort to explain to the mother and convince her of the importance of this decision*, then the health worker has no option except to try to provide essential care through alternative means. Attempts should be made to help the mother care for the child through alternative arrangements which may include:

- The child staying near the hospital and being brought to see the health workers several times a day.
- Arranging home visits - but this is time consuming and will depend on the amount of staff available.
1. Organising with the nearest health care centre to the mother’s village for the health worker to give/supervise treatment.

1.4 Discharge and follow-up

Studies carried out in developing countries of deaths from acute illnesses in childhood have shown that many children died shortly after discharge from hospital. It is therefore vital to give careful attention to planning the child’s discharge and follow-up to prevent this from occurring.

**Note:** The monitoring of how a child responds to treatment and correct planning of discharge and follow-up are equally as important as making the correct diagnosis and providing appropriate treatment.

The discharge process for all children should include:
- discharge from hospital should be based on the antibiotic treatment regimens
- mothers should be counselled about treatment and nutritional needs of the child at home
- making sure that the child’s immunisation status and record card are up-to-date
- giving written feedback to the health worker who referred the child or who will be responsible for follow-up care and review
- informing the mother on when to return to the hospital for follow-up and the importance of returning. Giving written/pictorial instructions to the mother on symptoms and signs which indicate the need to return immediately
- where there are specials needs for equipment or support (e.g. connecting with community support organisations for children with HIV/AIDS and malnutrition) the family should be assisted in linking up with the appropriate organizations.

If the above guideline are followed:
- the child’s condition is less likely to get worse again at home which could have serious consequences, including death if discharge is too soon.
- the child (and care-giver) will be able to return home to a safer place and allowing other sick children to use the hospital facilities if the discharge is not delayed too long.
• communication and linkages between the hospital and nearby health services, from where sick children are referred to the hospital will be strengthened resulting in continuity of care.

• an increase in families confidence to provide proper follow-up care at home for children who have been discharged from hospital.

1.4.1 Timing of discharge from hospital

Seriously ill children must stay in hospital as their condition requires it to be closely monitored, also the treatment they require is available only in a hospital (e.g. oxygen therapy or parenteral antibiotics). Early discharge may interrupt these treatments and run the risk of the child relapsing or of dying. Keeping a child in hospital for too long however is expensive and hard on the child’s family, also puts the child at risk of contacting diseases from other sick children and places a burden on limited health services needed by other sick children.

When a child is discharged from hospital is therefore very important. The treatment guidelines presented in this guide give treatment instructions for the patient according to their age and severity, not only indicating the correct treatment but the minimal number of days that a child should received it parenterally. The treatment of the young infant requires parenteral Gentamicin for the whole 8 days whole so the mother should be made aware of this prior to commencing treatment.

*Usually, in the management of acute respiratory infections, the child can be considered ready for discharge after the clinical condition has substantially improved (afebrile, alert, eating or breastfeeding and sleeping normally), the improvement has been sustained and treatment by mouth has been started for at least 24 hours.*

A number of factors need be taken into account when deciding on discharge and should be considered on an individual basis, such as:

• what is the family’s home situation like, how much support exists to help care for the child

• what is the likelihood that the treatment course will be completed at home, what is the staff’s opinion regarding this

• what is the likelihood that the family will return immediately to the hospital if the child’s condition should worsen — what is the staff’s judgment of this
**Removal of the child against medical advice**

*If the mother decides to discharge the child with severe pneumonia or very severe pneumonia/disease, against medical advise of the hospital staff, even though the health worker has made every effort to explain to the mother and convince her of the importance of this decision, then the health worker needs to counsel the mother on how to continue treatment at home and encourage her to bring the child for follow-up after 1-2 days, and to make contact with the local health worker for help in the follow-up care of the child.*

1.4.2 **Communicating with caregiver using the Mother’s Card**

A simple, pictorial card has been developed by the WHO which can easily be adapted to meet different ethnic and language groups. The card should be given to each mother when her child is discharged from hospital. It is used to remind the mother how to care for her child at home, when to return for follow up care, and the signs indicating the need to return immediately to the hospital.

When reviewing the Mother’s Card with the mother:

- Hold the card so that she can easily see the pictures, or allow her to hold it herself
- Hold the card out in front of you
- Point to the pictures as you talk about it
- Use language that the mother can understand — keep it simple progressing from what the mother knows to unknown (new) information. Information should be adapted to the mother’s culture, language and ethnic group
- Circle the picture/information that has specific meaning to the mother. For example, put a circle round signs of when to return immediately for child with cough or difficult breathing
- Watch the mother’s face — is she puzzled, confused — encourage to ask you questions, repeat back to you in her own words what you have told her using the card to help her remember

---

17 See Appendix 5 for example of a Mother’s Card
• Use simple illustrations
• Give a copy to take home with her writing on the date of return visit for follow-up and/or for the next immunization. Encourage the mother to use the card to teach other family members and neighbours.

1.4.3 Providing follow-up care

Children who are discharged after inpatient treatment

A children who is discharged home after inpatient hospital treatment for severe or very severe pneumonia to complete the course of oral antibiotics at home needs to return for follow-up care for the following reasons:

• to check that treatment at home was EITHER continuing or completed (course of antibiotics)
• to check that the child has fully recovered (if this had not already happened at the time of discharge) i.e. respiratory rate, temperature and drinking/eating/feeding pattern, for the particular child, have returned to normal
• to check for delayed (or hidden) complications that may occur after the child has recovered, such as chronic cough

Note: If the child lives far from the hospital and transportation is difficult, arrangements should be made for the mother to take child to the nearest health centre for follow-up visit. A discharge / follow-up form should be given to the mother to present to the health worker — this can then be completed and returned to the hospital. This fulfils two functions in that it:

• informs the local health centre of the patients hospitalization, especially if they had originally transferred them and,
• allows the hospital to receive the information so as to complete their discharge / outcome records on receipt of the follow-up visit information via the returned discharge / follow-up form.
2. Outpatient care of pneumonia

2.1 Pneumonia (non-severe)

2.1.1 Diagnosis

On examination, the child has cough or difficult breathing and fast breathing

- age 2 - 11 months ≥50/minute
- age 12 - 59 months ≥40/minute.

Check that the child has NONE of the signs of severe or very severe pneumonia given above 1.1 and 1.2. Other signs of pneumonia (on auscultation), other than those that indicate that the child has severe or very severe pneumonia, may be present: crackles, reduced breath sounds, or an area of bronchial breathing.

2.2.2 Treatment

Treat the child as an outpatient

Give cotrimoxazole (4 mg/kg trimethoprim and 20 mg/kg sulfamethoxazole twice a day) for 5 days or amoxicillin (15 mg/kg 3 times a day) for 5 days.

As the antibiotic is to be given by the mother in the home, for the treatment of pneumonia in a child of 2 to 59 months, ask the mother to give the child the first dose in the clinic so that her technique can be observed and corrected if necessary.

Use table 4 to determine the correct dose for each child and young infant requiring an antibiotic.

Antibiotics in tablet form are far cheaper and more stable than those produced in syrup form. For small children it may be necessary to crush the antibiotic tablet and mix it with a small amount of food, such as porridge, to make it easier for the child to swallow. If the child is only breast-feeding then expressed breast milk should be used to mix the powered tablet.
### Table 4 Antibiotic Treatment for Pneumonia
Child age 2 to 59 months

<table>
<thead>
<tr>
<th>AGE*</th>
<th>WEIGHT</th>
<th>COTRIMOXAZOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DOSE:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trimethoprim 4mg/kg/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sulphamethoxazole 20mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paediatric Tablet (20mg TMP + 100mg SMX)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adult Tablet (80mg TMP + 400mg SMX)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Give every 12 hours for 5 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE*</th>
<th>WEIGHT</th>
<th>Paediatric Tablet</th>
<th>Adult Tablet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 11 months</td>
<td>5 kg</td>
<td>1</td>
<td>¼</td>
</tr>
<tr>
<td></td>
<td>6 kg</td>
<td>2</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>7 kg</td>
<td>2</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>8 kg</td>
<td>2</td>
<td>½</td>
</tr>
<tr>
<td>12 to 59 months</td>
<td>9 kg</td>
<td>2</td>
<td>½</td>
</tr>
<tr>
<td>10 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19 kg</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20 kg</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
2.2.3 Follow-up

The mother should be encouraged to feed the child. Advise her to bring the child back after 2 days, or earlier if necessary if the child becomes sicker or is not able to drink or breastfeed. When the child returns:

1. If the child’s condition has generally improved, that is:
   - breathing has improved (slower)
   - there is less fever
   - the child is eating better

then the 5 days of antibiotic treatment should be completed.

2. If the breathing rate, fever and eating have not improved, the antibiotic should be changed to another antibiotic such as ampicillin and the mother advised to return again in 2 days. If no other oral antibiotic is available for treatment of non-severe pneumonia then admit the child and treat with benzylpenicillin according to the guidelines described for severe pneumonia.

   - If the child’s condition has worsened and there are signs of severe or very severe pneumonia, \textit{then admit the child to hospital} and treat according to the guidelines described above.

\textbf{NOTE: Malaria and Pneumonia}

The key signs of pneumonia and malaria can overlap i.e. a child with fever, cough and fast breathing may match the clinical definitions for both malaria and pneumonia, but have only one disease. Treatment should be given to cover both malaria and pneumonia\textsuperscript{18}.

3. Pneumonia in special circumstances

3.1 Measles

If pneumonia is a complication of measles give \textit{Vitamin A} as follows:

   - Give to all children with measles unless the child has already had adequate vitamin A treatment for this illness as an outpatient or had received a preventive vitamin A supplement within 1 month. Give two doses: the first immediately on diagnosis, the second the next day.

\textsuperscript{18} See WHO. Programme for Control of Acute Respiratory Infections and Malaria Unit Division for the Control of Tropical Diseases. The overlap in the clinical presentation and treatment of malaria and pneumonia in children: report of a meeting Geneva, 8 April 1991. WHO/ARI/92.23.
• The dose will vary with the child’s age: vitamin A 50 000 IU (if aged <6 months), 100 000 IU (6—11 months) or 200 000 IU (12 to 59 months).

• If the child has something wrong with its vision consistent with signs of vitamin A deficiency or is severely malnourished, a third dose must be given 2—4 weeks after the second dose when the child comes for followup.

3.2 Severe Malnutrition

Children with severe malnutrition have a

• HIGH CASE FATALITY RATE FOR PNEUMONIA

And

• REQUIRE DIFFERENT TREATMENT

Treatment

Pneumonia is especially common in the malnourished child. It is difficult to diagnose infections in a malnourished child because the body does not respond to infection in the usual way so there may be no fever, or increased respiration rate. All severely malnourished children should be routinely treated with broad-spectrum antibiotics.

Therefore give routinely on admission:

• broad-spectrum antibiotic(s)

AND

• measles vaccine if the child is >6 months and not immunized, or if the child is >9 months and had been vaccinated before the age of 9 months, but delay vaccination if the child is in shock.

Choice of broad-spectrum antibiotic

— ampicillin (50 mg/kg IM/IV 6-hourly for 2 days), then oral amoxicillin (15 mg/kg 8-hourly for 5 days) OR, if amoxicillin is not available, oral ampicillin (50 mg/kg 6-hourly for 5 days) over a total of 7 days

AND

— gentamicin (7.5 mg/kg IM/IV) once daily for 7 days.

If the child fails to improve within 48 hours, add chloramphenicol (25 mg/kg IM/IV 8-hourly) for 5 days.
If child has severe malnutrition follow the national guidelines on nutritional management or if there are no national guidelines follow WHO guidelines\(^{19}\).

4. **Cough or cold**

These are common, self-limited viral infections that require only supportive care. Antibiotics should not be given. Wheeze or stridor occur in some children, especially infants. Most episodes end within 14 days. Cough lasting 21 days or more may be caused by tuberculosis, asthma, pertussis or symptomatic HIV.

4.1 **Diagnosis**

Common features:

- cough
- nasal discharge
- mouth breathing
- fever

The following are *absent*:

- fast breathing
- lower chest wall indrawing
- stridor when the child is calm
- danger signs

4.2 **Treatment**

The child should be treated as an outpatient.

Give *paracetamol*. Give 10-15mg/kg/dose up to 4 times a day, to control high fever in a distressed child.

Teach mother to clear secretions from the child’s nose before feeds using a cloth soaked in water, which has been twisted to form a pointed wick.

4.2.1 Treatment of wheezing associated with cough or cold

Most first episodes of wheezing in children aged under 2 years are associated with cough and cold. These children are not likely to have a family history of atopy (e.g. hay fever, eczema, and allergic rhinitis) and their wheezing episodes become less frequent as they grow older and disappear by 3 year of age.

If the wheezing is troublesome, it often responds to oral salbutamol treatment which can be given by mother at home.

Oral salbutamol (in syrup or tablets) can be given. The dose is:

- age 2-12 months: 1 mg 6-8 hourly
- age 12 months to 59 months: 2 mg 6-8 hourly.

Salbutamol tablets are 2mg and the solution is 2mg/5ml

Do not give any of the following:

- an antibiotic (they are not effective and do not prevent pneumonia)
- remedies containing atropine, codeine or codeine derivatives, or alcohol (these may be harmful)
- medicated nose drops.

4.3 Follow-up

Advise the mother to:

- feed the child
- watch for fast or difficult breathing and return, if either develops
- return if the child becomes sicker, or is not able to drink or breastfeed.

ARI Case Management Policy

Do not use commercial cough mixtures they have no role in ARI management
VI. MANAGEMENT OF PNEUMONIA IN THE CHILD 0 TO 8 WEEKS OF AGE

In this section, you will learn how to interpret the signs for a young infant less than 2 months. You will make a decision about how to classify the severity of pneumonia, and then identify the appropriate treatment. The process is similar to the one you learned in Section V for the child aged 2 to 59 months.

When classifying the young infant, however, special characteristics must be taken into account. These are:

- they can rapidly become sick and die from serious bacterial infections
- they are much less likely to cough with pneumonia
- they frequently have only vague signs such as:
  - poor feeding
  - fever
  - low body temperature
- they have mild chest indrawing as this is normal in young infants because their chest wall is soft.

The presence of the above means that you will assess, classify and treat the young infant somewhat differently than an older child. A summary of the most important differences between the young infant and the older child follows:

---

Danger signs: Some of the danger signs differ in the young infant, these include:
- stopped breastfeeding well
- fever or low body temperature
- wheezing

Chest in-drawing: To classify chest indrawing as a sign in the young infant it must be severe; if not, it cannot be judged to be chest in-drawing in this age group in contrast with the child aged 2 months up to 5 years who is classified as having chest in-drawing if there is any chest indrawing that is clearly visible.

Fast breathing: The cutoff for fast breathing is different. In the young infant the child has fast breathing when breathing 60 or more times per minute.

Classification: There is no pneumonia ‘non-severe’ for this age group. Therefore once you have the assessment you will put each child into one of three classifications:
- Very Severe Pneumonia/disease
- Severe Pneumonia
- Cough or Cold

Each disease classification has a corresponding treatment plan which you should follow after you have classified the child into one of the above categories.

1. Inpatient care of pneumonia

Severe pneumonia and very severe pneumonia / disease classifications are based on the clinical features and have specific treatment regimes for each of them (Box 2, Chart 2, pages 53 and 54). Antibiotic therapy is needed in all cases. All cases of severe pneumonia and very severe pneumonia / disease require treatment to be given in hospital. This section will focus on these cases that require hospitalisation.
The child 0 to 8 weeks old
Assessment, classification and treatment

As was the case with the child 2 to 59 months, the health care worker who encounters the young infant who is brought with cough or difficult breathing must make the assessment and classification of the condition to determine the course of action which is to be taken. The **first section of Chart 2** indicates what signs are to be sought.

If the young infant has fast breathing and / or chest in-drawing the young infant **has severe pneumonia**. If the young infant has fast breathing and / or chest indrawing and any one of the signs indicated at the **first section of Chart 2** the young infant has **very severe pneumonia** / disease. **In any case the young infant** must be admitted **immediately** to hospital. The category of pneumonia ‘non severe’ is not applicable to young infants.

The initial assessment must concentrate on the signs that have been described and include: fast breathing and / or severe chest in-drawing for severe pneumonia; cyanosis, apnoeic episodes, nasal flaring and grunting for very severe pneumonia; other signs indicating a serious bacterial infection are failure to feed well, lethargy, vomiting everything, convulsions, fever greater than 38°C or low temperature below 35.5°C, pallor or jaundice, reduced level of consciousness, abdominal distension and hepatosplenomegaly. The **second section of Chart 2** indicates the categories. This **Guide will focus on the categories in the shaded areas.**

Any young infant with the signs of severe pneumonia or very severe pneumonia / disease must be admitted **IMMEDIATELY to the hospital for further management**. No child with such a condition should be managed within the community. The **third section of Chart 2** identifies the appropriate treatment for each category.
CHART 2

Diagnosis and treatment of children with cough or difficult breathing.

Young infant 0 to 8 weeks old

<table>
<thead>
<tr>
<th>Diagnostic features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very severe pneumonia/disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit immediately to hospital:</td>
</tr>
</tbody>
</table>
| • give oxygen if:  
  — central cyanosis  
  — unable to breastfeed  
  — restlessness  
  (improved by oxygen)  
  — severe chest indrawing  
  — grunting  
  • give antibiotics: benzylpenicillin and gentamicin |
| • Careful fluid management  
  • Continue breast-feeding  
  • Maintain warm environment  
  • Reassess by medical staff daily, nursing at least every 6 hours  
  (twice daily and every 3 hours if very sick) |
| Treat as out patient  
  Advise mother to give home care: |
| • assess and treat if present: ear problem |

no fast breathing  
or  
chest in-drawing
1.1 Decide if the young infant has VERY SEVERE PNEUMONIA/DISEASE

Serious bacterial infection in young infants includes pneumonia, sepsis and meningitis. They are difficult to tell apart as they all look very similar and treatment very often needs to be started immediately, even before a diagnosis of the specific cause is known. Some newborns with a serious bacterial infection can present with severe jaundice and an umbilical and/or skin infection. The course of the illness may be very rapid and lead to death in a few hours, or it may be more prolonged.

In the management of a young infant with cough or difficult breathing, the first step is to decide if they have a serious bacterial infection by using the information from the assessment.

**Ask this question about EVERY YOUNG INFANT you see with a cough or difficult breathing:**

*Does the young infant have any danger signs?*

A young infant with any danger sign is classified as having Very Severe Pneumonia / Disease

**NB** A young infant with a danger sign may have Very Severe Disease, and be at high risk of dying. It is difficult to distinguish between infections such as pneumonia, sepsis and meningitis in such an infant.

If you identified a danger sign (see Chart 2 page 54), you have already classified the young infant’s illness as Very Severe, and you must admit the child immediately to the hospital.

1.1.1 Diagnosis

1.1.1.1 Specific signs for Very Severe Pneumonia are:

- fast or irregular breathing
  
  \[
  \geq 60 \text{ breaths per minute}
  \]
  
  **AND/OR**

- severe chest indrawing
PLUS

any one of the following danger signs

• cyanosis
• apnoeic episodes
• nasal flaring
• grunting
• wheezing

The symptoms of serious bacterial infection are often non-specific. There may be a history of:

• being abnormally sleepy or difficult to wake
• stopped feeding well
• vomiting
• convulsions

General signs, on examination, are:

• fever (axillary temperature ≥37.5°C or ≥99.5°F) or hypothermia
• (<35.5°C or <95.9°F; <36°C or <96.8°F in newborns)
• pallor or jaundice
• swollen abdomen
• large spleen and/or liver
• reduced level of consciousness

1.1.1.2 Specific signs for Severe Pneumonia are:

• fast or irregular breathing
  ≥60 breaths per minute

AND / OR

• severe chest indrawing with no danger sign

1.1.2 Treatment for severe pneumonia and very severe pneumonia/disease

Antibiotic treatment is described below for the treatment of severe pneumonia, very severe pneumonia and generalized infection (sepsis).

Give IM benzylpenicillin (50 000 units/kg) every 6-12 hours depending on age (see Table 5) plus IM gentamicin (7.5 mg/kg once daily). Once the infant’s condition has substantially improved, and has sustained this improvement, oral amoxicillin (15 mg/kg every 8 hours) plus IM gentamicin (7.5 mg/kg once daily) can be given.

Use table 5 to determine the correct dose for each young infant.
**Table 5. Antibiotic Treatment for Severe Pneumonia and Very Severe Pneumonia/Disease**

Young infant aged less than 2 months:

<table>
<thead>
<tr>
<th>AGE</th>
<th>WEIGHT</th>
<th>GENTAMICIN PLUS BENZYLПENICILLIN* (Intramuscular injections)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Given Day 1 through Day 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Given Day 1 through Day 4*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vial containing 20mg/2ml</td>
</tr>
<tr>
<td>First week of life</td>
<td>3 kg</td>
<td>15.0 mg = 1.5 ml once a day 150,000 units = 0.3ml every 12 hours</td>
</tr>
<tr>
<td>After 1 week: 7.5 mg/kg/day</td>
<td>4 kg</td>
<td>20.0 mg = 2.0 ml once a day 200,000 units = 0.4 ml every 12 hours</td>
</tr>
<tr>
<td>One dose a day</td>
<td>5 kg</td>
<td>25.0 mg = 2.5 ml once a day 250,000 units = 0.5ml every 12 hours</td>
</tr>
<tr>
<td>1 week up to 8 weeks</td>
<td>3 kg</td>
<td>22.5 mg = 2.25 ml once a day 150,000 units = 0.3 ml every 6 hours</td>
</tr>
<tr>
<td>4 kg</td>
<td>30.0 mg = 3.0 ml once a day 200,000 units = 0.4 ml every 6 hours</td>
<td></td>
</tr>
<tr>
<td>5 kg</td>
<td>37.5 mg = 3.75 ml once a day 250,000 units = 0.5ml every 6 hours</td>
<td></td>
</tr>
<tr>
<td>6 kg</td>
<td>45.0 mg = 4.5 ml once a day 300,000 units = 0.6 ml every 6 hours</td>
<td></td>
</tr>
</tbody>
</table>

* Treatment with IM benzylpenicillin should be given for at least 4 days and switching to oral medication depends on substantial, sustained improvement in infant’s condition. In giving gentamicin, it is best to calculate the exact dose based on the child’s weight. Avoid using undiluted 40mg/ml gentamicin.
Once the infant’s condition has substantially improved, and this improvement continues without worsening, **switch from benzylpenicillin to oral amoxicillin - BUT continue with daily IM gentamicin.** The total course of treatment is at least 8 days.

Use table 6 below to determine the correct dose of amoxicillin for each young infant.

**Table 6. Oral Antibiotic Treatment for Severe Pneumonia and Very Severe Pneumonia/Disease**

<table>
<thead>
<tr>
<th>Young infant age 0 to 8 weeks:</th>
<th>AMOXICILLIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE</strong></td>
<td><strong>WEIGHT</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>First week of life</td>
<td>3 kg</td>
</tr>
<tr>
<td>Up to 8 weeks</td>
<td>4 kg</td>
</tr>
<tr>
<td></td>
<td>5 kg</td>
</tr>
<tr>
<td></td>
<td>6 kg</td>
</tr>
</tbody>
</table>

* Use syringe to measure accurate dose.

**Failure to improve**

- If there is no response to treatment in the first 48 hours, or if the child’s condition gets worse, add IM Chloramphenicol (25 mg/kg every 8 —12 hours according to age). However, chloramphenicol should **not** be used in premature infants (born before 37 weeks of gestation) and should be avoided in infants in the first week of life.

- If the response to treatment is poor after 48 hours the patient should be referred to a specialist or experienced clinician, change to IM or IV cefotaxime (50 mg/kg every 6 hours) plus IM ampicillin (50 mg/kg every 6 hours).
1.1.3 Oxygen therapy
Give oxygen treatment to young infants with any of the following:

- central cyanosis
- grunting with every breath
- difficulty in feeding due to respiratory distress — severe lower chest wall indrawing, — head nodding (i.e. a nodding movement of the head, synchronous with the respiration and indicating severe respiratory distress).

Nasal prongs are the preferred method for delivery of oxygen to this age group, with a flow rate of 0.5 litre per minute. Thick secretions from the throat may be cleared by intermittent suction, if they are troublesome and the young infant is too weak to clear them. Oxygen should be stopped when the infant’s general condition improves and the above signs are no longer present.

1.2 Complicating conditions

1.2.1 Hypoglycaemia

- Check for hypoglycaemia using a blood dextrostix test. If the blood glucose is <2.5 mmo/litre (<45 mg/dl), treat with 10 ml/kg of 10% glucose, given by nasogastric tube, and prevent recurrences by frequent feeding.

1.2.1.1 Breast-feeding
Continue feeding the young infant to provide calories and fluid and to prevent a drop in the blood glucose level reoccurring. Breastfeeding should be resumed as soon as possible. If the infant is too weak to breastfeed, give breast milk by nasogastric tube, spoon or cup.

If feeding is not possible, monitor the blood glucose 6 hourly and, if necessary, set up an IV line to administer glucose. See 1.3.3 for more details.

1.2.2 Hypothermia
Hypothermia can be a sign of a cold environment or of serious systemic infection. Therefore assess every hypothermic newborn for infection.
1.2.2.1 Diagnosis

Use a low-reading thermometer. If the rectal (core body) temperature is $<32^\circ C$ ($<89.6^\circ F$), the hypothermia is severe; between $32^\circ C$ (89.6°F) and $35.9^\circ C$ (96.6°F) the hypothermia is moderate.

1.2.2.2 Treatment

It is vital to re-warm a young infant with hypothermia as soon as possible. In cases of severe hypothermia (rectal temperature $<32^\circ C$ or $<89.6^\circ F$), rapid re-warming can be achieved by using a thermostatically-controlled, heated mattress set at 37-38°C (98.6-100.4°F) or an air-heated incubator set at 35-36°C (95-98.6°F). Make sure that the incubator or the mattress is reliable, well maintained, and that staff have experience in using them. The room temperature must be at least $25^\circ C$ (77°F).

This equipment is also good for re-warming infants with moderate hypothermia. If it is not available, use a warm room (at least 34°C, 93.2°F), a warm cot or skin-to-skin contact with the mother. The following points should be observed.

- Before re-warming, the child’s cold clothing should be removed and replaced with pre-warmed clothes and a bonnet.
- A cot should be warmed to 36-37°C (96.8°F-98.6°F). If it is heated with a hot water bottle, this must be removed before the baby is put in the cot.
- For skin-to-skin re-warming, place the infant between the mother’s breasts (“kangaroo mother care”). The child should be dressed in a shirt open at the front, a nappy, bonnet and socks, and covered with a blanket. The infant should be kept with the mother until the temperature becomes normal.
- Even if a warm room (at least 34-35°C, 93-95°F) is used for re-warming, the infant should still be dressed and well covered, and wear a bonnet.
- During an examination or investigation, particular attention should be paid to avoid chilling the infant.
1.3 General supportive care

1.3.1 Thermal environment

- Keep the young infant dry and well wrapped. A bonnet or cap is helpful to reduce heat loss. Keep the room warm (at least 25°C). As the condition of the young infant improves, keep the child close to the mother’s body. Keeping the young infant in close skin-to-skin contact with the mother (“kangaroo mother care”) for 24 hours a day is as effective as using an incubator or external heating device to avoid chilling.

Pay special attention to avoid chilling the infant during examination or investigation.

- Regularly check that the infant’s temperature is maintained in the range 36.5-37.5°C (97.7-99.5°F) rectal, or 36.0-37.0°C (96.8-98.6°F) axillary.

1.3.2 High fever

- Antipyretic agents such as paracetamol should NOT be used for controlling fever in young infants. Control the environment and if necessary, undress the child.

1.3.3 Fluid and nutritional management

- The mother should be encouraged to breastfeed frequently, unless the child has great difficulty breathing or is too sick to suck from the breast. In these cases, help the mother to provide her breast milk regularly and give it to the infant (20 ml/kg body weight) by nasogastric tube 6-8 times a day (or 8-12 times in newborns aged 1-2 weeks).

- If it is essential to give IV fluids (e.g. as a vehicle for IV antibiotics), take care to avoid the risk of heart failure from fluid overload. Do not exceed daily fluid requirements. Monitor the IV infusion very carefully and use an infusion chamber of 100-150 ml, where possible.

1.4 Monitoring

The young infant should be assessed by a nurse every 3 hours and by a doctor twice daily. A record should be kept of the respiratory rate, temperature,
level of consciousness and ability to drink or breastfeed. Within two days, if there is no complication, there should be signs of improvement recorded:

- Reduction in respiratory rate,
- Resolution of lower chest indrawing
- Reduction of fever
- Improved appetite and fluid intake

A nurse should check the young infant’s temperature and, where appropriate, the temperature of the external heating device at least every hour. Once the baby’s temperature reaches 34°C (93.2°F), the re-warming process should be slowed to avoid overheating.

1.5 Discharge and follow-up

See Section V.

2. Cough or Cold

A young infant who is breathing less than 60 times per minute, and has no severe chest indrawing or danger signs, is classified as having No Pneumonia: Cough or Cold.

A careful examination should be completed to exclude otitis media. If there is no otitis media the child is classified as having cough or cold. The mother should be instructed in providing care for the child in the home. In addition, she should be carefully instructed to watch for the development of signs of fast or difficult breathing, and if they appear, to return with the child immediately.

Under these circumstances no antibiotics should be given

The mother should be instructed to clear the nose if it interferes with feeding.

REMEMBER

Young infants have special characteristics that must be considered when classifying their illness. They can become sick and die very quickly, are much less likely to cough with pneumonia, and frequently have only vague signs such as poor feeding, fever, or low body temperature. Further, mild chest indrawing is normal in young infants because their chest wall is soft.
Wheeze, a symptom and sign that is associated with asthma, is a high-pitched whistling sound near the end of each breath as the child breathes out. It is caused by narrowing and inflammation of the airways. To hear a wheeze place the ear next to the child’s mouth and listen to the breathing while the child is calm or use a stethoscope to listen for wheeze.

In the first 2 years of life, wheezing is most frequently caused by acute viral respiratory infections such as bronchiolitis or colds. After 2 years of age, most wheezing is due to asthma. Asthma is a chronic inflammatory condition in which airways obstruction comes and goes. It is characterised by episodes of wheezing, often with cough, which respond to treatment with bronchodilators and anti-inflammatory drugs and are present on some occasions and absent on others. Antibiotics have no effect on asthma. They should be given only when a child has pneumonia.

1. Diagnosis

Asthma is detected by history and examination. Asthma should be diagnosed in any child who has wheeze or cough that is either present all of the time (getting better or worse) or that comes and goes and that improves with a bronchodilator (e.g. salbutamol). Asthma is more likely if one or both parents have a history of the disease. In older children asthma can be diagnosed by showing a 15% increase in the peak expiratory flow rate (PEFR) 15-20 minutes after giving a bronchodilator.

1.1 Measurement of peak expiratory flow rate (PEFR)

The peak flow meter is a practical and cheap tool to use to detect the presence of airflow limitation. This is done by comparing the patient’s peak flow rate with published ‘normal’ values or the child’s previous best PEFR. However, PEFR measurements are difficult to perform on children less than 5 years and are less practical in this age group. For more information about PEFR and normal values see Technical guides Management of Asthma in Adults. A Guide for Low Income Countries available from The Union or the website http://www.iuatld.org
1.2 Examination

- resonant percussion note
- hyperinflation of the chest
- lower chest wall indrawing
- prolonged expiration with audible wheeze
- reduced air intake when obstruction is severe
- absence of fever or low grade fever
- good response to treatment with a bronchodilator.

To confirm the diagnosis give a dose of a rapid acting bronchodilator (see below). A child with asthma will usually improve rapidly with a decrease in the respiratory rate and chest indrawing and less difficult breathing. Often the wheeze will disappear. A child with severe asthma may require several doses before a response is seen. Inhaled bronchodilators are best given by inhalation as they act more rapidly.

<table>
<thead>
<tr>
<th>RAPID ACTING BRONCHODILATOR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhaled Salbutamol from MDI</td>
<td>2 puffs (100 mcg/puff)</td>
</tr>
<tr>
<td>Nebulized Salbutamol (5mg/ml)</td>
<td>0.5 ml Salbutamol plus 2.0 ml</td>
</tr>
<tr>
<td></td>
<td>sterile water</td>
</tr>
<tr>
<td>Subcutaneous Epinephrine (adrenaline)</td>
<td>0.01 ml per kg body weight</td>
</tr>
<tr>
<td>(1:10 000 = 0.1%)</td>
<td></td>
</tr>
</tbody>
</table>

2. Management of an acute asthma attack

A child with the first episode of wheezing and no respiratory distress can usually be managed at home with supportive care only. A dose of bronchodilator can be given in the outpatient department to relieve symptoms.
If the child is in respiratory distress or has recurrent wheezing, give salbutamol by metered-dose inhaler with a spacer or by nebulizer. A very practical, effective and universally accessible spacer can be made from a plastic bottle (see 2.2.1 below). If salbutamol is not available, give subcutaneous epinephrine (adrenaline). Reassess the child after 30 minutes to determine subsequent treatment.

If respiratory distress has resolved, and the child does not have fast breathing, the child should be observed for a further 3 hours and if the improvement remains advise the mother on home care as described in section 3 below.

If respiratory distress continues or gets worse, admit the child to hospital and treat with oxygen, rapid-acting bronchodilators, oral prednisone and other drugs, as described below.

If the child has central cyanosis or is unable to drink, admit to hospital and treat with oxygen, rapid-acting bronchodilators, oral prednisone and other drugs, as described below.

2.1 Oxygen

Give oxygen to all children with asthma whose difficulty in breathing interferes with talking, eating or breastfeeding.

2.2 Rapid-acting bronchodilators

2.2.1 Salbutamol by metered-dose inhaler

Give the child a rapid-acting bronchodilator. While several options are available, the recommended treatment is salbutamol by metered-dose inhaler (MDI) with a spacer device, as described below.

Give the salbutamol using MDI with spacer starting with 2 puffs. Give each puff separately waiting 5-10 breaths between each puff. A positive response to these should be seen in 30 minutes, i.e. less respiratory distress, and better air entry on auscultation. If this does not occur, give another dose of the salbutamol. In severe cases a 6-10 puff course can be repeated at 30-minute intervals. Once the child responds, reduce the dose to 2 puffs at one-hour intervals.
intervals. Spacer devices with a volume of 350 - 500 ml are recommended to be used.

1. Shake MDI canister.
2. Introduce into spacer.
3. Place spacer over child’s mouth and nose as shown below.
4. Introduce 1 puff and allow child to take 5 breaths
5. Introduce another puff into the spacer chamber.

This can be repeated every 30 minutes reducing gradually to 6-8 hourly after the child’s condition improves. Some infants and young children cooperate better when a face mask is attached to the spacer instead of the mouthpiece.

A spacer device can be made from a 500 ml plastic bottle, as shown below. This has been shown to be as effective as expensive commercial devices. The spacer is made by cutting a hole in the base of a 500ml plastic soft drink bottle by means of a hot wire that is the size of the nozzle of the MDI holder. The MDI is then placed through the hole and the base sealed with some glue. This improves the functioning of the spacer. Spacers should be cleaned on a weekly basis and this is done by washing them with liquid soap and letting them drip dry over night as this increases their efficiency. A spacer made from a bottle can be fitted with commercial face mask when used for small children.
2.2.2 Oral bronchodilators

Once the child has improved sufficiently to be discharged home, oral salbutamol (in syrup or tablets) can be given. The dose is:

- age 2-12 months: 1 mg 6-8 hourly
- age 12 months to 59 months: 2 mg 6-8 hourly.

Salbutamol tablets are 2mg and the solution is 2mg/5ml

2.3 Steroids

If a child has a severe acute attack of wheezing and a history of recurrent wheezing, give oral prednisone 1-2 mg/kg, once a day for 3 days. If the child remains very sick, refer to the next level of care. Steroids are not usually required for the first episode of wheezing.

Prednisone tablets are 5mg per tablet.

2.4 Aminophylline

If a child does not improve after 3, 6-10 puff courses of salbutamol plus oral prednisolone, give IV aminophylline - initial dose of 5 - 6 mg/kg (up to a maximum of 300 mg), followed by a maintenance dose of 5 mg/kg every 6 hours. *Weigh the child carefully and give the IV dose over at least 20 minutes and preferably over 1 hour.*

**Note:** Intravenous aminophylline can be dangerous in an overdose or when given too rapidly and should only be given in hospital. *Omit the initial dose if the child has already received any form of aminophylline in the previous 24 hours.* Stop giving it immediately if the child starts to vomit, has a pulse rate >180/min, develops a headache, or has a convulsion.

2.5 Antibiotics

Antibiotics have no effect at all on asthma. They should be given, however, to any child who has pneumonia (as explained in sections V and V1). Pneumonia may occur in a child who also has asthma.
2.6 **Supportive care**

Be sure that the child gets the fluids needed for his/her age. Encourage breastfeeding and oral fluids. Encourage the young child in particular, to feed normally as soon as food can be taken.

2.7 **Monitoring**

Each hospitalized child should be assessed by a nurse every 3 hours when first admitted, or more frequently if child is very sick. Once the child improves (i.e. decreased breathing rate, less lower chest wall indrawing, and less difficulty in breathing) assess every 6 hours, and by a doctor at least once a day. Record the respiratory rate and watch especially for signs of respiratory failure i.e., increasing respiratory rate, hypoxia and difficulty in breathing leading to exhaustion. If the child does not improve as expected, give salbutamol more frequently, up to once every 30 minutes. If this is ineffective, give aminophylline. Monitor oxygen therapy as described in Appendix1.

2.8 **Complications**

If the child fails to respond to the above therapy, or the child’s condition worsens suddenly, obtain a chest X-ray to look for evidence of pneumothorax.

3. **Management of chronic asthma**

Children suffering from asthma usually suffer from long-standing (chronic) symptoms of continuous airway obstruction caused by their asthma. Common symptoms are:

- Attacks of wheezing
- Wheezing after exercise
- Continuing cough with wheezing
- Waking at night (early morning) with shortness of breath and wheezing
- Repeated attacks of bronchitis or airway inflammation

These symptoms are accompanied, in some children, by symptoms affecting the nose, ears and eyes.
Asthma requires repeated treatment often lasting many years or even for life. This raises the issue of cost, compliance and organisation of management of supplies, as in the case of other chronic illnesses.

3.1 Objectives of treatment

Asthma is said to be “under control” when the following objectives are achieved:

**Clinical:** Reduction or complete disappearance of symptoms, especially at night. No further need for emergency hospital visits, can play sports and does not miss school. Lives a normal life.

**Functional:** Normal or nearly normal PEF level — difficult to obtain in children less than 5 years of age.

**Treatment:** The need for bronchodilator medication less than twice daily (usually only occasionally). This does not include the need of bronchodilator use for preventing asthma attacks brought on by exercise.

3.2 Management of a child with asthma will include:

- Making the diagnosis
- Influencing the environment
- Stopping parents or caregivers from smoking around the child
- Assessing the severity of the asthma
- Selecting the correct therapy
- Selecting the correct delivery device
- Following-up the child
- Giving the best treatment
- Educating the care givers

3.3 Making the diagnosis of asthma

Asthma should be suspected when a child has repeated attacks of wheezing or of cough and wheezing, and confirmed if the wheezing decreases after a
short acting bronchodilator. Children with asthma frequently also have 
wheezing that is brought on by exercise (exercise induced asthma) which 
can be prevented by using a short acting bronchodilator prior to the exercise 
(see point 3.6.1)

3.4 Influencing the environment

Asthma is often brought on by certain substances (allergens) in the child’s 
environment that starts an attack (trigger factors). By taking a careful history 
the allergen causing the asthma can be discovered and then removed from 
the environment. Food allergens are very seldom the cause of asthma.

By paying attention to trigger factors for asthma, treatment requirements 
can often be reduced.

1. Tobacco smoke causes children to develop asthma and to make their 
   condition worse. Children exposed to the tobacco smoking of those 
   around them have more severe asthma, require more drugs to control 
   their asthma and have more acute attacks of asthma requiring more 
   days of hospitalisation. Parents must be convinced that smoking is bad 
   for their children’s health and that they should stop smoking especially 
   around the child.

2. Most children who develop asthma are allergic to airborne allergens. 
   House-dust mite, cat dander, cockroach allergen molds and pollens are 
   the most common allergens. If the child has a history of being allergic 
   to one of these, every effort should be taken to reduce exposure.

3. Food allergens rarely cause asthma. Food and drinks containing sulphur 
   dioxide should be avoided as these irritants often precipitate asthma 
   attacks. Allergy to cow’s milk formula rarely causes asthma.

4. Exposure to pollution in the home is often a problem in low-income 
   countries caused by the smoke from burning wood, coal or gas. This 
   can be reduced by adequate ventilation.
3.5 Evaluating the severity of the asthma

The severity of asthma is assessed by finding out if children are having symptoms that come and go (intermittent) or that are present all of the time (persistent).

### 3.5.1 Intermittent asthma

Most children (80%) with asthma have intermittent asthma having episodes of wheezing every few months that responds rapidly to bronchodilators.

### 3.5.2 Persistent asthma

<table>
<thead>
<tr>
<th>Category</th>
<th>% of all cases</th>
<th>Frequency of symptoms</th>
<th>Level of PEFR (% predicted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>10</td>
<td><strong>Every week.</strong> Regularly uses a bronchodilator.</td>
<td>&gt;80</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
<td><strong>Every day.</strong> Daily use of a bronchodilator.</td>
<td>60—80</td>
</tr>
<tr>
<td>Severe **</td>
<td>2</td>
<td><strong>Continuous wheezing.</strong> Will be awakened regularly by a tight chest or coughing.</td>
<td>&lt; 60</td>
</tr>
</tbody>
</table>

**Children who have been admitted to hospital or have had life threatening asthma belong in this group.**

Assessing the severity of asthma is very important as it is the only way to decide what treatment is appropriate.

*When making the diagnosis the child should always be put in the most severe group that the child’s symptoms suggest.*
3.6 Deciding which medication to use

If asthma is to be treated correctly, a permanent supply of medications is essential. There are only two types of medications that are essential for the treatment of asthma: a bronchodilator to relieve airflow limitation (reliever) and an anti-inflammatory medication to control the disease (controller).

<table>
<thead>
<tr>
<th>Type of medication</th>
<th>Generic name</th>
<th>Mode of administration/Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-inflammatory Corticosteroid</td>
<td>Beclomethasone</td>
<td>Aerosol: 50 - 250 mcg/puff</td>
</tr>
<tr>
<td></td>
<td>Prednisone</td>
<td>Oral: 1-2 mg/kg/day</td>
</tr>
<tr>
<td>Bronchodilator</td>
<td>Salbutamol</td>
<td>Aerosol: 100 mcg/puff</td>
</tr>
</tbody>
</table>

mcg = microgram

3.6.1 Determining treatment by severity of disease

If the child with asthma is assessed correctly the treatment follows logically. Children with intermittent asthma require only a short acting bronchodilator (salbutamol) when symptoms occur and do not require treatment to prevent an attack (preventive treatment). The most effective short acting bronchodilator is inhaled salbutamol delivered by a meter dose inhaler with the use of a spacer. Such a spacer can be made by anyone from a plastic bottle, as described in section 2.2.1 of this chapter.

Children with persistent asthma require daily preventive treatment. Children with persistent asthma need to be evaluated by the doctor in the first referral level hospital. The most effective treatment is inhaled corticosteroids (beclomethasone dipropionate). Beclomethasone inhalers give either 50 micrograms per puff or 250 micrograms per puff. Most asthmatic children will be controlled by a dose between 200 — 500 micrograms per day. The
type and dose of medication is determined by the severity of asthma as follows:

<table>
<thead>
<tr>
<th>Intermittent asthma</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe **</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermittent use of a bronchodilator</strong></td>
<td>Regular low dose inhaled corticosteroid (e.g. beclometasone) (dose 100-250 mcg/day) and intermittent inhaled bronchodilators to relieve symptoms*</td>
<td>Regular normal dose inhaled corticosteroid (e.g. beclometasone) (dose 250-500 mcg/day) and intermittent inhaled bronchodilators to relieve symptoms*</td>
<td>Regular high dose inhaled corticosteroid (e.g. beclometasone) (dose 500-1000 mcg/day) and intermittent inhaled bronchodilators to relieve symptoms*</td>
</tr>
</tbody>
</table>

*Inhaled bronchodilators should only be used when the patient has symptoms of airway limitation.

**These children often benefit from a 5-7 day course of oral steroids at the start of their treatment (prednisone 1-2 mg / kg /day) (maximum dose/day=40mg). They should be referred to next level of care for consultation.

Children with asthma often cough and wheeze during or after exercise (exercise induced asthma) which can be prevented by taking Salbutamol prior to exercise.

Children suffering from severe persistent asthma will require a course of oral prednisone (1mg/kg) to initially get the continuous symptoms under control. Children with persistent asthma also require short acting bronchodilators to relieve symptoms (wheezing). The short acting bronchodilators are only used as required and not on a regular basis.
3.6.1.1 Inhaled corticosteroids and safety

Although there is concern over the use of inhaled corticosteroids in children, specifically suppressing their growth, it is widely accepted that long-term treatment with doses equal to or lower than 400 mcg/day can be safely used.\textsuperscript{21} When doses higher than 400 mcg/day are used the dose should be decreased as soon as the asthma has been under control for 3 months or more. To decrease the local side effects of inhaled corticosteroids (oral thrush and hoarseness) a spacer should always be used.

3.7 Selecting the correct delivery device

Children under the age of 5 years cannot co-ordinate their breathing with the metered dose inhaler. For this reason inhaled medication should be delivered using a spacer. (see above) Using a spacer also improves the efficiency of the drugs delivered to the lung. Dry powder inhalers are inappropriate in children under 5 years of age.

3.8 Monitoring the care of the child

A fixed routine of visits must be set up for the child. The objective of these visits is to monitor improvement assessing the frequency of symptoms and by measuring the patient’s PEFR where possible. If the patient has reached the treatment objectives for 3 months or more the dose of the inhaled steroids should be reduced (Stepping down). This is important as the lowest possible dose of inhaled corticosteroids must be used. Caregivers should have a written action plan of what to do when their child’s asthma worsens. These visits also give the psychological support necessary to all families caring for someone with a chronic illness.

3.9 Optimizing the treatment

If a child’s asthma has been adequately controlled for 3-6 months the dose of the inhaled corticosteroids must be decreased. On the other hand if the

\textsuperscript{21} Pedersen S O’Byrne P. A comparison of the efficacy and safety of inhaled corticosteroids in asthma. Allergy. 1997 ; 52 (Suppl 39) : 1-34.
asthma is poorly controlled then the dose may need to be increased if the child is adhering to the treatment and receiving the drugs in the correct way (including correct use of a spacer). To assess this, it is important to observe the child taking the medication.

3.10 Educating the care givers

It is essential for the caregiver to understand that asthma is a chronic disease. It is not possible to know at the onset what will be required for treatment in the long term. The caregiver will be able to become involved in care of their child’s disease, and to learn to modify those factors that may influence its course, only if carefully informed about asthma and its treatment. To achieve this health education must be regular, repetitive and adapted to the local traditions, beliefs and conditions of the caregiver. What is taught should be simply explained, in clear terms, describing the illness, the treatment (including correct inhalation techniques) and the importance of a healthy lifestyle. This should include a written care plan.

The final goal of health education is to have the caregiver understand the disease and its treatment well enough to be able to take responsibility for changes to the treatment when necessary. This responsibility however should not be given until the health worker is certain that the caregiver is capable of the following: 1) understanding the importance of regular treatment; 2) the role of each medication in treatment; 3) the techniques of giving the medications and 4) the signs of worsening of the asthma.

4. What other conditions have similar symptoms (differential diagnosis)?

4.1 Bronchiolitis

Bronchiolitis is a viral infection of the lower respiratory tract, usually occurring in children between 3 to 12 months of age and occurs in annual
epidemics, at certain times of the year. Respiratory syncytial virus is the most important cause. Secondary bacterial infection may occur and is common in some settings.

4.1.1 Diagnosis

Typical features of bronchiolitis, on examination, include:

- infant less than 12 months of age
- wheezing which is not relieved by bronchodilators
- hyperinflation of the chest, with increased resonance to percussion
- lower chest wall indrawing
- fine crackles or rhonchi on auscultation of the chest
- difficulty in feeding, breastfeeding or drinking owing to respiratory distress.

4.1.2. Treatment

Most children can be treated at home, but any child with signs and symptoms of severe pneumonia (see section V for child 2 to 59 months and section VI for infant 0 to 8 weeks) must be treated in hospital.

4.1.2.1 Antibiotic treatment

- *If treated at home*, give cotrimoxazole (4 mg/kg trimethoprim/20 mg/kg sulfamethoxazole twice a day) or amoxicillin (15 mg/kg 3 times a day) orally for 5 days.
- For hospitalized child with severe or very severe pneumonia see section V for child 2 to 59 months and section VI for infant 0 to 8 weeks for treatment.
4.1.2.2 Oxygen

Give oxygen to all children with wheezing and severe respiratory distress as for severe or very severe pneumonia. (See Appendix 1 for details.)

4.1.2.3 Supportive care

• If the child has fever give paracetamol.

• Ensure that the hospitalized child receives daily maintenance fluids appropriate for the child’s age and weight, but avoid over-hydration.

• Encourage breastfeeding and oral fluids.

• Encourage the child to eat as soon as food can be taken.

4.1.2.4 Monitoring

A hospitalized child should be assessed by a nurse every 6 hours (or every 3 hours, if there are signs of very severe illness) and by a doctor at least once a day. Monitor oxygen therapy. Watch especially for signs of respiratory failure, i.e. increasing hypoxia and respiratory distress leading to exhaustion.

4.1.2.5 Complications

If the child fails to respond to oxygen therapy, or the child’s condition worsens obtain a chest X-ray to look for evidence of pneumonia or a pneumothorax. Tension pneumothorax associated with severe respiratory distress and shift of the heart requires immediate relief by placing a needle in the affected area to allow the air that is under pressure to escape. (Following this, continuous air exit should be assured by inserting a chest tube with an underwater seal until the air leak closes spontaneously and the lung expands). If the expertise or equipment is not available to carry out this procedure at the District Hospital level then the child should be transferred immediately to the next level referral hospital.
4.2 Other causes of wheeze

In children under the age of 1 year there may be many other causes of wheezing besides the above, such as pneumonia, aspiration pneumonia, inhalation of a foreign body, eosinophilic pneumonia, cardiac failure, cystic fibrosis, tuberculosis glandular involvement and congenital lung disease, but these are very uncommon. After the age of 2 years asthma becomes the most common cause of wheezing and only in those children not responding to asthma therapy should an alternate diagnosis be sought.
Children become infected with *M. tuberculosis* after contact with an infectious case of tuberculosis, usually an adult with smear-positive pulmonary disease, and may subsequently develop tuberculosis. An effective National Tuberculosis Programme (prioritizing the detection, treatment and cure of cases of smear-positive pulmonary tuberculosis in the community) will result in fewer children exposed to infectious cases. Therefore, a well functioning National Tuberculosis Programme is the most important step to prevent children being infected and developing disease. The risk of infection after exposure to infectious cases of tuberculosis, is especially high if the contact is close and, if the child is young, not only is infection more likely to occur but the child is also more likely to develop disease. Young children are also more likely to develop severe disease (tuberculous meningitis and disseminated tuberculosis). It is important to understand the difference between infection and disease. Most children who are infected do not develop disease.

The main aims of management of tuberculosis in children are:

1. to identify and treat children with tuberculosis disease to prevent disability and death due to tuberculosis

2. to identify young children with tuberculous infection to prevent the development of disease

3. to prevent re-activation of tuberculosis in later life.

This section of the guide should be read in conjunction with ‘Management of Tuberculosis. A Guide for Low Income Countries’ available in hard copy from The Union or in PDF on the website www.tbrieder.org.

This text assumes that there is a well functioning National Tuberculosis Programme in place and will only clarify the points that are specific to the management of childhood tuberculosis.
1. What are the stages of tuberculosis?

There are 2 stages of tuberculosis that are important to understand:

— A high percentage of children in contact with an infectious case of tuberculosis will become infected (tuberculous infection).

— A smaller percentage of children with tuberculous infection will progress to disease (tuberculosis). In most children with normal immunity, tuberculosis will be mild and the child will recover even with no, or minimal, treatment. However, children with an immature or impaired immunity have a higher risk of progressing to tuberculosis and of developing serious disease (meningitis and disseminated tuberculosis). Children with a high risk are younger children (under 5 years of age), HIV-infected children and malnourished children.

1.1 How are children infected?

The source cases with the greatest likelihood to infect others are patients with sputum smear positive tuberculosis. In children most transmission takes place from a close contact of the child (e.g. care giver, someone in the same household). When the infectious case coughs the micro-organisms are expelled in droplets into the air and inhaled by the child. The proportion of children who become infected will depend on the duration of exposure (time), the closeness of the contact, the number of organisms in the sputum of the source case and the age of the child.

Of children in contact with an infectious case about 50% with close contact and 10% with casual contact, will become infected.

1.2 How do we know that a child is infected?

An infected child develops a positive tuberculin skin test. After exposure a positive tuberculin skin test can take between 6 weeks and 3 months to develop. Children with tuberculous infection usually have few or no symptoms.
1.3 Can a child be infected by adult cases that are sputum smear negative?

Extra-pulmonary tuberculosis cases are almost never infectious. Patients with smear negative pulmonary tuberculosis are much less infectious than smear positive patients and pose much less of a risk to children and therefore Tuberculosis Programmes concentrate on children in contact with smear positive tuberculosis.

1.4 Can a child infect other children or adults?

The greatest majority of children with tuberculosis has only a small population of micro-organisms (pauci-bacillary tuberculosis) and pose a very low risk to other children or adults, because there are so few micro-organisms that the likelihood of infecting others is low.

A very small proportion of children, mainly school-aged children and adolescents, has smear positive tuberculosis. These children are as infectious as smear positive adults and other children in contact with them must be investigated as if they were in contact with an adult case with smear positive tuberculosis.

1.5 Can children be infected with drug resistant tuberculosis?

Drug resistant tuberculosis is as infectious as drug sensitive tuberculosis. Children exposed to drug resistant tuberculosis are at least at the same risk of being infected and developing disease as children exposed to drug sensitive tuberculosis.

1.6 What action should be taken after a child is exposed to a highly infectious case?

A child exposed to highly infectious tuberculosis (smear positive source case) must be screened for the symptoms of tuberculosis and any sick child who has been exposed should be suspected of having tuberculosis. All children suspected must be investigated and those with tuberculosis must be treated. After exclusion of tuberculosis, all other children under 5 years of age should be given preventive therapy due to their increased risk of developing tuberculosis.
1.7 What happens to children with tuberculous infection?

Most children have immunity that is strong enough to prevent the infection from developing further but a few will develop tuberculosis (see section 2 below).

2. What is tuberculosis?

Tuberculosis occurs when the infection in the child progresses to disease.

The risk of developing tuberculosis is highest in the first year following infection. Children younger than 5 years of age, and especially those younger than 2, have an increased risk of developing tuberculosis as well as an increased risk of serious disease. Other risk groups include HIV infected and severely malnourished children.

Children less than 12 months of age, with immature immune systems, are at highest risk, with pulmonary disease developing in 30-40% and tuberculous meningitis or disseminated disease in a further 10-20%. In children 12 to 23 months the risk decreases considerably, but is still significant, with 10-20% of infected children developing pulmonary disease and a further 2-5% tuberculous meningitis or disseminated disease. This risk decreases in the 2-5 year age group.\(^{22}\)

Children between the ages of 5 and 12 years are much less likely to develop tuberculosis. After this age, disease develops and progresses as in adults.

2.1 What type of disease do children develop?

Most develop pulmonary tuberculosis usually accompanied by mediastinal lymph gland enlargement.

The most frequent forms of extra-pulmonary tuberculosis are

- lymph gland involvement,
- pleural effusion
- tuberculous meningitis
- disseminated tuberculosis.

2.2 **When should tuberculosis be suspected in a child?**

Tuberculosis should be suspected in the following circumstances:

- A child in contact with a smear positive case of tuberculosis.
- A child who develops symptoms suggestive of tuberculosis.
- A child who develops signs suggestive of tuberculosis.

2.3 **What is the definition of a contact?**

A child living in the same household or in regular contact with a person (e.g. caregiver, grandparents) with highly infectious tuberculosis (smear positive) should be recorded and investigated as a contact. Young children (less than 2 years) are most frequently infected in the household but older children, being more mobile, can be infected from exposure to some highly infectious tuberculosis cases outside the home.

3. **What are the most frequent symptoms in children with tuberculosis?**

- Chronic cough that has been present for 3 weeks or more and is not improving especially if the child received a course of antibiotics.
- Fever, a temperature of greater than 38.5°C for more than 14 days without a cause being found.
- Weight loss or failure to gain weight especially after being on a Nutritional Rehabilitation Programme. This is reinforced if documented on the child’s Road to Health Chart.

> There are many other symptoms like lethargy, loss of appetite and night sweats that are less specific and may also be caused by other diseases.

3.1 **What physical signs warrant investigation for tuberculosis?**

Some signs are highly likely to have been caused by tuberculosis:

- the acute onset of sharp angulation (gibbus) of the spine.
Other clinical pictures likely to be caused by tuberculosis and warrant investigation include:

- Enlarged non-tender lymph glands especially in the neck
- Pneumonia that is not responding to antibiotic treatment
- Pleural effusion
- Abdominal distension with ascites,
- Meningitis that has developed over several days.

Some signs are very uncommon but when present make tuberculosis extremely likely.
An example of this is acute onset of angulation of the spine.

4. Which investigations should be carried out in children suspected of having tuberculosis?

The certainty that the child has tuberculosis is increased by the following:

- a positive tuberculin skin test
- a chest radiograph with signs suggesting tuberculosis.

4.1 Why is a tuberculin skin test more useful in children than in adults?

In young children, under 5 years of age, by definition a positive tuberculin skin test indicates ‘recent’ infection. If a child develops symptoms of tuberculosis the likelihood of tuberculosis is much greater as the likelihood of developing tuberculosis is much higher after recent infection. This is especially true of young children. In older children and adults the presence of a positive tuberculin skin test does not necessarily indicate recent infection and a negative test does not rule out tuberculosis. A Mantoux tuberculin skin test is regarded as positive if the size of induration is 10 mm or greater. Whether or not the child has received a BCG vaccination should not be taken into account in a child with close contact to a smear positive case.
4.2 Can a child have a negative tuberculin skin test and have tuberculosis?
Children who are immune suppressed can have a negative tuberculin skin test and active tuberculosis. Common causes of this situation are:
• HIV disease
• severe malnutrition
• following measles or other severe viral infections
• severe tuberculosis
• children on steroids or immunosuppressive treatment

4.3 What to do if the tuberculin skin test is not available?
When tuberculin is not available to carry out the test, all children under 5 years of age exposed to an infectious smear positive adult case should be regarded as being infected and given preventive treatment. If they have symptoms or signs of disease, they should be given treatment as a case of tuberculosis.

4.4 Is radiology useful?
• Most children with tuberculosis disease have an abnormal chest radiograph that is suggestive of tuberculosis. The most frequent abnormal finding is enlarged unilateral mediastinal lymph nodes often accompanied by shadowing in the lung fields.
• Chest radiographs with typical changes suggestive of tuberculosis should always be considered in conjunction with the proof of infection and symptoms of tuberculosis to make the diagnosis. The only exception to this is disseminated tuberculosis where treatment should be started immediately when disease is suspected.
• The ability to identify these findings on chest radiograph is highly dependent on the experience of the Medical Officer reading them.
4.5 Is sputum examination useful?

- In children, sputum examination is less likely to be positive due to the difficulty in collecting the sputum as well as to the fact that children with tuberculosis have a lower population of microorganisms.

- If the sputum smear is positive, this confirms the diagnosis and has the same implications for treatment and contact investigation as in adults.

4.6 Are there other samples that can be obtained for smear and culture of \textit{M. tuberculosis} to confirm tuberculosis in children?

Tests used to confirm the diagnosis of tuberculosis include:

- early morning gastric aspirates
- induced sputum samples
- fine needle aspiration of lymph glands and lymph node biopsy.

These are, under normal circumstances, only available in certain central hospitals.

5. How is tuberculosis diagnosed in a child?

In children under 5 years of age tuberculosis should be diagnosed if there are:

1. Evidence of tuberculous infection (positive tuberculin skin test) or a history of contact with a highly infectious case of tuberculosis

2. Symptoms or signs suggestive of tuberculosis (described above)

3. Chest radiograph changes consistent with tuberculosis

Children with all three of the above conditions should be considered to have definite tuberculosis disease and be recorded and treated as such.

5.1 What if chest radiography is not available?

The diagnosis is made with much less certainty but any child under 5 years of age who is in contact with a smear positive case and who has symptoms
or signs suggesting tuberculosis should be regarded as having active tuberculosis and should be treated as a case.

5.2 What are the danger signs in children suspected with, or diagnosed with tuberculosis?

Children with the following need to be referred to the first referral level hospital:

• Big liver and spleen (may be disseminated tuberculosis)
• Neck stiffness or drowsiness (may be tuberculous meningitis)
• Respiratory distress or wheezing in one lung (may be compression of bronchus by gland)
• Heart failure (may be pericardial effusion)

5.3 How does HIV infection affect the diagnosis of tuberculosis?

In HIV infected children the diagnosis of tuberculosis is more complex because:

• Their parents are more likely to develop tuberculosis increasing the child’s risk of exposure.
• The progression from infection to disease occurs more frequently and more rapidly making them a group at high risk
• The symptoms and signs of tuberculosis and those of other HIV-related lung diseases may be difficult to distinguish.
• The tuberculin skin test is more often non-reactive.
• Radiological changes of other HIV related lung diseases are difficult to distinguish from those caused by tuberculosis

In spite of the difficulties, tuberculosis (if present) can be diagnosed in the great majority of HIV infected children. Due to the overlap of symptoms and radiological changes, tuberculosis will be more likely to be over diagnosed in HIV infected children especially in those with AIDS.
5.4 When is drug resistant tuberculosis suspected in a child?

As drug resistant tuberculosis is as infectious as drug sensitive tuberculosis drug resistant tuberculosis is suspected in a child in contact with a case:

- known to be a drug resistant tuberculosis case
- classified as a treatment failure, or chronic case

Drug resistance is suspected in a child if:

- The child fails to respond to treatment
- Or requires re-treatment

The investigation of a child with suspected drug resistant tuberculosis is complex.

These children should be referred to a specialist for investigation and treatment.

6. Treatment of tuberculosis

6.1 Are children treated differently from adults?

- Children are treated by exactly the same principles as adults.
- Children are also treated under the DOTS Strategy (including directly observing pill swallowing if the treatment regimen contains Rifampicin).
- Children are also treated in 2 phases namely the intensive phase of 2 months and a continuation phase of 4-6 months, depending on the regimen. As with sputum smear negative and extra-pulmonary cases in adults, fewer drugs are required to treat uncomplicated tuberculosis in children. The reason for this is that children have fewer microorganisms and are less likely to develop drug resistant tuberculosis. During the intensive phase for such patients only three drugs isoniazid (H), rifampicin (R) and pyrazinamide (Z) are recommended.
6.2 Are 4 drugs ever required to treat children?

- The greatest majority of children are not smear positive or have severe disease and do not require 4 drugs in the initial intensive phase.

- Children that are sputum smear positive or have a cavity visible on chest radiograph have a high load of microorganisms and should be treated as adults with newly diagnosed smear positive disease with 4 drugs (H, R, Z, E.) in the initial intensive phase.

- Children with severe disease are also treated with 4 drugs in the initial intensive phase. Streptomycin should always replace Ethambutol when the child has disseminated tuberculosis or tuberculous meningitis.

6.3 What is regarded as severe disease?

Children with the following are regarded as having severe disease and are managed with a regimen containing 4 drugs in the intensive phase:

- extensive lung disease causing cavities
- tuberculous meningitis
- disseminated tuberculosis
- spinal tuberculosis with neurological signs.

6.4 How are the doses of the drugs calculated?

The doses are calculated from the body weight of the child as follows:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Daily dose (mg/kg)</th>
<th>Range (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid (H)</td>
<td>5</td>
<td>4-6</td>
</tr>
<tr>
<td>Rifampicin (R)</td>
<td>10</td>
<td>8-12</td>
</tr>
<tr>
<td>Pyrazinamide (Z)</td>
<td>25</td>
<td>20-30</td>
</tr>
<tr>
<td>Ethambutol (E)</td>
<td>15</td>
<td>15-20</td>
</tr>
<tr>
<td>Streptomycin (S)</td>
<td>15</td>
<td>12-18</td>
</tr>
</tbody>
</table>
6.5 Can ethambutol be used in children?

Ethambutol can cause optic neuritis if high doses are used over a prolonged period. However, the drug can be used safely in children at the recommended lower doses.

6.6 What treatment regimens are recommended for children?

Treatment principles are the same as for adults see ’Management of Tuberculosis. A Guide for Low Income Countries’ available from The Union or the website www.tbrieder.org.

The following regimens, based on WHO recommendations are recommended for children being treated for the first time for tuberculosis:

1. New smear negative pulmonary tuberculosis and extrapulmonary tuberculosis without severe disease:
   - Intensive phase (2 months) Isoniazid + Rifampicin + Pyrazinamide daily
   - Continuation phase (4 months) Isoniazid + Rifampicin daily or 3 times per week **OR** 6 months of Isoniazid + Ethambutol daily.

2. New smear positive pulmonary tuberculosis or other cases with severe disease:
   - Intensive phase (2 months) Isoniazid + Rifampicin + Pyrazinamide + Streptomycin (or Ethambutol) daily.
   - Continuation phase (4 months) Isoniazid + Rifampicin daily or 3 times per week **OR** 6 months of Isoniazid + Ethambutol daily

3. New cases with tuberculous meningitis, disseminated tuberculosis or spinal tuberculosis with neurological involvement
   - Intensive phase (2 months) Isoniazid + Rifampicin + Pyrazinamide + Streptomycin daily.
   - Continuation phase (7 months) Isoniazid + Rifampicin daily
4. Smear positive re-treatment cases.

These cases are infrequent and are likely to be complicated by such conditions as HIV infection or drug resistance. Such cases should be referred to a specialist.

6.7 How are children monitored?

The treatment of tuberculosis is monitored, as in adults, according to the classification of the disease. Those who are sputum smear positive are requested to provide sputum specimens for smear examination at the end of 2 months of treatment and again at 4 months and 6 months (for the 6-month regimen) or 5 months and 7 months (for the 8-month regimen). When children are sputum smear negative or may not be able to provide sputum, their treatment is monitored and evaluated as for adult cases with sputum smear negative or extra-pulmonary tuberculosis. Children responding well to treatment gain weight and lose their symptoms associated with tuberculosis.

Children’s progress should be evaluated every 14 days for the first 2 months of treatment and thereafter monthly. Clinical improvement in treatment is usually seen within one month.

*Chest radiography is not useful as radiological response is much slower than clinical response and is therefore not recommended.*

6.8 What is the outcome of children treated for tuberculosis?

The outcome for the greatest majority of children is excellent. Only children suffering from disseminated tuberculosis, tuberculous meningitis and children with immune suppression have a poor outcome.

6.9 Are HIV infected children treated differently?

Children with HIV infection are treated similarly to other children with tuberculosis. HIV infected children are more likely to die during the course of treatment and have higher relapse rates. Thioacetazone-containing regimens MUST NOT be used as HIV infected children may develop toxic side effects which can be fatal.
6.10 **Is there a place for a trial of treatment?**

Children MUST NOT receive a trial of treatment. Every effort should be made to make the diagnosis by other means rather than use a trial of treatment.

6.11 **How are children managed if they have a relapse or have treatment failure?**

These children are more likely to have drug resistant tuberculosis or underlying HIV disease. These children should be referred to a specialist for assessment and initiation of treatment.

6.12 **How should suspected drug resistant tuberculosis managed?**

The treatment of drug resistant tuberculosis is very complex. These children should be referred to a specialist for diagnosis and treatment.

7. **Preventive treatment**

7.1 **Which children should receive preventive treatment?**

After active tuberculosis has been excluded, all children under the age of 5 years who have recently been exposed to a smear positive patient or those children who are known to be infected must receive preventive treatment. The aim of the therapy is to decrease mortality from tuberculosis and prevent disseminated disease.

7.2 **How do we give preventive therapy?**

- First ensure that the child does not have active tuberculosis
- Children are treated with isoniazid (5 mg/kg) daily for 6 months.

7.3 **How do we manage a baby born to a mother with tuberculosis?**

A baby born to a mother with newly diagnosed tuberculosis needs to be carefully managed as the infant is at risk of developing severe disease.
• If the baby is symptomatic, it is possible that the baby has active disease. Where possible, the baby should be referred to a specialist for evaluation to exclude tuberculosis.

• If the baby is asymptomatic then the baby needs preventive therapy (Isoniazid 5 mg/kg/day) for 6 months. These babies should not initially receive a BCG vaccination. If the baby continues to be asymptomatic, the BCG is administered after completion of the preventive treatment.

• If tuberculin is available, the child can be tested after 3 months of isoniazid treatment and, if non-reactive and the mother has become sputum smear negative, the treatment can be stopped and the child given BCG vaccination.

7.4 What if a mother, with a child who is breast-feeding, develops tuberculosis?

Although the anti-tuberculosis drugs are secreted in the breast milk the concentrations are very low and do not affect the baby. The low concentrations are not effective preventive treatment. Breast-feeding must be continued and the baby evaluated to ensure that the baby does not have tuberculosis. If the baby is not ill, preventive therapy should be given (see 7.3).

8. Protecting children from tuberculosis in the community

8.1 How can children be protected?

Children can be protected from developing tuberculosis, especially the serious forms of tuberculosis, by implementing three strategies:

• The early detection and treatment of adult infectious cases

• Preventive treatment to children under 5 years of age who are in contact with cases of sputum smear positive pulmonary tuberculosis

• Universal use of BCG

All three of these strategies should be in place to protect children. If none of these strategies is in place, priority should be given to the early detection and treatment of adult infectious cases.
8.2 Should children receive BCG?

BCG provides children with a certain degree of protection against serious forms of tuberculosis, especially tuberculous meningitis and disseminated tuberculosis. In most Expanded Program of Immunization (EPI) Programmes, BCG is given soon after birth. There is no value in revaccinating with BCG and this should be discouraged. Asymptomatic HIV infected children should all receive BCG.

9. Public health measures

ALWAYS notify any case treated for tuberculosis to the responsible district health authorities and National Tuberculosis Programme (NTP). Ensure that treatment monitoring is carried out as recommended by the NTP. The NTP should ensure a policy that health workers check all household members and other adult contacts of the child for undetected cases of tuberculosis and arrange treatment for any who are found.

For any child who commenced treatment in hospital, on discharge from the hospital, refer to local NTP health worker with written feedback on treatment and progress during hospital stay.

10. Level of care

10.1 What should be available at first referral level of care?

At first referral level hospitals the staff should be trained to diagnose and initiate treatment of uncomplicated tuberculosis in children. They should be able to recognise the symptoms and signs of probable tuberculosis, perform tuberculin skin tests and have access to a reported chest radiograph. Children diagnosed with tuberculosis should be referred to the National Tuberculosis Programme and receive treatment at the appropriate health centre.

Children with complicated tuberculosis and those suspected of having drug resistant tuberculosis should be referred to a specialist at the next referral level.
10.2 What should be available at the highest level of care?

This will vary widely from country to country according to the resources available. Children at this level of care should be evaluated by a person experienced in childhood tuberculosis. After confirmation of the diagnosis the child must be referred to the National Tuberculosis Programme to be registered and receive treatment at the appropriate level.

Children with suspected drug resistant tuberculosis should always be evaluated at this level and treatment appropriate for the country initiated.

11. Monitoring and recording

Always confirm that the medication is being taken as instructed, by direct observation of each dose when rifampicin is used. Monitor the child’s weight gain (weekly) and temperature (daily at the onset) in order to check for resolution of fever. These are signs of the response to therapy. When treatment is given for tuberculosis, improvement should be seen within one month. HIV-infected children with tuberculosis may not show a good response to treatment.

11.1 How should children be recorded in the tuberculosis register?

Children with tuberculosis should also be recorded in the NTP register. The disease site is recorded as either pulmonary or extra-pulmonary. Similarly the same categories of patient are used for children as for adults

<table>
<thead>
<tr>
<th>Category of patient</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>New case</td>
<td>Never been treated before for as much as 1 month</td>
</tr>
<tr>
<td>Relapse</td>
<td>Previously treated, declared cured, and developed tuberculosis again</td>
</tr>
<tr>
<td>Treatment after failure</td>
<td>Patient who remained or became again smear positive at 5 months or later during treatment</td>
</tr>
<tr>
<td>Treatment after default</td>
<td>Patient who returned to health service smear positive after interrupting treatment for more than 2 months</td>
</tr>
<tr>
<td>Transfer in</td>
<td>Patient registered at another unit and transferred for treatment</td>
</tr>
<tr>
<td>Other</td>
<td>All other children treated for tuberculosis</td>
</tr>
</tbody>
</table>
As children are less likely to be smear positive, the categories of treatment failure, treatment after default and relapse can seldom meet the strict criteria of the categories. They must therefore be recorded in the register in the column labelled ‘other’ with comments describing the case recorded in the ‘remarks’ column. These categories are not routinely reported within the NTP. Specialists and those with an interest in evaluating the outcome of such cases can do so, provided the information is recorded carefully in the columns ‘other’ and ‘remarks’.

### 11.2 Which results of treatment should be recorded for children?

The treatment outcomes are the same as those used in adult patients. Where the child has smear negative or extrapulmonary tuberculosis, the result of treatment most frequently expected is smear not done (treatment completed).

<table>
<thead>
<tr>
<th>Treatment result</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smear negative (cured)</td>
<td>Smear positive patients who were smear negative at last month of treatment and on one other occasion</td>
</tr>
<tr>
<td>Smear not done (treatment completed)</td>
<td>Treatment completed but did not meet criteria to be evaluated ‘smear negative’ or ‘smear positive’</td>
</tr>
<tr>
<td>Smear positive (failure)</td>
<td>Any new smear positive patient that remains or becomes again smear positive at 5 months or later during treatment</td>
</tr>
<tr>
<td>Died</td>
<td>Children that die from any reason during treatment</td>
</tr>
<tr>
<td>Defaulted</td>
<td>Failed to collect medication for more than 2 consecutive months after last attendance during treatment</td>
</tr>
<tr>
<td>Transferred</td>
<td>Patient who was transferred to another unit to continue treatment and treatment results are unknown</td>
</tr>
</tbody>
</table>
11.3 For which age categories should the cohort be analysed?

In order to monitor the situation of tuberculosis in children and to determine trends, children should be evaluated using 3 age categories namely those below 2 years of age (up to 24 months), those between 2 and 5 years of age (up to 59 months) and those between 6 and 14 years of age. Information for this can be obtained from the tuberculosis register, where it must be routinely recorded. Periodic surveys of a representative sample of district registers will give a powerful indication of the level and trend of tuberculosis in children under 5 years of age, a sensitive indicator of tuberculosis in communities where tuberculosis programmes are well developed.
IX. THE DELIVERY OF SERVICES

Integrated Management of Childhood Illness and ARI:

According to the WHO, as IMCI activities expand in countries, it is anticipated that single programmes focused on childhood ARI will be phased out. It is important however, that support to such programmes continue in countries and districts where IMCI is not yet implemented so as not to lose the considerable gains already made, while awaiting the scaling-up of IMCI.

The IMCI strategy guidelines for care of sick children at community level are integrated into a single clinical algorithm on the basis of a syndromic case management approach. Such an integration into a single algorithm is not feasible for inpatient care at first referral level hospitals, where a disease specific case management approach has to be followed. Therefore they are developed in separate modules, such as the child with cough or difficult breathing.

1. Structure of services for ARI and other lung diseases

The activities directed at controlling ARI and other lung diseases in children less than 5 years of age are the responsibility of the government. These activities should be organized in the form of a National Strategy for managing ARI and other lung diseases in children less than 5 years of age (child lung health — CLH).

To achieve the aims (page 4) this strategy must be:

— country-wide with a rural focus (as in many countries most of the population live in rural area) but with a strong urban component (as the rate of urbanization is increasing rapidly);

— permanent, ensuring that the measures used to identify and treat pneumonia quickly will be available to successive generations of children;

— adapted to the social, cultural and physical realities of each community within which it operates, taking note of access to and convenience of health services and attitude of health care personnel;
— integrated within the general health services of the community recognizing that children under five years with ARI/pneumonia in low-income countries (as with any country) may present at every level of the health service.

1.1 Operational targets

Stage 1. The main operational target is to offer correct standard case management and free or affordable antibiotics for childhood pneumonia to at least 80% of the population.

Stage 2. The main operational target is to ensure that at least 80% of children under 5 years of age make use of the standard case management services for pneumonia offered by the health services.

2. Management of the services

The management structure to support the services should be based upon the ‘unit of management’ which, in many countries, is designated as the health district.

2.1 At the basic unit of management

Each basic unit of management (BMU) should have a single designated individual who, along with other responsibilities normally carried out by health workers, is responsible for ensuring that activities for CLH are correctly applied within the BMU. The appropriate population size of the BMU to ensure efficient management is 50-150 000 inhabitants. The BMU (District) CLH Coordinator will be based at the BMU level health facility/first referral level hospital located in that community.

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23 The term basic unit of management is the generic terminology used to: i) describe the level of management of the health care system where plans and budgets are prepared, and implementation is coordinated with local government and with other sectors; and ii) refers to a unit of population usually numbering 100 000.

24 The term “first-referral level hospital” is the generic terminology used to describe first level referral health facilities, with beds, capable of giving inpatient care.
The BMU CLH Coordinator is responsible for:

— ensuring that standard case management is applied in the diagnosis and treatment of all children presenting with ARI and other lung diseases;

— supporting and supervising all health workers involved in these activities who must be visited at least quarterly (or more frequently in case of poor performance);

— ensuring that all health workers involved with these activities receive the appropriate training, and refresher courses for those who require special attention in light of their performance;

— collaborating with the Regional Training Team to identify health workers requiring training or refresher courses;

— keeping the First Referral Level Hospital Pneumonia Register in order and up to date;

— reporting the results of CLH activities in the BMU;

— maintaining supplies of medications and materials within the district.

2.2 At the region level

In order to maintain a good quality of service, a system of training, supervision and logistics must be in place to support the BMU CLH Coordinator. For this reason, each region (usually consisting of 5-10 districts) should have a designated individual in charge of CLH activities (the Regional CLH Coordinator). In most instances, this individual is a physician or medical assistant who acts as an ‘expert’ in the area to determine what is to be done when problems arise. This individual carries out the CLH activities in addition to other responsibilities (usually in a related area such as other major childhood diseases). The Regional CLH Coordinator will be based at the regional level health facility/hospital.

25 The term region is the generic terminology used to describe the intermediate level of management of the health care system between central and district levels.

26 The term “regional hospital” is the generic terminology used to describe intermediate level referral health facilities with in-patient beds.
The Regional CLH Coordinator is responsible for:

— support and supervision of the activities of the BMU CLH Coordinator who must be visited at least quarterly, or more frequently in case of poor performance;

— ensuring training of all new regional level CLH personnel, new BMU CLH Coordinators and refresher courses for those who require special attention in light of their performance;

— collaboration with the National Training Team to identify health workers to be trained as trainers and to establish and supervise a Regional CLH Training Team;

— maintenance of a continuous supply of medications and materials;

— quarterly review of the reports of CLH activities with discussion at the BMU level;

— coordination with national level officials to ensure regular supervision, training, supply and reporting.

2.3 At the national level

Within the Ministry of Health (MOH) there must be a designated Programme for managing ARI and other lung diseases in children less than 5 years of age with a Manager and support staff to ensure that the services are implemented and functioning properly. The Manager must have responsibility for all Programme related activities in the country. The functions of the National Programme Manager and staff include the following:

— regularly supervising and supporting the Regional CLH Coordinators;

— formulating policies, planning, monitoring and evaluating the National Programme including: work-plans, budgets, reports and administration;

— coordinating the training of Regional CLH Coordinators and trainers at the regional training centres. National level trainers should be proficient in teaching health services management, case management strategies, communication skills and educational techniques;

— ensuring regular supply of medications and materials throughout the country including: monitoring of consumption based on reports of burden
of disease, coordination with the supply system and Essential Drugs Programme in the MOH; estimation of requirements for supplies of medications and materials;

— collaborating with other programmes within the MOH dealing with Maternal and Child Health, Public Health Laboratories and preventive activities;

— ensuring that the authorities are fully aware of the priority which should be given to ARI Programme activities including allocation of materials and human resources.

— coordinating the collaboration in ARI with WHO, UNICEF, The Union and other cooperation agencies and non-governmental organizations.

3. Evaluation of the services

Evaluation requires identification of certain tasks and activities e.g., delivery of standard case management at health facilities, training, supervision, medical supplies and health education, that must be monitored on a continuous basis. It is impossible without such evaluation to understand the size of the problem of ARI, to manage the programme correctly or to know whether or not the case management is beneficial. It is also impossible to maintain a regular supply of medications and equipment if there is no information upon which to base the supply system. Evaluation requires that a number of measurable indicators be identified by which to assess the progress of the programme towards its targets. These key indicators are selected by the objectives to be achieved by the Programme.

3.1 Indicators for evaluation of inpatient services

- Number of children admitted with severe pneumonia, very severe pneumonia or very severe pneumonia/disease by age groups (young infants/other children)

- Number of children with pneumonia receiving standard case management in hospital.

- Treatment outcome of children hospitalized for pneumonia by severity and age
3.2 External evaluation

Frequent external evaluation by recognized experts in health services and CLH management should be undertaken in all countries for review of technical aspects of the programme and their implementation. Such reviews provide an independent critique of the activities and give support to programme personnel in their attempts to strengthen the MOH political and financial commitment to the programme.

3.3 Information system

Evaluation of the services entails accurate measurement of ARI morbidity and mortality and of the delivery of the appropriate control measures. This requires monthly reports on diagnosis, treatment and outcomes of cases of ARI and pneumonia.

The regular review of such reports allows an evaluation of the treatment and control activities in:

- approaching the targets defined by the National Programme for the management of ARI;
- comparing various geographical areas of a country to identify problems;
- defining trends (positive and negative) in a single location which indicate changes in the situation in that location.
- ensuring that adequate supplies of essential materials are provided.

3.4 Documentation

The documents used to record and report these data should be simple, clear and kept to the absolute minimum that is required for adequate monitoring and evaluation of the programme. The following description provides a guide for the recording of patients as they are admitted into hospital at BMU Level.

3.4.1 Recording of cases of pneumonia admitted to hospital

3.4.1.1 Pneumonia Inpatient Recording Form

If the child presenting at the first referral level hospital is diagnosed as having severe pneumonia or very severe pneumonia/disease for young infants, or
severe pneumonia or very severe pneumonia in children 2 to 59 months of age a Pneumonia Inpatient Recording Form (see Appendix 6, Form 1) will be completed and kept at the health facility. Having a Pneumonia Inpatient Recording Form can help make sure that the patients:

- were correctly classified as having either very severe or severe pneumonia
- were prescribed the correct regimen and dosages
- had appropriate investigations carried out
- were regularly administered correct drugs

The health worker carrying out the initial clinical examination of the patient will complete the first part of the Pneumonia Inpatient Recording Form. When a Pneumonia Inpatient Recording Form has not been filled out, or some information is missing, it is the responsibility of the health worker who is responsible for treatment of the patient to complete it. The Pneumonia Inpatient Recording Form will be used on admission, throughout the course of treatment and completed on discharge.

**Part 1: Record General Patient Information**

It is important that this card contain all relevant and up-to-date information about the patient and patient’s disease. Some of this information will be used for other records. Therefore, you should make sure that the data is accurate. This section contains the name, age in months, sex and address of the child and date of admission. It identifies the name of reporting hospital and Hospital Pneumonia Register number. Other information includes number of days of signs/symptoms, treatment prior to admission and referral data.

**Part 2: Clinical Features and Classification**

Information required for all children includes the following

- Weight:
- Temperature:

---

27 This information will be completed after the patient is registered in the Pneumonia Inpatient Register.
• Respiratory Rate:
• Previous pneumonia in the last 12 months:
• Previous hospital admission in the last 12 months:
• Measles at this visit or in past 3 months:
• Severe Malnutrition (visible severe wasting or oedema in both feet)

**Information for a child 2 to 59 months old:**

The presence or absence of clinical signs are indicated for the following:

- Chest-in-drawing
- Severe respiratory distress
- Central cyanosis
- Sleepy/difficult to wake
- Convulsions
- Stridor (calm child)
- Able to breastfeed well
- Able to drink
- Wheeze

The appropriate box is ticked for the classification:

- Very severe pneumonia
- Severe Pneumonia
- Pneumonia
- Pneumocystis jiroveci (carinii) pneumonia (PCP)
- Other (Specify)

**Information for a child 0 to 8 weeks:**

The presence or absence of clinical signs are indicated for the following:

- Severe chest indrawing
- Central cyanosis
• Sleepy/difficult to wake
• Able to breastfeed well
• Wheeze
• Grunting It can be intermittent or continuous
• Nasal flaring
• Apnoeic spells
• Convulsions

The appropriate box is ticked for the classification:
• Very severe pneumonia/disease
• Severe Pneumonia
• Pneumocystis jiroveci (carinii) pneumonia (PCP)
• Other (Specify)

Information for all children, if feasible:
• Was a chest x-ray: carried out If yes, register date and results
• HIV status
• Blood film (malaria)

**Part 3: Treatment**

The upper part of this section is for children 2 to 59 months, and the lower part for young infants 0 to 8 weeks.

Write the dose, frequency and route of the prescribed antibiotic that should be given to the child each time in the second column of the chart on the appropriate line.

**Note:** A child aged 36 months, weighing 15kg with a diagnosis of severe pneumonia would require 750,000 units of injectable benzylpenicillin followed by 225 mgs of oral amoxicillin.
**Discharge information**

The columns headed duration/days and number of doses received should be completed upon discharge using the appropriate documents to ascertain this information, e.g. medication or monitoring flow sheet.

In the line *Other Treatment*, register any other non-antibiotic treatment that is given to the child, for instance oxygen, intravenous fluids, analgesics, vitamin A in measles pneumonia, or antimalarial drugs.

**Part 4: Discharge Information**

Information required in this section includes the following:

- Duration of hospitalisation:
- Diagnosis on admission and discharge

Information on discharge and follow-up includes:

- Was the course of antibiotics to be completed at home?
- Was the mother informed to return with the child once antibiotics were completed?
- Did the child return for follow-up visit?
- Was the course of antibiotic completed?
- Had the child fully recovered?

Information on treatment results includes the following categories:

- **Treatment Completed:** *course of antibiotic completed* and child fully recovered
- **Failure at 48 hours or Failure at Day 5:** treatment failure means worsening of fast breathing, or worsening of chest indrawing, or development/persistence of abnormal sleepiness or difficulty in awakening, or development/persistence of inability to drink or poor breastfeeding
- **Left Against Advice:** child removed from the hospital against medical advice before treatment is completed
• Transferred: child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result “transferred”

• Outcome unknown when the mother does not return with the child for follow-up visit once course of antibiotic(s) is finished

• Died within 24 hours of admission

• Died after 24 hours of admission

Any additional comment about the child, such as discharge medication, follow-up visits can be written in the space provided on the back of the form.

3.4.1.2 First Referral Level Hospital Pneumonia Register

If the child presenting at the First Referral Level Hospital is diagnosed as having severe pneumonia or very severe pneumonia/disease for young infants, or severe pneumonia or very severe pneumonia in children 2 to 59 months of age, also those diagnosed with pneumonia but treated as an inpatient, a Pneumonia Inpatient Recording Form will be completed and kept at the health facility. At the end of each work day, the designated CLH Coordinator must collect all newly completed Pneumonia Inpatient Recording Forms of individuals cared for during the day and transcribe the relevant information into the First Referral Level Hospital Pneumonia Register (see Appendix 6, form 2).

It is very important to register every patient who is diagnosed and treated for pneumonia in the First Referral Level Hospital Pneumonia Register because you may not keep the Pneumonia Inpatient Recording Forms therefore relevant information on all patients should be collected and then recorded in the First Referral Level Hospital Pneumonia Register. (There is information on the Pneumonia Inpatient Record Form that is not in the Register, such as malnutrition and measles information. This information should be verified for completeness and accuracy at time of recording.)

Registration number

Assign a new First Referral Level Hospital Pneumonia Register Number to each patient who is being registered. Start with the number 1 at the beginning of every year. As each new patient is registered, add 1 to this number.
Example: Today is 14 March and you are registering 3 patients. The last First Referral Level Hospital Pneumonia Register Number (Pneumonia Register No:) in the register is 64. Assign the 3 patients with Pneumonia Register No: of 65, 66, and 67.

After you write the patient’s Pneumonia Register Number in the Register, write this number on the line of his Pneumonia Inpatient Record Form. When you use the Pneumonia Inpatient Record Form to record information in the First Referral Level Hospital Pneumonia Register (for example the treatment outcome) you can easily find the patient in the Register by using this number.

3.4.2 Reporting of ARI activities at the first referral level hospital and regional levels

The primary goal of a CLH Programme is to diagnose, treat and cure children with lung disease especially children with severe and very severe pneumonia and to reduce the case fatality rate of hospitalised cases. A reduction of the case fatality rate of at least 30% for pneumonia cases is a reasonable goal. Determining the case fatality rate for pneumonia cases registered in the First Referral Level Hospital Pneumonia Register is a useful way to evaluate the effectiveness of standard case management in treating pneumonia cases in the first referral level hospital. Another way to evaluate the programme is to examine the other possible treatment results, besides death, in pneumonia cases, and determine the percentage of cases who completed treatment, failed treatment, left against medical advice, or were transferred to another BMU.

Think of the patients you register in a month as a group of individuals who start out together in a 10 kilometre foot race. At the end of the race, the judges count how many people in the group completed the course within a certain time period, how many people completed the course at all, and how many people did not complete the course. In a similar way, you should count how many pneumonia cases you registered in a specific month completed treatment, died, failed treatment, left against medical advice or were transferred out. You should record the number of cases for each treatment outcome and report the results to the Central Unit.
The Central Unit should analyse the numbers of cases you report and determine the percentages of pneumonia patients registered who completed treatment, died, failed treatment, left against medical advice or were transferred out. The Central Unit should determine these percentages by district, region and nation wide. The Central Unit Coordinator should discuss the results of the analysis with you. The Central Unit Coordinator should use the information from the analysis to identify areas that require attention in order to improve the case fatality rate.

*Regular reporting every month of pneumonia diagnosis and treatment permits the monitoring and evaluation of activities related to case management and allows the early identification of problems arising with the hospital services.*

### 3.4.2.1 Monthly Report on Cases of Pneumonia

The Report on Cases of Pneumonia Form, records how many pneumonia cases were diagnosed and registered during a month.

By the 15th day of the following month the report should be completed to allow enough time for the pneumonia patients admitted at the end of the month to complete the antibiotic treatment before the reporting deadline. The completed form is then sent to the Central Unit. Central Unit Coordinator will review the report for consistency and completeness. Then he will compare the reported numbers of cases with the numbers of cases expected to be diagnosed and registered during the month under study. When there are differences, you and the Central Unit Coordinator should investigate why and identify ways to improve case management of pneumonia in the BMU.

The Central Unit will analyse, by computer, data by BMU, region and nation wide. The Central Unit will produce a report, analyse the data and send the report every six months to District Coordinators. The Central Unit will use the information to plan and manage the child lung disease more efficiently.

This section teaches you how to complete this report. You will learn how to obtain the information from the First Referral Level Hospital Pneumonia Register, how to summarise the data and how to enter the data into the appropriate spaces on the report.
Completing the Monthly Report on Cases of Pneumonia

The top block of the form is for general information about the BMU first referral level hospital. It allows Central Unit to quickly determine which BMU and month data are reported.

Name of District (BMU)

Write the BMU name.

Name of Hospital

Write the hospital name.

Patients registered during month of

Write the month and the year of the month on which you are reporting.

Name of District Coordinator

Write your full name.

Signature

Sign your full name.

Date of Completion of this form

Write the day, month and year you are completing the report.

The next block is subdivided into spaces to record the number of cases of each type of pneumonia by sex and age. The first column identifies gender. Each of the next five columns are to record the number of cases of each type of pneumonia by sex and age. Column 5 is subdivided into three lines to
record the total number of male cases, total number of female cases and overall total number of cases of pneumonia for the month.

The bottom part of the form contains definitions for type of patients.

The *Monthly Report on Cases of Pneumonia* is completed systematically by counting the number of cases recorded in the *First Referral Level Hospital Pneumonia Register* within the month that has just ended.

**Locate the section of the First Referral Level Hospital Pneumonia Register to review**

To locate the section of First Referral Level Hospital Pneumonia Register to review, examine the **Date of Registration** column and identify the pages with cases registered during the previous month. Draw a line after the last registered case in the month. Another way to visually separate cases registered in one month from cases registered in the next month, is to leave a row empty when you begin registering cases in a new month.

1. Count the number of male severe pneumonia cases in infants under 2 months
   a. Look at the columns **Sex, Disease Classification and Age** in the First Referral Level Hospital Pneumonia Register. Use a sheet of paper to cover the rows. Slowly move the paper down one row at a time. Count the number of male severe pneumonia cases, putting a mark next to each patient counted and a tally mark within the correct column as demonstrated above. That is, look for:
      - **M** in the column for Sex
      - Infants **below 2 months of age**
      - **Severe pneumonia** in the column for Disease Classification
b. Enter the total number (in pencil) at the bottom of the Register page. The method for counting the severity and distribution of cases by age and gender is demonstrated by the use of the tally sheet below.

<table>
<thead>
<tr>
<th>Pneumonia</th>
<th>Severe Pneumonia</th>
<th>Age group</th>
<th>Very severe pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males  Females</td>
<td>Males  Females</td>
<td></td>
<td>Males  Females</td>
</tr>
<tr>
<td>III II</td>
<td>III II</td>
<td>Young infants 0 to 8 weeks</td>
<td></td>
</tr>
<tr>
<td>III III</td>
<td>II III</td>
<td>Child 2-11 months</td>
<td>II II</td>
</tr>
<tr>
<td>II III</td>
<td>III II</td>
<td>Child 12-59 months</td>
<td>III II</td>
</tr>
<tr>
<td>5 6 8 8</td>
<td></td>
<td>Total</td>
<td>5 4</td>
</tr>
</tbody>
</table>

It is an example of how to organise the cases counted on the register page. Each forward slash (/) represents a case. When you are counting cases to complete the Monthly Report on Cases of Pneumonia, you can draw (in pencil) a table like the one above at the bottom of the Register page, or on a sheet of paper.

b. Check your work to make sure the number obtained is correct.

c. Add together the numbers of male severe pneumonia cases in infants **less than 2 months** from the bottom of each page of the First Referral Level Hospital Pneumonia Register you review.

d. Enter the number of male severe pneumonia cases in infants **less than 2 months** in the appropriate column of the Report on Cases of Pneumonia.

2. Repeat this process for each of the remaining columns. That is:
   i. Male very severe pneumonia in infants <2 months
   ii. Male pneumonia cases in child 2-11 months
   iii. Male pneumonia cases in child 12-59 months
   iv. Male severe pneumonia cases in child 2-11 months
   v. Male severe pneumonia cases in child 12-59 months
   vi. Male very severe pneumonia cases in child 2-11 months
   vii. Male very severe pneumonia cases in child 12-59 months
viii  Female severe pneumonia cases in infants under 2 months
ix   Female very severe pneumonia/disease cases in infants <2 months
x    Female pneumonia cases in child 2-11 months
xi   Female pneumonia cases in child 12-59 months
xii  Female severe pneumonia cases in child 2-11 months
xiii Female severe pneumonia cases in child 12-59 months
xiv  Female very severe pneumonia cases in child 2-11 months
xv   Female very severe pneumonia cases in child 12-59 months

3. Determine the total number of cases of pneumonia by gender and severity
   Add the number of **male** cases of pneumonia across the columns and enter in **Total by gender** column.
   Add the number of **female** cases of pneumonia across the columns and enter in **Total by gender** column.
   On the **Total by severity of pneumonia** line at bottom of report, in each column, add male and female pneumonia cases together.

3.4.2.2 Monthly report of treatment outcomes

At the same time as the report on case-finding is completed a *Monthly Report of Treatment Outcomes* (Appendix 6, Form 4) is prepared from the *First Referral Level Hospital Pneumonia Register* and is only as accurate as the information within that register. The quarterly reports should be completed by the 15th day of the following month to allow enough time for the pneumonia patients admitted at the end of the month to complete the antibiotic treatment before the reporting dead-line. For instance the report on pneumonia admissions and pneumonia treatment outcomes of March should be completed on/after the 15th April. The report should be submitted to the District ARI Coordinator no later than the 20th of the month in which they are completed.

This section teaches you how to complete this report. You will learn how to obtain the information from the First Referral Level Hospital Pneumonia Register, how to summarise the data and how to enter the data into the appropriate spaces on the report.
Completing the Monthly Report on Treatment Results

The top of the Monthly Report on Treatment Results contains general information about your BMU. This information allows the Central level to quickly determine which BMU and month data are reported. Complete this section as described above.

The next section of the report is divided into and upper and lower blocks. The first column in both blocks identifies the age and pneumonia category. The next column in both blocks identifies the recommended antibiotics. The 3rd column in both blocks has spaces to record the overall total for each of the categories of pneumonia as recorded on the Monthly Report on Cases of Pneumonia. In the remaining columns there are spaces to record the overall total for each of the treatment outcome categories. The treatment results are the same as the treatment results listed in the First Referral Level Hospital Inpatient Pneumonia Register.

The back of the form contains definitions of the treatment results.

Complete the Column: Total number of pneumonia patients registered in the above month

On the Monthly Report on Treatment Results you report on the results of treatment for the same group of pneumonia cases you registered in the previous month and reported on in the Monthly Report on Cases of Pneumonia for that month. The numbers of Pneumonia cases, Severe Pneumonia cases, and Very Severe Pneumonia cases on both reports represent the same group of children.

The Monthly Report on Treatment Results is completed systematically by counting the number as recorded in the First Referral Level Hospital Inpatient Pneumonia Register within the month which has just ended.
Locate the section of the First Referral Level Hospital Pneumonia Register to review

To locate the section of First Referral Level Hospital Inpatient Pneumonia Register to review, examine the Date of Registration column and identify the pages with cases registered during the previous month. Draw a line after the last registered case in the month. Another way to visually separate cases registered in one month from cases registered in the next month is to leave a row empty when you begin registering cases in a new month.

1. Count the number of infants (1 through 8 weeks) with severe pneumonia by antibiotics received.
   a. Look at the columns Antibiotics for Pneumonia in the First Referral Level Hospital Pneumonia Register. Use a sheet of paper to cover the rows. Slowly move the paper down one row at a time. Put a mark next to the columns corresponding to the infants <2 months identified when completing the Monthly Report on Cases of Pneumonia.
   b. Count how many infants <2 months received Benzylpenicillin/ gentamicin/amoxicillin antibiotics. See the tally sheet on next page. It is an example of how to organise the cases counted on the register page.
      Each forward slash (/) represents a case. When you are counting infants <2 months received Benzylpenicillin/ gentamicin/amoxicillin antibiotics cases to complete the Monthly Report on Treatment Results, you can draw (in pencil) a table like the one at the bottom of the Register page, or on a sheet of paper.
   c. Check your work to make sure the number obtained is correct.
   d. Add together the number of infants <2 months received Benzylpenicillin/ gentamicin/amoxicillin antibiotics and enter the number in the appropriate column of the Report on Treatment Results.
   e. Repeat this process for infants <2 months who received Other antibiotics — specify the types used.
## Tally sheet

<table>
<thead>
<tr>
<th></th>
<th>INFANTS 0 – 8 weeks</th>
<th>CHILD 2 – 59 MONTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEVERE PNEUMONIA</td>
<td>VERY SEVERE PNEUMONIA</td>
</tr>
<tr>
<td></td>
<td>2-11</td>
<td>12-59</td>
</tr>
<tr>
<td>MALE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BENZYL PENICILLIN/ GENTAMCIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMOXICILLIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COTRIMOXAZOLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BENZYL PENICILLIN/ AMOXICILLIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHLORAMPHENICOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TREATMENT COMPLETED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEFT AGAINST ADVICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSFER-RED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUTCOME UNKNOWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TREATMENT FAILURE AT 48 HOURS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TREATMENT FAILURE AT 5 DAYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIED BEFORE 24 HOURS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIED AFTER 24 HOURS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
f. Repeat this process for infants <2 months with very severe pneumonia

g. Repeat this process for infants <2 months who received Other antibiotics — specify the types used.

h. Repeat the above process for each of the remaining columns. That is:

i. Pneumonia cases in child 2-11 months

ii. Pneumonia cases in child 12-59 months

iii. Severe pneumonia cases in child 2-11 months

iv. Severe pneumonia cases in child 12-59 months

v. Very severe pneumonia cases in child 2-11 months

vi. Very severe pneumonia cases in child 12-59 months

2. Count the number of infants (1 through 8 weeks) with severe and very severe pneumonia/disease by treatment results

a. Look at the columns Treatment Results in the First Referral Level Hospital Pneumonia Register. Use a sheet of paper to cover the rows. Slowly move the paper down one row at a time. **Put a mark next to the columns corresponding to the infants <2 months identified when completing antibiotic column.**

b. Count how many infants <2 months who received Benzylpenicillin/ gentamicin / amoxicillin antibiotics appear in the **Completed Treatment** column. See example Tally Form provided. It is an example of how to organise the cases counted on the register page. Each forward slash (/) represents a case. When you are counting infants <2 months who received Benzylpenicillin/ Gentamicin / Amoxicillin and **Completed Treatment** to complete the Monthly Report on Treatment Results, you can draw (in pencil) a table like the example at the bottom of the Register page, or on a sheet of paper.

c. Check your work to make sure the number obtained is correct.
d. Add together the number of infants <2 months who received Benzylpenicillin / gentamicin / amoxicillin antibiotics and **Completed Treatment** and enter the number in the appropriate column of the Report on Treatment Results.

e. Repeat this process for infants <2 months who received Benzylpenicillin/gentamicin/amoxicillin antibiotics for each of the other columns. That is:

i. Left Against Advise

ii. Transferred

iii. Treatment Failure at 48 hours

iv. Treatment Failure at 5 days

v. Outcome unknown

vi. Died <24 hours

vii. Died >24 hours

f. Repeat this process for infants <2 months who received **Other antibiotics** — specify the types used.

g. Repeat this process for each of the remaining columns. That is:

i. Pneumonia cases in child 2-11 months

ii. Pneumonia cases in child 12-59 months

iii. Severe pneumonia cases in child 2-11 months

iv. Severe pneumonia cases in child 12-59 months

v. Very severe pneumonia cases in child 2-11 months

vi. Very severe pneumonia cases in child 12-59 months
In order to achieve successful treatment of pneumonia patients, it is essential to ensure that appropriate antibiotics are continuously available.

Treatment depends on drugs and other treatment-related supplies. One of the CLH Coordinator most important tasks is to make sure that the hospital has the drug supplies and other materials it need. These drug supplies and other materials include the following:

- drugs for pneumonia treatment
- treatment related supplies, such as syringes and needles
- forms and registers

1. Management of supplies

The CLH Coordinator will order drugs and treatments related supplies on a monthly basis and forms and registers once a year.

This section describes the steps to take when maintaining drugs supplies and other materials in your hospital. At the end of the section, you should be able to:

- Calculate the amount of drugs your hospital will need for a month.
- Place requests for drugs on a monthly basis.
- Make sure there is an adequate supply of drugs in your hospital.
- Calculate the amount of treatment-related supplies your hospital will need for a month.
- Place requests for treatment-related supplies on a monthly basis.
- Make sure there is an adequate supply of treatment related supplies in your hospital.
- Calculate the number of forms and registers your hospital will need for a year.
- Place a request for forms and registers once a year.
- Make sure there is an adequate supply of forms and register in your hospital.
1.1 Ordering medications

The ordering and maintenance of adequate supplies of medications are determined by the number of cases recorded on the Monthly Report on Cases of Pneumonia Form for inpatient services. For instance at the end of April the estimates will be made for the first quarter of the year, and at the end of July, October and January for the other quarters. Supplies of medications are ordered using the Order Form for Treatment Supplies (Appendix 6, Form 5). The amount of materials required for the treatment of patients each quarter is determined as follows.

— The number of patients to be treated is determined from the Monthly Reports which has just been completed for the preceding quarter (totals from the 3 Monthly Reports).

— The number of patients is entered under the column headed “cases” for: young infants - severe pneumonia/very severe pneumonia/disease in first column; child - severe pneumonia in the second column; child - very severe pneumonia in the third column and child - pneumonia in the fourth column.

— The amount of each type of medication which is to be ordered is determined by multiplying the number of cases by the factor and taking the sum of all the numbers in the four columns (A+B+C+D).

1.1.1 Maintenance of medications supplies

In many countries, the transfer of information (post and telecommunications) is often difficult and transportation of supplies may be delayed. As a result, supplies may not arrive at health institutions a long distance from the port or main city of the country. Because the majority of all patients in most countries live in communities outside the main centres, it is very important to make allowances for the problems of communication and transportation. This can be accomplished by maintaining a “reserve” stock of medications within the health services system. In this way, every patient can be assured of receiving all the medications necessary for the treatment of pneumonia. Also the
incidence of pneumonia shows a marked seasonality it is necessary to maintain a 3 month “reserve” to control for varying levels of disease throughout the year.

The amount of reserve stock to be maintained is determined using the *Order Form for Treatment Supplies*. The total amount advisable to be kept at each BMU is equivalent to the amount of medications which are consumed in one calendar quarter. The BMU CLH Coordinator calculates this using the form as follows:

— The total amount needed for a quarter has been calculated under the column “E” (A+B+C+D) in the upper section of the Order Form.

— These amounts (E) are entered into the lower section of the Order Form, under F and under G.

— The amount of medications in the BMU stores (pharmacies) at the time of completion of the form (once each quarter) must be counted and the quantity of items entered under “H”. **The expiry date of medications should also be noted to ensure that supplies are used correctly.**

— By adding the amount of medications required for the patients during the quarter (F) and the amount of “reserve” stock needed (G) and then subtracting from this sum the amount of medications presently on hand in the stores (H), it is possible to arrive at the total amount required for the BMU for the next quarter.

Maintaining the reserve stock allows the flexibility to ensure that all patients receive regular treatment. As is apparent, the amount of medications derived from the number of cases requiring different forms of treatment, which are determined from the *Monthly Reports* are not exact figures; some seriously ill patients may have required longer courses of treatment or required a change in antibiotic. However, the maintenance of the reserve stock ensures that sufficient medications will be available for the coming period and the correction for the differences noted will automatically occur when the next order for medications is completed in the following quarter.
1.2 Other supplies

To maintain the regular care of patients, other materials are also required. In particular, a regular supply of forms, registers and other recording materials are needed to ensure that the patients are correctly managed. The determination of volume of such materials required is based on the regular activity reports.

Timers will be distributed to all health facilities at the beginning of the programme. A reserve stock should be maintained at the Regional level to replace lost and damaged units.

District hospitals which cannot regularly be supplied with oxygen cylinders should be equipped with Oxygen Concentrators and flow-splitters together with the accessories necessary for oxygen administration to children.
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Appendix 1

Oxygen Administration\textsuperscript{28}

Indications

Where the oxygen supply is \textit{limited}, priority should be given to children with very severe pneumonia, bronchiolitis, or asthma who have

- central cyanosis,
- or are unable to drink (where this is due to respiratory distress).

Where the oxygen supply is \textit{more plentiful}, it should be given to children with any of the following:

- severe lower chest wall indrawing
- respiratory rate of 70/min or above
- grunting with every breath (in young infants)
- head nodding.

Sources

Oxygen supplies should be available at all times. The two main sources of oxygen are cylinders and oxygen concentrators. It is important that all equipment is checked for compatibility.

Oxygen cylinders

See list of recommended equipment for use with oxygen cylinders and instructions for their use in the WHO technical review paper\textsuperscript{29}.


**Oxygen concentrators**

The concentrator, with a built-in flow control device, should meet WHO specifications for operation. Non crush plastic tubing for oxygen delivery is required. If a nasopharyngeal catheter is used, a bubble humidifier is needed. If the oxygen source is used for more than one child, a flow splitter, 0.5 and 1.0 litre/minute nozzles, blanking plugs and flow indicators, together with additional tubing (and humidifiers) are required. Instructions for the use of oxygen concentrators are given in the WHO technical review paper, *Oxygen therapy for acute respiratory infections in young children in developing countries*.

**Oxygen delivery**

Three methods are recommended for the delivery of oxygen: nasal prongs, nasal catheter and nasopharyngeal catheter. Nasal prongs or a nasal catheter are preferred in most circumstances. Nasal prongs are the best method for delivering oxygen to young infants and children with severe croup or pertussis (do not use a nasopharyngeal catheter or a nasal catheter as they provoke paroxysms of coughing).

Use of a nasopharyngeal catheter calls for close monitoring and prompt action, in case the catheter enters the oesophagus or other serious complications develop. The use of face masks or headboxes is *not* recommended. It is important to have the proper equipment to control low flow rates (0.5-2 litres/minute)-see details in the WHO technical review paper cited above.
Nasal prongs. These are short tubes inserted into the nostrils. Place them just inside the nostrils and secure with a piece of tape on the cheeks near the nose (see Figure). Care should be taken to keep the nostrils clear of mucus, which could block the flow of oxygen.

Set a flow rate of 1-2 litres/min (0.5 litre/min in young infants) to deliver an inspired oxygen concentration of 30-35%. Humidification is not required with nasal prongs.

Nasal catheter. This is a 6 or 8FG catheter which is passed to the back of the nasal cavity. Place the catheter at a distance equal to that from the side of the nostril to the inner margin of the eyebrow. The tip of the catheter should NOT be visible below the uvula (see Figure below). Set a flow rate of 1-2 litres/min. Humidification is not required with a nasal catheter.

Oxygen Therapy: Correct position of nasal catheter (cross-sectional view)

Nasopharyngeal catheter. This is a 6 or 8 FG catheter which is passed to the pharynx just below the level of the uvula. Place the catheter at a distance equal to that from the side of the nostril to the front of the ear. The tip of the catheter should be visible just below the uvula. If it is placed too far down, gagging and vomiting and, rarely, gastric distension can occur.

This catheter is passed to the pharynx just below the level of the uvula. Place the catheter at a distance equal to that from the side of the nostril to the front of the ear (see Figure A). The tip of the catheter should be visible just below the uvula (see Figure C). If it is placed too far down gagging and vomiting and rarely gastric distension can occur.
A. Measuring the distance from nose to the tragus of the ear for the insertion of a nasopharyngeal catheter

B. Cross sectional view of the position of the nasopharyngeal catheter

C. Tip of the nasopharyngeal catheter visible just below the soft palate

Set a flow rate of 1-2 litres/min, which delivers an inspired oxygen concentration of 45-60%. It is important that this flow rate is not exceeded because of the risk of gastric distension.

Humidification is required. The bubble humidifier should be filled to the correct level with previously boiled, clean warm water. Connections should be regularly checked for leaks. The water should be changed daily and the humidifier cleaned with detergent. Once a week, the humidifier should be washed in a mild antiseptic solution and allowed to dry completely.
Monitoring

Train the nurses to place and secure the nasal prongs or catheter correctly. Check regularly that the equipment is working properly, and remove and clean the prongs or catheter at least twice a day.

Monitor the child at least every 4 hours to identify and correct any problems, including:

- nasal catheter or prongs out of position
- leaks in the oxygen delivery system
- oxygen flow rate not correct
- airways obstructed by mucus (clear the nose with a moist wick or by suction)
- gastric distension (check the catheter’s position and correct it, if necessary).

Whenever signs of deterioration are noted in the child, including an increase in respiratory rate or increased chest indrawing, check the equipment as above. If no problem is found, increase the oxygen flow rate and check for other complications of the condition such as pneumothorax. Treat accordingly (see Section V).

DO NOT INTERRUPT OXYGEN THERAPY IN A CHILD WHO IS STILL VERY ILL.
Appendix 2

Fluid Management for Children Hospitalized with Severe/Very Severe Pneumonia/Disease\textsuperscript{30}

1. General principles of fluid management

1.1 Increased fluid losses

Increased fluid losses occur during acute respiratory infections. These are due to pulmonary water loss resulting from fast breathing and sweat loss from fever. These fluid losses are generally modest and result in very low salt loss. They tend to cause “true dehydration” with largely intercellular fluid losses and without clinical signs of dehydration. In children with very severe infections antidiuretic hormone levels may be high and therefore urine output falls. Severe clinical dehydration from these fluid losses therefore is rare.

1.2 Risk of fluid overload

Children with meningitis and, to a lesser extent, very severe pneumonia have a risk of secreting large amounts of antidiuretic hormone. This results in a fall in urine output and the retention of fluid and thus the risk of fluid overload and pulmonary oedema. This factor can be an important cause of death in these children. It is important therefore to closely monitor fluid intake. Many doctors restrict fluid intake to a maximum of 80ml/kg/day (about 3ml/kg/hour) in children 2 months up to 12 months of age and 60ml/kg/day (2.5ml/kg/hour) in children 12 to 59 months of age, particularly in meningitis. In addition, the delivery of intravenous fluids should be limited to the management of septic shock or the delivery of intravenous antibiotics by indwelling catheter in circumstances where this can be safely monitored.

1.3 Need for vigorous management of septic shock

Children with very severe pneumonia and/or meningitis can develop shock due to sepsis. Septic shock is caused by the capillary leak of fluids and other effects of bacterial toxins. This requires urgent and vigorous treatment to restore an effective circulating fluid volume.

1.4 Risks with delivery of fluids by nasogastric tube

In children with very severe pneumonia who are unable to drink the risk of fluid overload associated with intravenous fluids should be balanced against the risk of aspiration associated with the use of a nasogastric tube when respiratory distress is present. In general the use of the nasogastric tube is recommended but small volumes should be delivered frequently and the child should be carefully monitored.

2. Fluid management in specific circumstances

2.1 Children with diarrhoea

2.1.1 Children with diarrhoea and (very) severe pneumonia

Children with diarrhoea and pneumonia or meningitis should be managed according to CDD case management guidelines. However, they should be monitored carefully at all times for signs of fluid overload by checking for peripheral oedema or increasing respiratory distress which may indicate pulmonary oedema.

2.2 Children with no diarrhoea

2.2.1 Children with (very) severe pneumonia without signs of shock or dehydration

These children should have their fluid intake restricted to 80ml/kg/day (about 3ml/kg/hour) in children 2 months up to 12 months of age and 60ml/kg/
day (2.5ml/kg/hour) in children 12 to 59 months of age. The most appropriate fluids for these children are clean water, milk feeds and other low salt fluids. If the child is unable to drink, small volumes of fluids should be given regularly by means of a nasogastric tube.

2.2.2 Children with (very) severe pneumonia with signs of septic shock

This is a medical emergency and treatment is required without delay. Large volumes of fluid should be given intravenously and 30 ml/kg of Ringers Lactate (or normal saline if this is not immediately available) should be given in the first hour. 10-20 ml/kg of this can be given as a bolus injection. This amount can be repeated if necessary if signs of shock persist after one hour.

When the signs of shock have resolved, Oral Rehydration Salts (ORS) can be given at a rate of 15-20 ml/kg/hour for the next 2 hours, reducing to 10 ml/kg/hour for a further 4 hours. Thereafter if there are no signs of shock, fluid management can be carried out as in 2.2.1 above.

2.2.3 Children with (very) severe pneumonia with signs of severe dehydration

As noted in 1.1 above, children with pneumonia and without diarrhoea, only rarely present clinically with severe dehydration. Those who do usually have an additional source of fluid loss such as repeated vomiting or sepsis with evidence of capillary leak. These children should be given ORS 10 ml/kg/hour for 4 hours, repeated as necessary until there are no signs of dehydration. Some paediatricians give a diluted ORS (2/3 ORS and 1/3 water) in these circumstances. This is not incorrect, but since these children tend to be hyponatremic the risk of pulmonary oedema and intracellular fluid shifts is less if full strength ORS is used.
## Maintenance fluid requirements

<table>
<thead>
<tr>
<th>Body weight of child</th>
<th>Fluid (ml/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 kg</td>
<td>100-120 ml/kg</td>
</tr>
<tr>
<td>10-19 kg</td>
<td>90-120 ml/kg</td>
</tr>
<tr>
<td>&gt;20 kg</td>
<td>50-90 ml/kg</td>
</tr>
</tbody>
</table>

Thus, for example:

- 2 kg: 220 ml/day
- 4 kg: 440 ml/day
- 6 kg: 660 ml/day
- 8 kg: 900 ml/day
- 10 kg: 1100 ml/day
- 12 kg: 1300 ml/day
- 14 kg: 1400 ml/day
- 16 kg: 1600 ml/day
- 18 kg: 1700 ml/day
- 20 kg: 1800 ml/day
- 22 kg: 1900 ml/day
- 24 kg: 2000 ml/day
- 26 kg: 2100 ml/day

---

Supportive Care in Hospital

Food

Loss of appetite is common during acute respiratory infections, especially if fever is present. Children with severe pneumonia may have fast or difficult breathing. Encourage the child to eat small meals frequently. Do not force children to eat.

Also encourage continued breast-feeding; it is important to let the mother stay with the child in hospital. If the child is too ill to breast-feed, the mother can express milk into a cup and feed it with a spoon, slowly. (Expressed breast milk can also be given by nasogastric tube.) For the child 0 to 8 weeks of age give 20 ml of milk per kg of body weight by nasogastric tube 6 times a day totaling 120 ml/kg/day.

Feeding should be avoided if the child is so ill that it could cause aspiration.

Secretions

As many infants do not normally breathe through the mouth, a blocked nose may cause respiratory distress and some difficulty in breast-feeding. A normal child with a blocked nose tries to suck and thus behaves differently from a child who has loss of appetite or is too ill to feed.

Use a plastic syringe (without a needle) to gently suck any secretions from the nose when it is necessary to clear the airway. If the mucus is dry it must be cleared out of each nostril VERY GENTLY with a wick of soft cloth dipped in a salt-water solution.

Thermal environment

It is important not to overheat or chill a child who has severe pneumonia. Heat and cold stress can both increase a child’s oxygen consumption by two or three times, increase carbon dioxide production, and precipitate respiratory failure. A neutral thermal environment minimizes oxygen consumption.

---

The child with severe pneumonia should be nursed, lightly clothed, in a warm room (25°C). Proper temperature control is much more important than humidification of the air.

The thermal environment is especially important for the young infant who lose heat rapidly, especially when they are wet. They should be kept dry and well wrapped, and ideally held close to the mother’s body. A hat or bonnet is valuable to prevent heat loss from the head.

Feel the hands and feet — they should be warm. **The axillary temperature should be between 36.5°C and 37.5°C.**

**Home care advice for the child 2 to 59 months with pneumonia (not severe)**

The following section should assist the health worker to advise the mother on the home care of her child with pneumonia (not severe).

*Give information to the mother through both verbal and written instructions — use examples to make your instructions more interesting and effective such as through pictures or demonstration of task. It is important to have the mother practice.*

**Antibiotic treatment**

Antibiotic treatment and administration, and reassessment visit, is covered on pages 45 to 47 of the Guide.

**Food**

Loss of appetite is common during acute respiratory infections, especially if fever is present. Encourage the child to eat small meals frequently. Lowering the temperature may help the child to eat. Continued feeding will help to prevent malnutrition and ideally foods given at this time should have large amounts of nutrients and calories but not bulk. Local recommendations will depend on the availability of foods and cultural preferences. In the exclusively breast-fed infant under 4 months, increase breast-feeding by giving more milk per feed or by feeding more frequently.

After the episode of pneumonia is over, and if weight loss has occurred, give one extra meal each day for a week, or until the child has regained its normal weight.
Examples of local adaptations of feeding recommendations from Bolivia; Indonesia, Nepal, South Africa and Tanzania

<table>
<thead>
<tr>
<th>Country</th>
<th>Age group: 6 months up to 12 months</th>
<th>12 months up to 2 years</th>
<th>2 years and older</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bolivia</strong></td>
<td>Cereal gruel, vegetable puree, egg yolk, fruit. From 9 months: fish, whole egg</td>
<td>Family meals plus additional seasonal fruit, minced meat or milk-based desserts (custard, milk rice), yoghurt, cheese, give milk twice a day</td>
<td>Give adequate amounts of family foods in 3 meals each day consisting of rice, side dishes, vegetables and fruits. Also, twice daily, give nutritious foods between meals, such as green beans, porridge, banana, biscuit, naga sarai</td>
</tr>
<tr>
<td><strong>Indonesia</strong></td>
<td>Give adequate amounts of rice porridge with egg/chicken/fish/meat/tempe/tahu/carrot/spinach/green beans/oil/ coconut milk. Give also snacks 2 times a day between meals such as green beans, porridge, banana, biscuit, naga sarai</td>
<td>Give adequate amounts of family foods in 3 meals each day consisting of rice, side dishes, vegetables and fruits. Also, twice daily, give nutritious foods between meals, such as green beans, porridge, banana, biscuit, naga sarai etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Nepal</strong></td>
<td>Give adequate servings of (mashed) foods such as rice, lentils (dal), mashed bread (roti), biscuits, milk, yoghurt, seasonal fruits (such as banana, guava, mango etc), vegetables (such as potatoes, carrots, green leafy vegetables, beans etc), meat, fish and eggs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South Africa</strong></td>
<td>Porridge with added oil, peanut butter or ground peanuts, margarine and chicken, beans, full-cream milk, fruit and vegetables, mashed avocado or family food</td>
<td>Porridge with added oil, peanut butter or ground peanuts, margarine and chicken, beans, full-cream milk, fruit and vegetables, mashed avocado or banana, canned fish or family food</td>
<td>Bread and peanut butter, fresh fruit or full cream</td>
</tr>
<tr>
<td><strong>Tanzania</strong></td>
<td>Thick gruel, mixed food containing milk, mashed foods (rice, potato, ugall). Add beans, other legumes, meat, fish, or groundnuts. Add greens or fruit such as pawpaw, mango, banana, or avocado. Add spoonful of extra oil into food.</td>
<td>Give twice daily such as thick enriched UJ, milk fruits or other nutritious snacks.</td>
<td></td>
</tr>
</tbody>
</table>

---

Fluids

Children with a respiratory infection lose more fluid than usual, especially when they have a fever. Encourage them to take extra fluid to prevent dehydration. If the child is exclusively breast-fed, breast-feed more frequently. If the child is not exclusively breast-fed, offer extra to drink: breast milk, clean water, clear liquids, juice, or milk. Milk feeds should be prepared with the normal amount of clean water.

Soothing throat/cough remedies

_Cough and cold remedies that contain atropine, codeine, alcohol, phenergan, or antihistamines should be avoided._

Use safe, home-made remedies such as tea with sugar, lemon with honey syrups. _These can be prepared in the clinic or at home._

If the nose is blocked with mucus which is dry or thick, it must be cleared out of each nostril VERY GENTLY with a wick of soft cloth dipped in a salt-water solution.

_Advise the mother NOT to buy medicated nose drops as these can be harmful._
Appendix 4

Penicillin Side Effects

Hypersensitivity reactions

Reactions to penicillin can be divided into two categories:

1. Severe hypersensitivity or anaphylaxis

   This is rare with 4-15 cases of non-fatal anaphylaxis occurring in every 100 000 patients but can result in death within minutes (1-2 deaths in every 100 000 patients). Reactions are more likely in young adults and are less common in children below the age of 12 years. Anaphylaxis usually occurs within 15-30 minutes of receiving penicillin and presents with pallor, difficulty in breathing due to bronchospasm and hypotension.

2. Less severe hypersensitivity

   This is the more common reaction occurring in 5-10% of patients treated with penicillin, and results from previous contact with penicillin. Symptoms experienced by these patients are wheezing, an itchy rash (urticaria), and swelling which may involve the joints. These symptoms can occur between 30 minutes and up to three days after receiving the medication. Frequently the rash will start to develop more than three days after receiving penicillin.

Guidelines for giving penicillin by injection

Health personnel should always inquire whether the patient has had a reaction to a prior dose of penicillin since severe reactions are more common in children with a history of any type of prior reaction. If the child has had a previous reaction to penicillin then an alternative antibiotic should be given.

Skin testing is not recommended for children with no history of allergic reactions to penicillin, but all patients receiving penicillin by injection should remain in the clinic or hospital for a minimum of 30 minutes in case of an immediate reaction developing.

An emergency tray, set up for treating anaphylactic reactions, should always be readily available for immediately use. This should contain:

— epinephrine (adrenaline)
— diphenhydramine
— syringes (tuberculin or insulin)
— needles of various sizes
— antiseptic wipes

**How to treat penicillin reactions**

1. Severe hypersensitivity or anaphylaxis

   Symptoms: Anaphylaxis usually occurs within 15-30 minutes of receiving penicillin and presents with pallor, difficulty in breathing due to bronchospasm and hypotension.

   Initial treatment:
   
   Epinephrine 1:1000 (aqueous)

   Dose: infants less than 1 year: 0.1 ml per dose
          children 1-2 years: 0.2 ml per dose
          children 2-4 years: 0.3 ml per dose

   Administer by intramuscular injection in the arm that did not receive antibiotic. The dose can be repeated every 15 to 30 minutes.
The IV administration of hydrocortisone and an antihistamine agent will help to prevent deterioration after primary treatment has been given, for example:

— **diphenhydramine** 20-50 mg per dose (do not exceed 50 mg) IM or IV every 6 hours

— **hydrocortisone** 100-200 mg per dose IM or IV every 4 to 6 hours

If shock occurs, an IV infusion of a plasma substitute such as dextran should be started, if possible, **OR** normal saline solution at 20 ml/kg/hour.

2. Less severe hypersensitivity

Symptoms: wheezing, itchy rash (urticaria), and swelling which may involve the joints.

Initial treatment:

Epinephrine 1:1000 (aqueous)

Dose:

- infants less than 1 year: 0.1 ml per dose
- children 1-2 years: 0.2 ml per dose
- children 2-4 years: 0.3 ml per dose

Administer by subcutaneous or intramuscular injection in the arm that did not receive antibiotic. The dose can be repeated within 15 to 30 minutes.

If the patient responds to this treatment oral antihistamines can be given for the next 24 hours.

Oral prednisone may be necessary if the child, with a significant allergic reaction, does not respond to this treatment within 24 to 48 hours.
Mother’s Card

[Diagram of Mother’s Card]

1 Pneumonia Inpatient Recording Form
2 First Referral Level Hospital Pneumonia Register
3 Monthly Report on Cases Of Pneumonia
4 Monthly Report of Treatment Outcomes
5 Order Form for Treatment Supplies
## Pneumonia Inpatient Recording Form

**First Referral Level Hospital**

**Registration No:**

<table>
<thead>
<tr>
<th>Chest Xray</th>
<th>Yes ☐</th>
<th>No ☐</th>
</tr>
</thead>
</table>

If yes date taken and results:

<table>
<thead>
<tr>
<th>Previous pneumonia in the last 12 months</th>
<th>Yes ☐</th>
<th>No ☐</th>
</tr>
</thead>
</table>

Previous hospital admissions for pneumonia in last 12 months | Yes ☐ | No ☐ |

### Clinical Features

**Child 2 Months to 5 Years**

<table>
<thead>
<tr>
<th></th>
<th>Classification</th>
<th>Antibiotic</th>
<th>Dosage Amount/frequency/route</th>
<th>Duration days</th>
<th>Total number of doses received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Very severe pneumonia</td>
<td>☐</td>
<td>Benzyplecinil</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Severe pneumonia</td>
<td>☐</td>
<td>Amoxycllin</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Pneumonia</td>
<td>☐</td>
<td>Chloramphenicol</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>PCP</td>
<td>☐</td>
<td>Cotrimoxazole</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Other (specify)</td>
<td>☐</td>
<td>Other antibiotic (specify)</td>
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</table>

**Young Infant < 2 Months**

<table>
<thead>
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<th></th>
<th>Classification</th>
<th>Antibiotic</th>
<th>Dosage Amount/frequency/route</th>
<th>Duration days</th>
<th>Total number of doses received</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Severe pneumonia</td>
<td>☐</td>
<td>Gentamicin</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Very severe pneumonia/disease</td>
<td>☐</td>
<td>Benzyplecinil</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>PCP</td>
<td>☐</td>
<td>Amoxycllin</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Other (specify)</td>
<td>☐</td>
<td>Other antibiotic (specify)</td>
<td></td>
</tr>
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</table>

**HIV status**

- Positive ☐
- Negative ☐
- Unknown ☐

**Blood film (malaria)**

- Positive ☐
- Negative ☐
- Unknown ☐

**Measles at this visit or in past 2 months**

- Yes ☐
- No ☐

**Severe Malnutrition**

- Yes ☐
- No ☐

*Severe malnutrition is visible severe wasting or oedema in both feet*

**Date of hospital admission:**

**Weight:**

**Temperature:**

**Respiratory rate x 1 minute:**

---

* please turn over
### Hospitalisation

<table>
<thead>
<tr>
<th>Duration of hospitalisation in either</th>
<th>Hours</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge diagnosis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DISCHARGE AND FOLLOW-UP

| Course of antibiotics to be completed at home | Yes □ No □ | Child returned for follow-up visit | Yes □ No □ |
| Mother informed to return with child once antibiotics completed | Yes □ No □ | Course of antibiotic completed** | Yes □ No □ |
|                                                  |             | Child fully recovered**            | Yes □ No □ |

### Treatment Results

| Treatment completed(1) | ☐ | Failure at 48 hrs (2) | ☐ | Failure at Day 5 | ☐ |
| Left against advise(3) | ☐ | Transferred (4) | ☐ | Outcome unknown (5) | ☐ |
| Died within 24 hours of admission | ☐ | Died after 24 hours of admission | ☐ | (See below for definitions) | ☐ |

### Additional Remarks:

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### Rationale for Information/Recording System

When the decision is reached that the child has pneumonia and requires hospitalisation then the **Pneumonia Inpatient Recording Form** must be completed in addition to other forms that may be used, such as critical care pathways. The use of this form is a prerequisite of the Project providing the drugs for treatment of such cases. The form is initiated when the patient is started on treatment and is completed on discharge. The form is provided to assist the health worker in providing good quality care for the patient. All information is transferred to the **Pneumonia Inpatient Register**.

* If NO then tick Outcome Unknown (5) in Treatment Results section
** If YES then child can be registered as Treatment Completed(1) in Treatment Results section

1. Course of antibiotics completed and child fully recovered
2. Treatment failure means: Worsening of fast breathing, or Worsening of chest in-drawing, or Development/persistence of abnormal sleepiness or difficulty in awakening, or development/persistence of inability to drink or poor breastfeeding.
3. Child removed from the hospital against medical advice before treatment is completed
4. Child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result “transferred
5. When mother does not return with child for follow-up visit once course of antibiotic(s) is finished
# First Referral Level Hospital Inpatient

<table>
<thead>
<tr>
<th>Date</th>
<th>File No.</th>
<th>Name in Full</th>
<th>Address Village/District</th>
<th>Age in Months</th>
<th>Sex M/F</th>
<th>Previous Pneumonia in last 12 months Y/N</th>
<th>Previous Admission for Pneumonia Y/N</th>
<th>Clinical Signs of Pneumonia</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
## PNEUMONIA REGISTER

<table>
<thead>
<tr>
<th>Associated Conditions</th>
<th>Diagnosis confirmed by Xray Y/N</th>
<th>HIV Status</th>
<th>Admitted</th>
<th>Antibiotics for Pneumonia</th>
<th>Addition treatment</th>
<th>Treatment Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>Other(s) (Specify)</td>
<td></td>
<td></td>
<td></td>
<td>Specify</td>
<td>Treatment Completed (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Failure 48 hrs (3)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Failure 5 days (3)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Left against advice (4)</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Transferred (5)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Died before 24 hrs</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Died after 24 hrs</td>
</tr>
</tbody>
</table>

1. If “No” due to admission refused indicate with “R”
2. Course of antibiotics completed and child fully recovered
3. Treatment failure means: Worsening of fast breathing, or Worsening of chest in-drawing, or Development/persistence of abnormal sleepiness or difficulty in awakening, or Development/persistence of inability to drink or poor breastfeeding.
4. Child removed from the hospital against medical advise before treatment is completed
5. Child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result “transferred”
### MONTHLY REPORT ON CASES OF PNEUMONIA

<table>
<thead>
<tr>
<th>Name of District</th>
<th>District Coordinator’s Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Hospital</td>
<td>Signature</td>
</tr>
<tr>
<td>Patients registered in Month/Year</td>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INFANTS (under 2 months old)</th>
<th>CHILD (2 to 59 months)</th>
<th>Total by gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Severe pneumonia</td>
<td>Very severe pneumonia/disease</td>
</tr>
<tr>
<td>Males</td>
<td>2 – 11 months</td>
<td>12 – 59 months</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total by severity of pneumonia</th>
</tr>
</thead>
</table>

**Definitions to use when completing the form:**

**Severity of pneumonia**

**YOUNG INFANT (1 to 8 weeks):**
- **Severe pneumonia:** a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing and with any one or more of the following: not feeding well, convulsions, abnormally sleepy or difficult to wake, wheezing, raised temperature (>38°C) or low temperature (<35.5°C), central cyanosis, grunting or apnoeic episodes.
- **Very severe pneumonia/disease:** a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing who presents with fast breathing and/or chest indrawing and with any one or more of the following: not feeding well, convulsions, abnormally sleepy or difficult to wake, wheezing, raised temperature (>38°C) or low temperature (<35.5°C), central cyanosis, grunting or apnoeic episodes.

**CHILD (2-59 months old):**
- **Pneumonia:** a patient presenting with cough or difficult breathing with fast breathing
- **Severe pneumonia:** a patient presenting with cough or difficult breathing with fast breathing and chest indrawing
- **Very severe pneumonia:** a patient with severe pneumonia with any one or more of the following: central cyanosis, severe respiratory distress, not feeding/drinking well, convulsions, abnormally sleepy or difficult to wake, stridor in a calm child.
MONTHLY REPORT OF PNEUMONIA TREATMENT RESULTS

Name of District ________________________________  District Coordinator’s ________________________________
Name of Hospital ________________________________  Signature ________________________________
Patients registered in Month/Year _________________  Date ________________

<table>
<thead>
<tr>
<th>Type of case</th>
<th>Antibiotic given</th>
<th>Total no: of pneumonia patients registered in above month</th>
<th>Completed Treatment</th>
<th>Left against advise</th>
<th>Transferred</th>
<th>Outcome unknown</th>
<th>Treatment Failures</th>
<th>Died</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young infants: (1 through 8 weeks)</td>
<td></td>
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<tr>
<td>Severe pneumonia</td>
<td>Benzylpenicillin/ Gentamicin/ Amoxicillin</td>
<td></td>
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<tr>
<td>Other(s) (specify):</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Very severe Pneumonia/ disease</td>
<td>Benzylpenicillin/ Gentamicin/ Amoxicillin</td>
<td></td>
<td></td>
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<tr>
<td>Other(s) (specify):</td>
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</tr>
<tr>
<td>Children: (2 through 59 months)</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Cotrimoxazole</td>
<td></td>
<td></td>
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<tr>
<td>Other(s) (specify):</td>
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<tr>
<td>Severe pneumonia</td>
<td>Benzylpenicillin/ Amoxicillin</td>
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<tr>
<td>Other(s) (specify):</td>
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<td></td>
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<tr>
<td>Very severe pneumonia</td>
<td>Chloramphenicol</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other(s) (specify):</td>
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</tr>
</tbody>
</table>

please turn over for definitions to use when completing the form
Definitions to use when completing the form:

Severity of pneumonia
YOUNG INFANT (1 to 8 weeks):

Severe pneumonia a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing
Very severe pneumonia/disease a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing and with any one or more of the following:
not feeding well, convulsions, abnormally sleepy or difficult to wake, wheezing, raised temperature (>38°C) or low temperature (<35.5°C), central cyanosis, grunting or apnoeic episodes.

CHILD (2-59 months old):

Pneumonia a patient presenting with cough or difficult breathing with fast breathing
Severe pneumonia a patient presenting with cough or difficult breathing with fast breathing and chest indrawing
Very severe pneumonia a patient with severe pneumonia with any one or more of the following: central cyanosis, severe respiratory distress, not feeding/drinking well, convulsions, abnormally sleepy or difficult to wake, stridor in a calm child.

Treatment results

Treatment completed Course of antibiotics completed i.e. all prescribed injections/tablets/capsules have been given and the young infant/child is fully recovered i.e. respiratory rate, temperature and drinking/eating/feeding pattern, for the particular child, have returned to normal.

Treatment failure Failure of initial antibiotic treatment/antibiotic was changed because of: Worsening of fast breathing, or Worsening of chest in-drawing, or Development/persistence of abnormal sleepiness or difficulty in awakening, or Development/persistence of inability to drink or poor breastfeeding. It should be recorded if this was at 48 hours or 5 days.

Left against advise Child removed from the hospital against medical advice before treatment is completed

Transferred Child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result “transferred”.

Outcome unknown When mother does not return with child for follow-up visit once course of antibiotic(s) is finished

Died When a child dies during treatment it should be recorded whether the child died during or after the first 24 hours following admission
# Order Form for Treatment Supplies

Enter the number of cases registered in the previous month (from *Monthly Report* from inpatient services for pneumonia)

<table>
<thead>
<tr>
<th>Item</th>
<th>Young infant – severe pneumonia/very severe pneumonia/disease cases</th>
<th>Child - severe pneumonia cases</th>
<th>Child - very severe pneumonia cases</th>
<th>Child pneumonia*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Factor</td>
<td>Total A</td>
<td>Cases</td>
<td>Factor</td>
</tr>
<tr>
<td>Benzylpenicillin 0.6g (1 MU) vial</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>X 8 vials =</td>
<td></td>
<td></td>
<td></td>
<td>X 12 vials =</td>
<td>0</td>
</tr>
<tr>
<td>Gentamicin 20 mg vial</td>
<td></td>
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<tr>
<td>X 16 vials =</td>
<td></td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Amoxicillin suspension (125mg/5ml)</td>
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<tr>
<td>X 36 mls =</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Amoxycillin 250 mg tablet</td>
<td>0</td>
<td></td>
<td>X 9 tabs =</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cotrimoxazole paediatric tablet (Sulphameth/trim 100/20 mg)</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chloramphenicol x injection 1g vial</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>X 8 vials =</td>
</tr>
<tr>
<td>Chloramphenicol powder for oral suspension 1.8g/60ml bottle</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>X 225 mls =</td>
</tr>
<tr>
<td>Syringes/Needles</td>
<td>X 32 =</td>
<td></td>
<td></td>
<td>X 12 =</td>
<td>X 15 =</td>
</tr>
<tr>
<td>Water for injection x 10 ml ampoule</td>
<td>X 11 =</td>
<td></td>
<td></td>
<td>X 5 =</td>
<td>X 7 =</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Running requirement</th>
<th>Reserve requirement</th>
<th>Currently in stock</th>
<th>Total order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E (from above) = F</td>
<td>G ( = F)</td>
<td>H</td>
<td>F + G - H = Total</td>
</tr>
<tr>
<td>Benzylpenicillin 0.6g (1 MU) vial</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin 20 mg vial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin suspension (125mg/5ml)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Amoxycillin 250 mg tablet</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole paediatric tablet (Sulphameth/trim 100/20 mg)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol x injection 1g vial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol powder for oral suspension 1.8g/60ml bottle</td>
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</tr>
<tr>
<td>Syringes/Needles</td>
<td></td>
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<tr>
<td>Water for injection x 5 ml ampoule</td>
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</tbody>
</table>

* The number to be entered in this column is found on the *Monthly Report on Cases of Pneumonia* under CHILD (2-59 months) section pneumonia column

Name and Signature: ___________________________ Date: ___________________________
FORMS

OPTIONAL

Outpatient (community level) services

1  First Referral Level (community level) Acute Respiratory Infection Register

2  Monthly Report of ARI Case Finding And Treatment Outcomes
## Child Lung Health Programme

### Acute Respiratory Infections

<table>
<thead>
<tr>
<th>Date</th>
<th>File No.</th>
<th>Name in full</th>
<th>Address in full</th>
<th>Age in months</th>
<th>Sex M/F</th>
<th>Main presenting symptoms</th>
<th>Reassessment visit¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Street/village</td>
<td>District</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respiratory rate x 1 min</td>
<td>Chest indrawing</td>
<td>Chronic cough &gt; 21 days</td>
<td>Wheeze</td>
<td>Ear problem</td>
</tr>
</tbody>
</table>

1. Follow up visit for reassessment of child taking an antibiotic for pneumonia
2. If otitis media diagnosed state if acute "A" or chronic "C" in nature
3. If at reassessment visit antibiotic was changed identify the replacement antibiotic
4. If the child is managed entirely in the clinic, leave this section blank; if referred to hospital but not admitted check for assessment; if referral for admission is necessary but not possible indicate with N/P
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Treatment</th>
<th>Referred to hospital</th>
<th>Treatment results</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough or Cold</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Cough</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otitis media</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptococcal Pharyngitis</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td></td>
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<tr>
<td>Severe Pneumonia</td>
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</tr>
<tr>
<td>Very Severe Pneumonia/disease</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
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<tr>
<td>Antibiotic at home (specify)</td>
<td></td>
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</tr>
<tr>
<td>Reassessment Antibiotic change (specify)</td>
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<td></td>
</tr>
<tr>
<td>Other (specify)</td>
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<td></td>
</tr>
<tr>
<td>For admission</td>
<td></td>
<td></td>
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<tr>
<td>For assessment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Treatment completed</td>
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</tr>
<tr>
<td>Died</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Absconded</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Transferred</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

5 Course of antibiotics completed and child fully recovered
6 Child does not return for reassessment during course of antibiotics
7 Child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result "transferred"
# CHILD LUNG HEALTH PROGRAMME

## QUARTERLY REPORT OF ARI CASE FINDING AND TREATMENT OUTCOMES

**REGISTERED IN THE PREVIOUS MONTH**

<table>
<thead>
<tr>
<th>Name of District</th>
<th>ARI Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Health Facility</td>
<td>Signature</td>
</tr>
<tr>
<td>Patients registered in _______ quarter of Year _________</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Type of case</th>
<th>Action taken</th>
<th>Treatment outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Referred to hospital</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>Antibiotic at home</td>
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<td>Admit</td>
<td>Assess</td>
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<tr>
<td>Young infant</td>
<td>severe pneumonia/Very severe pneumonia/disease</td>
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<td></td>
<td>Acute otitis media</td>
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<td>Cough or cold</td>
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<td>Other</td>
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<tr>
<td>Child 2 months to 5 years</td>
<td>Pneumonia</td>
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<tr>
<td></td>
<td>Severe pneumonia</td>
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<td>Very severe pneumonia/disease</td>
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<td>Acute otitis media</td>
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<td>Chronic otitis media</td>
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<td>Streptococcal pharyngitis</td>
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<td>Wheeze</td>
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<td>Chronic cough</td>
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<td>Other</td>
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</table>

Please turn over for definitions to use when completing the form.
Definitions to use when completing the form:

**Young infant (under 2 months old):**

**Severe pneumonia**
- a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing

**Very severe pneumonia/disease**
- a patient with cough or difficult breathing who presents with fast breathing and/or chest indrawing
- and with any one or more of the following:
- not feeding well, convulsions, abnormally sleepy or difficult to wake, wheezing, raised temperature (>38°C) or low temperature (<35.5°C), central cyanosis, grunting or apnoeic episodes.

**CHILD (2-59 months old):**

**Pneumonia**
- a patient presenting with cough or difficult breathing with fast breathing

**Severe pneumonia**
- a patient presenting with cough or difficult breathing with fast breathing and chest indrawing

**Very severe pneumonia**
- a patient with severe pneumonia with any one or more of the following: central cyanosis, severe respiratory distress, not feeding/drinking well, convulsions, abnormally sleepy or difficult to wake, stridor in a calm child.

**Treatment completed**
- Course of antibiotics completed i.e. all prescribed injections/tablets/capsules have been given and the young infant/child is fully recovered i.e. respiratory rate, temperature and drinking/eating/feeding pattern, for the particular child, have returned to normal.

**Absconded**
- Child removed from the health facility against medical advise before treatment is completed.

**Transferred**
- Child is referred for treatment to another health facility and the result of treatment is unknown; where the result is known, that result should be recorded in place of the result “transferred.”