



# **Guidelines for Management of Tuberculosis in Children**

Ministry of Health  
Sri Lanka

**National Programme for Tuberculosis Control  
and Chest Diseases**

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**FOREWORD**

Tuberculosis (TB) remains a major & growing public health problem throughout the world. Tuberculosis can affect all sections of society and all countries and communities are vulnerable to this infectious disease. In Sri Lanka about 9,000 cases are detected each year.

Tuberculosis can be cured completely by proper treatment. The 'DOTS Strategy' which was implemented in 1997 in Sri Lanka is the most cost effective way of controlling the disease.

Since the children with TB can present with complications such as 'Miliary TB' and 'TB meningitis' it is very important to diagnose them early and manage properly to prevent deaths due to TB. Therefore it is essential that all children with tuberculosis are managed according to the national guidelines provided in this manual.

Fixed-Dose combinations of Anti-TB drugs was introduced in Sri Lanka in 2005, for adult patients with TB. Similarly by introducing the paediatric formulations of Fixed- Dose Combinations of Anti-TB drugs is expected to manage the children with TB more effectively in the coming years.

I request all health personnel in the country to adhere to the national guidelines and join hands in addressing the challenge of tuberculosis control.

Dr. U. Ajith Mendis

Director General of Health Services

30 April, 2008

## **PREFACE**

The National Programme for Tuberculosis Control and Chest Diseases (NPTCCD) has prepared the “Guidelines for management of tuberculosis in children” with the aim to give practical guidance to all those who diagnose & manage tuberculosis in children.

Following up on the application submitted by Sri Lanka to the Global Drug Facility (GDF) for a grant of anti-TB drugs, a conditional approval was granted by the Stop TB Coordinating Board upon the recommendation of the GDF Technical Review Committee. The development and implementation of paediatric guidelines is one condition that needed to be addressed, the guidelines were prepared.

“Guidance for national tuberculosis programmes on the management of tuberculosis in children” published by World Health Organization in 2006 is a document that complement national and international guidelines and standards for managing TB, many of which include guidance on children. NPTCCD revised the document to adapt the guidance according to local circumstances.

“National Guidelines for the management of tuberculosis in children” is a combined effort of the NPTCCD and the ‘College of Paediatricians’. It is intended for the use by all the medical officers both in the public & private sector in the management of childhood TB and I trust that they will adhere to the guidelines laid down here to diagnose the TB in children early in the disease, to ensure cure of the diagnosed patients and to prevent the emergence of Multidrug-resistant TB.

I express my sincere thanks to all those who worked hard in developing the guidelines.

Dr. Chandra Sarukkali  
Director

National Programme for Tuberculosis Control and Chest Diseases

**ABBREVIATIONS**

<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>ART</b>	Antiretroviral Therapy
<b>ARTI</b>	Annual Risk of Tuberculosis Infection
<b>BCG</b>	Bacillus Calmete & Guarin
<b>CNS</b>	central Nervous System
<b>CHDR</b>	Child Health Development Record
<b>CSF</b>	Cerebra- Spinal Fluid
<b>DDG</b>	Deputy-Director-General
<b>DDG/PHS</b>	Deputy Director General Public Health Services
<b>DGHS</b>	Director General of Health Services
<b>D/NPTCCD</b>	Director/ National Programme for Tuberculosis Control and Chest Diseases
<b>DOT</b>	Directly Observed Treatment
<b>DOTS</b>	Internationally recommended strategy for tuberculosis control
<b>DTCO</b>	District Tuberculosis Control Officer
<b>GDF</b>	Global Drug Facility
<b>GFATM</b>	Global Fund to Fight AIDS, Tuberculosis and Malaria
<b>HAART</b>	Highly Active Antiretroviral Therapy
<b>HIV</b>	Human Immunodeficiency Virus
<b>IRIS</b>	Immune Reconstitution Inflammatory Syndrome
<b>IUATLD</b>	International Union Against TB & Lung Disease
<b>M. bovis</b>	Mycobacterium bovis
<b>MDG</b>	Millennium Development Goal
<b>MDR-TB</b>	Multi Drug Resistant tuberculosis
<b>MLT</b>	Medical Laboratory Technician
<b>MO</b>	Medical Officer
<b>MoH</b>	Ministry of Healthcare and Nutrition
<b>Nacl</b>	Sodium Chloride
<b>NPTCCD</b>	National Programme for Tuberculosis Control and Chest Diseases
<b>NTP</b>	National Tuberculosis Programme
<b>PPD</b>	Purified Protein Derivative
<b>SAARC</b>	South Asian Association for Regional Cooperation
<b>SEAR</b>	South East Asian Region
<b>TB</b>	Tuberculosis
<b>TST</b>	Tuberculin Skin Test
<b>TU</b>	Tuberculin Units
<b>WHO-SEARO</b>	WHO South-East Asia Regional Office (New Delhi)
<b>TB</b>	Tuberculosis
<b>WHO</b>	World Health Organization





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## **1. INTRODUCTION**

### **1.1 Global, Regional and Country Burden**

Tuberculosis (TB) infects over one third of the world's population, causes 8 million new cases of disease, and over 2 million deaths every year worldwide. TB is the leading cause of death in women in their reproductive years, responsible for 9% of deaths in this age group and kills more women than all causes of maternal mortality combined.

Tuberculosis is mainly affecting people in the economically active age groups, which result in an immense loss to communities and countries. TB is a disease of poverty. It impacts most on developing countries, which carry 95% of the global TB burden, and on disadvantaged groups within all societies.

The WHO South-East Asia Region carries the highest burden of tuberculosis among all WHO Regions: 35% of the global burden. Within this Region, five countries (Bangladesh, India, Indonesia, Myanmar and Thailand) belong to the 22 TB high-burden countries, which contribute 80% of the global caseload. Another SAARC<sup>1</sup> Member country, Pakistan, belongs to the 22 high-burden countries, but is located in the WHO Eastern Mediterranean Region. India alone contributes 20% of the global disease burden.

Sri Lanka is not among the high-burden countries. However, tuberculosis remains a widespread problem and poses a continuing threat to the health and development of the people. It is estimated that about 60% of adults and 45% of the general population have been infected with the disease. The annual risk of tuberculosis infection (ARTI) is falling slowly, with the decline estimated at about 2% per year. The highest rates of infection have been found in the most densely populated areas, such as Colombo and other urban areas.

### **1.2 Tuberculosis Disease**

Nearly 17 000 people (80/100 000) are currently estimated to suffer from tuberculosis disease. Every year, it is estimated that more than 11 000 new cases (60/100 000) arise. About half of these new cases (more than 5000 annually or 27/100 000) are sputum smear-positive and, if untreated, continue to spread the infection. Over 50 000 people are expected to develop TB disease during the next five years. The majority of these patients will be people in the economically active age groups of 15–54 years.

Reported rates of smear-positive TB are substantially higher in males than in females, except among children, possibly because adult men are more frequently exposed to infection than women.

### **1.4 Tuberculosis in Children**

Over 250,000 children develop TB and 100,000 children will continue to die each year from TB. Deaths due to TB is the leading cause of child orphanage mostly in developing countries. In Sri Lanka, 360 new TB cases in children were found during 2007 and annual age distribution of children is around 4% of total new cases.

The main source of transmission of TB infection to a child is usually an adult with positive tuberculosis in the lungs. TB in children is mainly due to a failure to cure the infectious adult patients. Adults who do not complete their TB treatment put young children below ten years of age at risk to become infected with TB bacilli with a high risk of becoming active tuberculosis.

### **1.6 HIV and Tuberculosis**

Tuberculosis patients have been included in the annual sentinel surveillance for HIV since 1993. In Sri Lanka, only 5 HIV positive cases have been detected among the patients tested during the year of 2006 and 2007. It is estimated that one fifth of the cases that progressed to AIDS had co-existing TB. However, since 80% of the HIV cases are in the age group 20-44 years, the TB/HIV association is of potential significance. Increasing numbers of HIV-related TB cases can be expected as the prevalence of HIV increases in Sri Lanka.

In HIV infected children the risk of developing TB meningitis is very high and often results in deafness, blindness, paralysis and mental retardation.

### **1.7 Multi Drug-Resistant Tuberculosis**

The emergence of multi drug-resistant tuberculosis (MDR-TB), defined as resistance against at least isoniazid and rifampicin, may pose a threat to the success of the programme. All smear-positive patients who fail Category 1 or 2 regimens either have sputum samples taken or are referred to the National Reference Laboratory, for culture and drug-susceptibility testing, which is performed at the National Reference Laboratory. 8 new MDR TB cases were detected in 2007 and out of them 2 were under 14 year of age.

The fact that a substantial number of patients are treated in the private sector where data on proper case management are not readily available, potentially contributes to the further emergence of resistant TB strains.

## **2. GOAL, OBJECTIVE AND TARGETS OF NPTCCD**

### **2.1 Goal**

Sri Lanka under scribes the global vision of a TB-free world.

The overall medium-term goal for TB control is to reduce morbidity, mortality and transmission of TB until it is no longer a public health problem in the country. Elimination of TB, defined as less than one case per million populations, is a long-term goal targeted for 2050.

## 2.2 Objectives

The objectives of NPTCCD are:

- ❖ To ensure that every TB patient has access to effective diagnosis, treatment and cure;
- ❖ To interrupt the transmission of TB;
- ❖ To prevent the emergence of drug resistance;
- ❖ To reduce the social and economic toll caused by TB.

## 2.3 Targets

The NPTCCD is putting the following targets, in line with internationally agreed targets:

To reach and thereafter to sustain the 2005 global targets—achieving at least 70% case detection and at least 85% treatment success among TB cases under DOTS; in order to then, reach the interim targets of at least halving TB deaths and prevalence by 2010; towards, halting and reversing the incidence of TB as stated in the Millennium Development Goals, set for 2015.

## 3 STRUCTURE OF NPTCCD

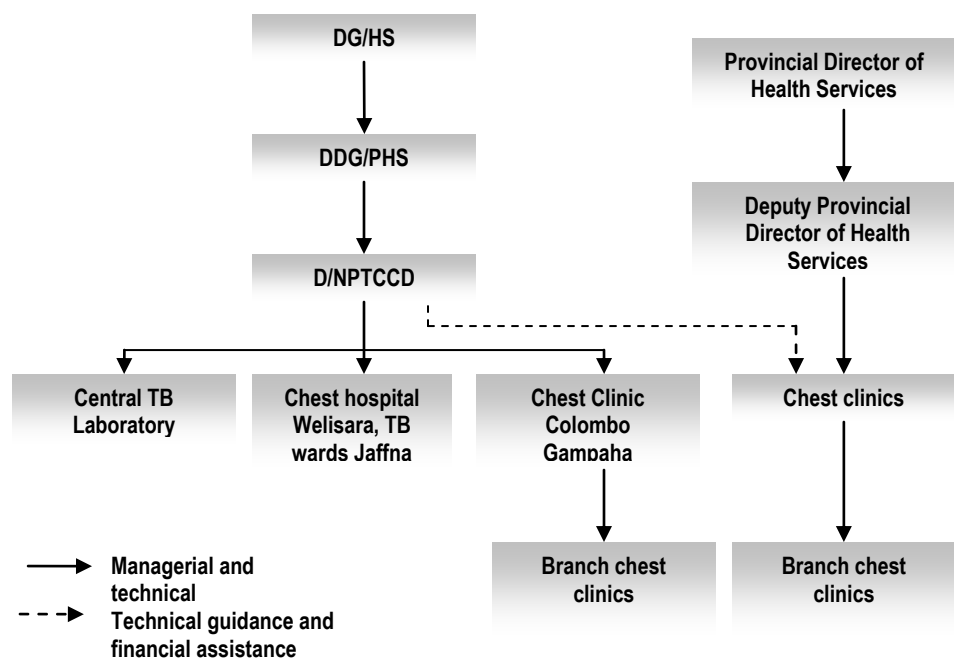
### 3.1 Central level

Tuberculosis control in Sri Lanka is operated through NPTCCD. The programme is headed by a director, who functions under the DDG for Public Health Services in the Directorate-General of Health Services.

The public health facilities for tuberculosis control consist of the government institutions under the direct management of the central unit of the National Programme for Tuberculosis Control and Chest Diseases (NPTCCD), the district chest clinics of Colombo and Gampaha, the chest hospital/ Wellisara (National Reference Hospital), the National Reference Laboratory (also located at Wellisara) and the TB wards in Jaffna); The other chest clinics come under the respective Provincial Director and Deputy Provincial Director of Health Services. The role of the central unit is mainly to provide technical advice and to channel funds obtained from international sources, in addition to what the provinces provide under the provincial governments.

The organizational structure of NPTCCD is given in Figure 1

**Figure 1: Organizational structure of NPTCCD**



The central unit has, apart from its Director, other Medical Officers to assist in TB control activities.

### 3.2 District level

The DTCOs are responsible for coordinating all TB control activities in the district, and DTCOs (except Colombo and Gampaha) are administratively under provincial health authority. Each district has a chest clinic, which is the central reference place for all TB patients residing in the district. The chest clinics are mainly involved in TB control activities and also involve in the diagnosis and managements of respiratory diseases. All of them are equipped with a microscopy laboratory and have X-ray facilities. Staffing includes a chest physician in Ten chest clinics, as well as medical officers, nursing officers and one or two public health inspectors.

## **4 CLASSIFICATION OF TUBERCULOSIS**

It is important to classify the cases of TB in order to determine the correct treatment regimen and the duration of treatment and for recording and reporting purposes, which will facilitate cohort analysis of treatment outcome.

Classification of tuberculosis is based on:

- Site of TB disease
- Results of sputum smear
- History of previous TB treatment

### **4.1 Classification by Site of disease and Result of sputum smear**

#### **Pulmonary tuberculosis (PTB)**

Pulmonary tuberculosis refers to disease involving the lung parenchyma.

#### **Smear-positive pulmonary tuberculosis**

- A patient with at least two sputum smears positive for AFB by direct smear microscopy

OR

- A patient with at least one sputum smear positive for AFB by microscopy and chest X-ray abnormalities consistent with active pulmonary TB as determined by a clinician

OR

- A patient with at least one sputum smear positive for AFB by microscopy and sputum culture positive for *M. tuberculosis*.

### **Smear-negative pulmonary tuberculosis**

- A patient with at least three sputum smears negative for AFB by microscopy **and** chest X-ray abnormalities consistent with active pulmonary tuberculosis **and** no response to a course of broad-spectrum antibiotics **and** a decision by a clinician to treat the patient with a full course of anti-tuberculosis therapy (Any patient given anti-TB treatment should be recorded as a case. Incomplete trials of anti-tuberculosis treatment should not be considered a method of diagnosis).

OR

- A patient whose initial sputum smears were negative for AFB, but whose sputum culture is positive for *M. tuberculosis*.

This group also includes cases without smear result, which should be exceptional in adults but are relatively more frequent in children, because children rarely produce a positive sputum smear.

### **Extrapulmonary tuberculosis (EPTB)**

This refers to tuberculosis of any organ of the body other than the lung parenchyma. Diagnosis should be based on one smear/culture-positive specimen, **or** histological **or** strong clinical evidence consistent with active extrapulmonary tuberculosis, followed by a decision by a clinician to treat with a full course of anti-tuberculosis chemotherapy.

A patient with both pulmonary and extrapulmonary tuberculosis should be classified as a case of pulmonary TB.

Cases of pleural effusion and intra-thoracic lymphadenopathy (mediastinal and hilar) without X-ray abnormalities in the lung parenchyma are also classified as extrapulmonary TB.

#### **4.2 Classification by previous treatment**

In order to identify those patients at increased risk of acquired drug resistance and to prescribe appropriate treatment, a case should be defined according to whether or not the patient has previously received TB treatment.

The following definitions are used:

##### **New**

A patient who has never taken treatment for TB

OR

Who has taken anti-tuberculosis drugs for less than one month



**Relapse**

A patient previously treated for TB who has been declared cured or treatment completed, and is diagnosed with bacteriologically positive (smear or culture) tuberculosis

**Treatment after failure**

A patient on treatment with category 1 who remains smear-positive at the end of 5 months or later during the course of treatment

**Treatment after default**

A patient who returns to treatment, with positive bacteriology, following interruption of treatment for two months or more

**Transfer in**

A patient already registered in one district and transferred to another district for continuation of treatment

**Other**

A patient who does not fit into anyone of the above definitions: e.g.

- A patient who has been taking treatment for TB for more than four weeks without being registered with the NTP.
- A patient with smear-negative pulmonary TB or extrapulmonary TB who may have relapsed (but without any bacteriological evidence) although this may be rare.

**Chronic**

Patient remaining sputum smear positive after completing a fully supervised re-treatment regimen

## **5 DIAGNOSIS OF TUBERCULOSIS (TB) IN CHILDREN**

Diagnosis of TB in children refers to the recognition of an active case, i.e. a child with symptomatic disease due to *Mycobacterium tuberculosis* infection.

### **Recommended approach to diagnosis of TB in children**

1. History
2. Clinical examination
3. Tuberculin skin testing
4. Bacteriological confirmation
5. Investigations relevant to suspected TB
6. HIV testing

#### **5.1 HISTORY**

This should include a *contact history of TB* and *symptoms consistent with TB*.

### Contact history of TB

- *Close contact is defined as living in the same household as or in frequent contact with a source case with sputum smear-positive pulmonary TB.*
- Sputum smear-negative but culture-positive source cases are much less infectious.
- Source cases include the child's household members, neighbours in crowded areas, frequent visitors, servants, school van drivers, staff in day care centres, nurseries etc.
- All children under 5 years of age and children, who are symptomatic between 5-15 years, must be screened for TB if they have been in close contact with a smear-positive TB case.
- When any child below 15 years of age is diagnosed as having TB, an effort should be made to detect the source case.
- Children should be regarded as infectious if they have sputum smear-positive pulmonary TB or cavitary TB on chest x-ray (CXR). In such instances contacts must be sought and screened.

### Symptoms consistent with TB

- An unremitting cough that has been present for more than three weeks.
- Fever for two weeks or more.
- A history of weight loss or failure to thrive. In children below 5 years of age it is helpful to look at the child's growth chart.
- A recent history of lethargy or malaise.

## 6.2 CLINICAL EXAMINATION

- Manifestations such as phlyctenular conjunctivitis and erythema nodosum are suggestive of TB.
- Documented weight loss or failure to gain weight is indicators of a chronic disease such as TB.
- Absence of BCG scar is a point in favour of TB in a child below 5 years of age.
- Non-painful, enlarged, matted cervical lymphadenopathy is *suggestive of TB*. The presence of an overlying sinus or fistula is highly suggestive of TB.
- Gibbus, especially of recent onset, is *highly suggestive of spinal TB*.
- Meningitis with atypical features such as sub acute onset or poor response to antibiotic therapy requires exclusion of TB.
- Pleural effusion, pericardial effusion and ascites *require investigation to exclude TB*.
- A monoarthropathy of more than one month duration requires exclusion of TB.

## 6.3 TUBERCULIN SKIN TEST (TST)

- A TST is the *intra*dermal injection of mycobacterial antigens which elicit an immune response, represented by induration, measured in millimetres (mm).
- TST using the Mantoux method is recommended for identifying people infected with *M. tuberculosis*.
- A positive TST occurs when a person is infected with *M. tuberculosis*, but does not necessarily indicate active disease.
- In Sri Lanka, the TST is standardized using 2 tuberculin units (TU) of tuberculin purified protein derivative (PPD) RT23.
- TST can be used to screen children exposed to TB. It may also be used in HIV-infected children to identify those with dual TB/HIV infection, although fewer HIV-infected children will have a positive TST.

**The following steps should be followed in performing the Mantoux test:**

- Place the left forearm palm-side up on a firm, well-lit surface.
- Select an area, at the junction of the upper and middle thirds of the forearm, free of scars and sores.
- Clean the area with an alcohol swab.
- Check the expiry date on the tuberculin vial and ensure that the vial contains 2 TU of tuberculin PPD RT23 per 0.1 ml.
- Use a single-dose tuberculin syringe with a ¼ to ½ inch, 27-gauge needle with a short bevel.
- Fill the syringe with 0.1 ml tuberculin.
- Insert the needle slowly, bevel up, intradermally, at an angle of 5-15 degrees.
- Needle bevel should be visible just below skin surface.
- After injection, a flat intradermal wheal of 8-10 mm diameter should appear. If not, a repeat injection at a site at least 5 cm away from the original site.
- Record all the information required for documentation (e.g. date and time of test, injection site location, lot number of tuberculin)

**The Mantoux test should be read as follows:**

- Results should be read between 48 and 72 hours after administration. A patient not returning within 72 hours will need to be rescheduled for another TST.
- Visually inspect injection site and measure induration (thickening of skin), not erythema (reddening of the skin).
- Use fingertips as a guide for marking widest edges of induration across the forearm.
- Place the “0” line of a clear flexible ruler on one edge of the induration.
- Read the ruler line on the opposite edge of the induration. Use the lower measurement if the reading is between two gradations on the mm scale).
- The reading should be taken with the elbow extended.
- *Do not record as “positive” or “negative”.*
- Only record measurement in millimetres.
- If no induration, record as 0 mm.

*N.B.*

*The direction of the reading of the area of induration was changed from transverse to any direction on the personal experience and advice of paediatricians.*

- Interpretation of the Mantoux test depends on two factors:
  - a. Diameter of the induration.
  - b. Child's risk of being infected with TB and if infected, the risk of progression to disease.
- Diameter of induration of **5 mm or more** is considered **positive in high-risk** children (HIV-infected children and severely malnourished children), whether they have received a BCG vaccination or not.
- Diameter of induration of **10 mm or more** is considered **positive in all other children** whether they have received a BCG vaccination or not.

There can be *false-positive* as well as *false-negative* TSTs.

**Causes of a positive Mantoux test in the absence of TB infection**  
**(Causes of false-positive Mantoux test)**

- Incorrect interpretation of test
- BCG vaccination
- Infection with non-tuberculous mycobacteria
- Secondary infection (at site)

**Causes of a negative Mantoux test in the presence of TB infection**  
**(Causes of false-negative Mantoux test)**

- Incorrect administration or interpretation of test
- HIV infection
- Improper storage of tuberculin
- Viral infections (e.g. measles, varicella)
- Vaccination with live viral vaccines (within 6 weeks)
- Under nutrition
- Bacterial infections (e.g. typhoid, leprosy, pertussis)
- Immunosuppressive medications (e.g. corticosteroids)
- Neonates
- Primary immunodeficiencies
- Diseases of lymphoid tissue (e.g. Hodgkin disease, lymphoma, leukaemia)
- Disseminated TB and miliary TB

Sometimes it is useful to repeat the Mantoux test in children once their nutritional status has improved or their severe illness (including TB) has resolved, as they may be initially TST negative but positive after 2-3 months on treatment.

A negative TST ***never*** rules out a diagnosis of TB in a child.

#### 6.4 BACTERIOLOGICAL CONFIRMATION

- It is always advisable to confirm the diagnosis of TB in a child using appropriate specimens and available laboratory facilities.
- Appropriate specimens from suspected sites of involvement should be obtained for microscopy, culture and histopathological examination. Such appropriate clinical samples include sputum and biopsy material.
- Mycobacterial culture is the only way to differentiate *M. tuberculosis* from other non-tuberculous mycobacteria.
- Bacteriological confirmation is especially important for children who have:
  - suspected drug-resistant TB
  - HIV infection
  - complicated or severe disease
  - an uncertain diagnosis
- Common ways of obtaining samples for smear microscopy include the following:

##### Expectoration

- ***It is very important to ensure that specimens are of sputum and not saliva.***
- All sputum specimens produced by children should be sent for smear microscopy and, where available, mycobacterial culture.
- Children who can produce a sputum specimen may be infectious and should be asked to do this outside and not in enclosed spaces (such as toilets).
- Sputum should always be obtained in children 10-15 years of age who are pulmonary TB suspects.
- Among younger children, especially children under 5 years of age, sputum is difficult to obtain and most children are sputum-smear negative.
- Bacterial yields are higher in children 10-15 years of age and in children of all ages with severe disease.
- Three sputum specimens should be obtained. An on-the-spot specimen (at first evaluation), an early morning specimen and a second on-the-spot specimen next day. In hospitalized patients three early morning specimens are preferable.

##### The following steps should be followed in obtaining a sputum specimen:

1. Explain to the child and family members the reason for sputum collection.
2. Instruct the child to rinse his/her mouth with water before producing the specimen. This will help to remove food and any contaminating bacteria in the mouth.
3. Instruct the child to take two deep breaths, holding the breath for a few seconds after each inhalation and then exhaling slowly. Ask him/her to breathe in a third time and then forcefully blow the air out. Ask him/her to breathe in again and then cough. This should produce sputum from deep in the lungs. Ask the child to hold a wide mouth sputum container close to the lips and to spit into it gently after a productive cough. Close the lid of the container.

4. If the amount of sputum is insufficient, encourage the child to cough again until a satisfactory specimen is obtained.

### **Sputum induction**

- This is a procedure which generates aerosols and, wherever possible, should be performed in an isolation room that has adequate infection control precautions.
- It is safe and effective in children of all ages and the bacterial yields are as good as or better than for gastric aspirates.
- Adverse effects include coughing spells, mild wheezing and nosebleeds.
- *Training and specialized equipment are required to perform this procedure.*
- Children with the following characteristics should not undergo sputum induction:
  - a. If a child has not been fasting for at least 3 hours, postpone procedure until appropriate time.
  - b. Severe respiratory distress
  - c. Low platelet count, bleeding tendency, history of severe nosebleeds
  - d. Reduced level of consciousness
  - e. History of significant asthma (diagnosed and treated by a clinician)

### **The following steps should be followed in carrying out sputum induction:**

1. Administer a bronchodilator to reduce the risk of wheezing.
2. Administer nebulized hypertonic saline (3% NaCl) for 15 minutes or until 5 ml of solution have been fully administered.
3. Give chest physiotherapy to mobilize secretions.
4. For older children now able to expectorate, follow procedures described earlier to collect expectorated sputum.
5. For young children unable to expectorate carry out either suction of the nasal passages to remove nasal secretions or nasopharyngeal aspiration to collect a suitable specimen.
6. Any equipment that will be reused will need to be disinfected and sterilized before use for a subsequent patient.

*Pharyngeal aspiration using a mucous extractor is a suitable alternative procedure to obtain sputum.*

## **6.5 INVESTIGATIONS RELEVANT TO SUSPECTED TB**

### **Suspected pulmonary TB**

- Chest x-ray (CXR) is useful in the diagnosis of TB in children.
- The majority of children with pulmonary TB have suggestive CXR changes.
  - The commonest picture is that of persistent opacity-s in the lung together with enlarged hilar or subcarinal lymph glands.

- A miliary pattern of opacification in a non HIV-infected child is highly suggestive.
- Children with persistent opacification not improving after a course of antibiotics should be investigated for TB.
- Adolescents with TB may have CXR changes similar to adult patients with large pleural effusions and infiltrates with cavity formation in the upper zones being the most common form of presentation. They could also manifest primary disease with hilar lymphadenopathy and collapse lesions visible on CXR.
- CXRs should preferably be read by a radiologist or a clinician.

### **Suspected extrapulmonary TB**

- Lymph node biopsy and culture are indicated in TB lymphadenopathy.
- Lumbar puncture is indicated in suspected miliary TB and TB meningitis.
- CXR and pleural tap (for biochemical analysis, cell count and culture) are indicated in pleural effusion.
- Abdominal ultrasound and ascitic tap are indicated in abdominal TB.
- X-ray, joint tap and synovial biopsy are indicated in TB arthritis.
- Echocardiography and pericardial tap are indicated in pericardial TB.

***All efforts should be taken to send specimens for culture.***

### **Other tests**

- *Serological tests and nucleic acid amplification (e.g. polymerase chain reaction) tests are not currently recommended for routine diagnosis of childhood TB.*
- Other specialized tests, such as computerized chest tomography and bronchoscopy are not recommended for the routine diagnosis of TB in children.
- **A trial of treatment with anti-TB medications is not recommended as a method to diagnose TB in children.**

### **6.6 HIV TESTING**

In Sri Lanka, which has a low HIV prevalence, HIV counselling and voluntary testing is indicated for TB patients with symptoms and/or signs of HIV-related conditions and in TB patients having a history suggestive of high risk of exposure to HIV.

### **56.7 STANDARD CASE DEFINITIONS OF TB IN CHILDREN**

The case definition is determined by the:

- site of disease,
- result of any bacteriological tests,
- severity of TB disease and
- history of previous anti-TB treatment.



### **Pulmonary TB, sputum smear-positive**

The criteria are:

- Two or more initial sputum smear examinations positive for acid-fast bacilli, or
- One sputum smear examination positive for acid-fast bacilli plus CXR abnormalities consistent with active pulmonary TB, as determined by a clinician, or
- One sputum smear examination positive for acid-fast bacilli plus sputum culture positive for *M. tuberculosis*.

*Adolescents, or children of any age with complicated intrathoracic disease, are more likely to have sputum smear-positive pulmonary TB.*

### **Pulmonary TB, sputum smear-negative**

The criteria are:

- at least three sputum specimens negative for acid-fast bacilli; and
- radiological abnormalities consistent with active pulmonary TB; and
- no response to a course of broad-spectrum antibiotics; and
- decision by a clinician to treat with a full course of anti-TB chemotherapy.

### **Extrapulmonary TB**

Children with only extrapulmonary TB should be classified under this case definition. Children who have both pulmonary and extrapulmonary TB should be classified under the case definition of pulmonary TB.

### **Drug-resistant TB**

Drug-resistant TB is a laboratory diagnosis. However, drug-resistant TB should be suspected if any of the features below are present.

*Features in the source case suggestive of drug-resistant TB*

- Contact with a known case of drug-resistant TB or a chronic defaulter.
- Remains sputum smear-positive after 3 months of treatment.
- History of previously treated TB.
- History of treatment interruption.

*Features of a child suspected of having drug-resistant TB*

- Contact with a known case of drug-resistant TB.
- Not responding to the anti-TB treatment regimen

- Recurrence of TB after adherence to treatment.

## **7. ANTI-TB TREATMENT IN CHILDREN**

### **7.1 ADMINISTERING TREATMENT AND ENSURING COMPLIANCE**

- Children, their parents, other family members and other caregivers should be educated about TB and the importance of completing the full course of treatment.
- The support of the child's parents and immediate family is vital to ensure a satisfactory outcome of treatment.
- Often a health-care worker can observe or administer treatment but if this is not convenient for the family, a trained community member (preferably someone other than the child's parent or immediate family) can undertake the responsibility.
- Fixed dose combinations of drugs should be used whenever possible to improve simplicity and adherence.
- Patient treatment cards are recommended for documenting treatment adherence.
- Children with severe forms of TB should be hospitalized for intensive management wherever possible.

- Conditions that merit hospitalization include:
  - A very ill child
  - TB meningitis and miliary TB
  - Extensive pulmonary TB
  - Respiratory distress
  - Spinal TB
  - Severe adverse events, such as clinical signs of hepatotoxicity (e.g. jaundice)
  - Social and logistic reasons where it is not possible to ensure good adherence and treatment outcome on an outpatient basis.

## 7.2 RECOMMENDED TREATMENT REGIMENS

- Anti-TB treatment is divided into two phases, an intensive phase and a continuation phase.
- The purpose of the intensive phase is to rapidly eliminate the majority of organisms and prevent the emergence of drug resistance.
- The purpose of the continuation phase is to eradicate the dormant organisms.
- In either phase, treatment is given daily.
- There are two treatment regimens recommended by the national tuberculosis programme (NTP) for treatment of children with TB.
- There is a standard code for anti-TB treatment regimens which uses an abbreviation for each anti-TB drug: isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E) and streptomycin (S).
- The number in front of each phase of treatment represents the duration of that phase in months.
- Direct observation of drug administration is recommended during the intensive phase of treatment and wherever possible during the continuation phase too.

**Table 1**

### Recommended doses of first-line anti-TB drugs for children

<b>1. Isoniazid</b>	
Daily dose and range	5 (4-6) mg/kg body weight
Maximum daily dose	300 mg
<b>2. Rifampicin</b>	
Daily dose and range	10 (8-12) mg/kg body weight
Maximum daily dose	600 mg
<b>3. Pyrazinamide</b>	
Daily dose and range	25 (20-30) mg/kg body weight
<b>4. Ethambutol</b>	

Daily dose and range	20 (15-25) mg/kg body weight
<b>5. Streptomycin</b>	
Daily dose and range	15 (12-18) mg/kg body weight

### New cases

This includes patients who have

- Never received anti-TB treatment previously
- Have received anti-TB therapy for less than one month

Recommended treatment (Category 1)

- Intensive phase: 2HRZE or 2HRZS
- Continuation phase: 4HR (*However, in the case of miliary TB, TB meningitis and spinal TB with neurological involvement, the continuation phase is 10 HR*).

**Ethambutol should be avoided in children below 6 years.**

In milder forms of TB in children below 6 years, the intensive Phase is 2HRZ instead of 2HRYS..

### Re-treatment cases

- This category comprises previously treated smear-positive pulmonary TB
  - Relapse
  - Treatment failure
  - Treatment after default
- Recommended treatment (Category 2)
  - *Intensive phase: 2HRZES/1HRZE*
  - *Continuation phase: 5HRE*
- Wherever possible, mycobacterial culture and drug susceptibility testing should be performed for all re-treatment cases before starting treatment where possible.

## 7.3 MANAGEMENT OF TB MENINGITIS AND MILIARY TB

- Miliary TB has a 60-70% risk of meningeal involvement and should be managed similarly to TB meningitis.

- All children with suspected or confirmed miliary TB should have a lumbar puncture to test for meningitis.
- Children with TB meningitis or miliary TB should be hospitalized initially until their clinical state has stabilized.
- The regimen is 2HRZS-10HR
- Prednisolone is recommended for all children with TB meningitis in a dose of 2 mg/kg/day for 4 weeks. The dose should be tapered over 1-2 weeks before stopping. The dose can be increased to 4 mg/kg (maximum 60 mg/day) in seriously ill children because rifampicin will decrease steroid concentrations, but higher doses carry a risk of greater immune suppression.

#### **7.4 MANAGEMENT OF DRUG-RESISTANT TB IN CHILDREN**

- If drug resistance is suspected culture and sensitivity testing is essential.
- Resistance to isoniazid and/or rifampicin is the most important as these two drugs form the mainstay of current chemotherapy.
- Multi drug resistant TB (MDR-TB) is resistant to both isoniazid and rifampicin, with or without resistance to other anti-TB drugs.
- MDR-TB in children is mainly the result of transmission of a strain of *M. tuberculosis* that is MDR from an adult source case.
- **Treatment is difficult and specialist referral is mandatory.**

#### **Basic principles of treatment of MDR-TB**

- Do not add a single drug to the failing regimen.
- Use a regimen comprising at least four drugs to which the patient has not been exposed.
- Use daily treatment only; directly observed therapy is essential.
- Counsel the child's caregiver at every visit, to provide support, advice about adverse events and the importance of compliance and completion of treatment.
- Follow-up is essential: clinical and bacteriological.
- Treatment duration should be at least 18-24 months after culture conversion.

#### **7.5 MANAGEMENT OF TB IN THE HIV-INFECTED CHILD**

- All HIV-infected children should be screened for TB.
- The approach to diagnosing TB in HIV-infected children is essentially the same as for HIV-non-infected children and the presence of three or more of the following should strongly suggest the diagnosis of TB:
  - Chronic symptoms suggestive of TB
  - Physical signs highly suggestive of TB
  - A positive TST (diameter of induration 5 mm or more)
  - CXR suggestive of TB
- In HIV-infected children with confirmed or presumptive TB disease, initiation of anti-TB treatment is the priority.

- Most current international guidelines recommend that TB in HIV-infected children should be treated with a 6-month regimen as in HIV-non-infected children.
- Most children with TB who are HIV co-infected have a good response to the 6-month regimen.
- Possible causes of failure, such as non-compliance with therapy, poor drug absorption, drug resistance and alternative diagnoses should be investigated in children who are not improving on anti-TB treatment.
- All children with TB and HIV coinfection should be evaluated to determine if antiretroviral therapy (ART) is indicated during the course of treatment for TB.
- Given the complexity of co-administration of anti-TB treatment and ART, consultation with an expert in this area is recommended before initiation of concurrent treatment for TB and HIV infection, regardless of which disease appeared first.
- The decision on when to start ART after starting anti-TB treatment involves a balance between the child's age, pill burden, potential drug interactions, overlapping toxicities and possible immune reconstitution inflammatory syndrome (IRIS) versus the risk of further progression of immune suppression with its associated increase in mortality and morbidity.
- When indicated, the initiation of ART should be deferred for at least 2-8 weeks in children starting anti-TB treatment who have not yet started ART.
- Daily cotrimoxazole prophylaxis (20 mg trimethoprim TMP) + 100 mg sulphamethoxazole (SMX) if <6 months of age; 40 mg TMP + 200 mg SMX if aged under 5 yrs; 80 mg TMP + 400 mg TMP if 5-15 yrs) prolongs survival in HIV-infected children and reduces the incidence of respiratory infections and hospitalization.

## 7.6 CORTICOSTEROIDS

- These may be used in the management of some complicated forms of TB e.g. TB meningitis, complications of airway obstruction by TB lymph glands and pericardial TB.
- Even in cases of advanced TB meningitis, corticosteroids have been shown to improve survival and decrease morbidity and are thus recommended in all cases of TB meningitis.
- Prednisolone is used in a dosage of 2 mg/kg daily, increased up to 4 mg/kg in the case of the most seriously ill children, with a maximum dosage of 60 mg/day for 4 weeks. The dose should then be tapered over 1-2 weeks before stopping. Dexamethasone in equipotent doses could be substituted.

## 7.7 ADVERSE EVENTS

- Adverse events caused by anti-TB drugs are much less common in children than in adults.
- The most important adverse event is the development of hepatotoxicity which can be caused by isoniazid, rifampicin or pyrazinamide.
- Baseline ALT (SGPT) and bilirubin estimations are recommended. However, further routine regular monitoring of ALT levels should not be undertaken as transient elevation (less than three times the upper limit of normal) is not an indication to stop treatment.
- However, deterioration of appetite, nausea with or without vomiting, liver tenderness, hepatomegaly or jaundice should lead to assessment of ALT and serum bilirubin. Anti TB

treatment should be stopped if ALT is more than three times the upper limit of normal or serum bilirubin above normal or both with symptoms of hepatitis. Patients should be screened for other causes of hepatitis, and no attempt should be made to reintroduce these drugs until liver functions have normalized.

- If treatment needs to be continued, non-hepatotoxic anti-TB drugs should be introduced.
- A respiratory physician should be involved in the further management of such cases.
- Isoniazid may cause symptomatic pyridoxine deficiency, particularly in severely malnourished children and HIV-infected children on highly active antiretroviral therapy (HAART).
- Supplemental pyridoxine (5-10 mg/day) is recommended in:
  - Malnourished children
  - HIV-infected children
  - Breastfed infants
  - Pregnant adolescents
- Streptomycin may cause irreversible auditory nerve damage.
- Ethambutol may cause optic neuritis but this is rare.
- Skin rashes can occur due to any of the first line drugs and will entail stoppage of all drugs and referral to a respiratory physician.

## 7.8 FOLLOW UP

- Ideally each child should be assessed by the clinician at the following intervals:
  - every two weeks in the intensive phase
  - every month during continuation phase until the completion of treatment
- Assessment should include:
  - symptom assessment
  - assessment of treatment adherence
  - enquiry about any adverse events
  - weight measurement
- Any weight gain should be taken into account in adjusting dosages.
- Adherence should be assessed by reviewing the treatment card.
- A follow-up sputum sample for smear microscopy should be obtained, whenever possible, at the end of the intensive phase, at 5 months and on completion of treatment in children with pulmonary TB.
- If the smear is positive at the end of the intensive phase, same treatment has to be continued for another one month. If the smear still remains positive, sputum culture and drug sensitivity should be carried out and continuation phase commenced.
- If the smear is positive at the end of 5 months, it is considered as treatment failure and re-treatment regimen is commenced.
- Follow-up CXRs are carried out at the end of one month of treatment in children with smear negative pulmonary TB.
- A child who is not responding to anti-TB treatment should be referred for further assessment and management. These children may have:
  - drug-resistant TB
  - an unusual complication of pulmonary TB
  - other causes of lung disease
  - problems with treatment adherence

## **7.9 PREVENTIVE TREATMENT**

In Sri Lanka, preventive treatment is given for the following groups:

- Infants of sputum smear positive mother.
- Household contacts of sputum smear positive patients who are below 5 years of age and do not have evidence of active disease.
- All HIV infected children who are close contacts of sputum smear positive patients.

Preventive treatment consists of INAH 5mg/kg daily for 6 months.

## **7.10 IMMUNE RECONSTITUTION**

- A temporary clinical deterioration, with new or worsening symptoms, signs or radiological manifestations, sometimes occurs after beginning anti-TB therapy due to restoration of capacity to mount an inflammatory immune response.
- This paradoxical reaction can simulate worsening disease, with fever and increased size of lymph nodes (tuberculomas) and worsening of pulmonary infiltrates.
- Immune reconstitution can occur with improved nutritional status or anti-TB treatment itself.
- In TB patients who are co-infected with HIV, clinical deterioration due to immune reconstitution can occur after initiation of antiretroviral therapy (ART) and is known as the immune reconstitution inflammatory syndrome (IRIS).
- In all such cases anti-TB treatment should be continued.
- The addition of corticosteroids is useful in many cases.
- If there is any doubt, the child should be referred to the next level of care.

## **8. SCREENING AND MANAGEMENT OF CHILD CONTACTS OF SMEAR POSITIVE ADULT TB CASES**

### **8.1 BACKGROUND AND RATIONALE**

- Investigation of contacts is a valuable means of identifying new TB cases and is recommended by WHO and the International Union Against TB and Lung Disease (IUATLD).
- The main purposes of child contact screening are to:-



- identify symptomatic children (i.e. children of any age with undiagnosed TB disease).
- provide preventive therapy to susceptible individuals (i.e. asymptomatic children under 5 years of age in close contact with a smear-positive pulmonary TB case).
- Young children living in close contact with a source case of smear-positive pulmonary TB are at particular risk of TB infection and disease. The risk of infection is greatest if the contact is close and prolonged such as the contact an infant or toddler has with a mother or other caregiver in the household.
- The risk of developing disease after infection is much greater for infants and young children under 5 years than it is for children aged 5 years or older.
- It is recommended that all National TB Programmes (NTPs) screen household contacts of smear positive pulmonary TB, for symptoms of disease and offer isoniazid for six months to children aged less than 5 years and all HIV-infected children who are household contacts.
- Isoniazid preventive therapy for young children with infection who have not yet developed disease will greatly reduce the likelihood of developing TB during childhood.
- If disease does develop, it usually does so within 2 years of infection, but in infants the time-lag can be as short as a few weeks.

### **Definitions used in contact screening**

<b>Source case</b>	A case of pulmonary TB (usually sputum-smear positive) which could result in infection or disease among contacts.
<b>Contacts for screening</b>	All children aged less than 5 years (whether sick or well) and children 5 years or older if symptomatic, who are in close contact with a source case.
<b>Close contact</b>	Living in the same household as a source case or in frequent contact with a source case.

## **8.2 ASSESSMENT AND MANAGEMENT**

- Clinical evaluation is an important component of assessment.
- Routine assessment of child contacts does not always require CXR and Mantoux test except in children less than 5 years of age.
- If the contact of a source case with pulmonary TB is symptomatic then the contact needs to be investigated for TB, whatever his/her age.
- Recommended prophylactic treatment for a healthy contact aged less than 5 years of a smear positive pulmonary TB patient is isoniazid 5 mg/kg/day for 6 months. Follow-up should be carried out at least monthly until treatment is completed.
- Referral to a Chest Clinic or a Specialist Referral Centre may be necessary when there are doubts about the diagnosis.

## **8.3 SPECIAL CIRCUMSTANCES**

### **Child contact known to be HIV-infected**

- If the child contact is HIV-infected and asymptomatic, then isoniazid preventive therapy should be considered for all ages, including those 5 years and older.
- As with other contacts, active disease should be ruled out before providing HIV-infected children with isoniazid preventive therapy.
- HIV-infected children who have symptoms should be carefully evaluated for TB and if found to have TB should be referred to the NTP for registration and initiation of treatment.

### ***Child contacts of infectious MDR-TB cases***

- Close contacts of MDR-TB patients should receive careful clinical follow-up for a period of at least 2 years.
- If active disease develops, prompt referral to a Respiratory Physician for further management is recommended.

## **8.4 MANAGING CHILD CONTACTS WITHIN THE NTP**

- Close contact screening and management is recommended by most NTPs.
- There is no need to create a separate structure for contact screening and management. It is possible to work within the existing NTP structure and with existing specialist support.
- It would be best if responsibility for contact tracing and subsequent management lay with the same health-care worker who registers and/or supervises treatment of the source case.
- This health-care worker could then also provide isoniazid preventive therapy or treatment to the children.
- This is likely to be more convenient to the household or family and to improve compliance by all.
- It may be helpful to add an information box to the reverse side of the current treatment card.
- Child recommended for isoniazid preventive therapy should then be registered separately and have his/her own preventive therapy card.
- A prophylaxis register should be used to keep track of contacts.

## **8.5 ESTABLISHING CONTACT SCREENING AND MANAGEMENT WITHIN THE NTP**

- The process will require education of TB health-care workers to explain the rationale and potential benefit of contact tracing as well as appropriate management of contacts.
- Categorization by age into at least two groups (0-4 years and 5-14 years) is useful for monitoring practice and outcome and for drug ordering.

- Performing monitoring and analyzing outcome data are critical, both from a patient management perspective and to identify possible shortfalls in the system that could be addressed and corrected.
- Important information could be gathered locally and then sent to central office for analysis, such as:
  - number of children screened, categorized by age group.
  - number treated for TB and outcome.
  - number given isoniazid preventive therapy and outcome, including treatment completion.
  - adverse reactions to medications.
- Each child (on whatever treatment) should have his/her own card, which also has the details of the source case.
- The information could be kept at the local level and provided to the central office with a quarterly report of case-finding.
- It would be useful to have a separate registration book for children on isoniazid preventive therapy.
- Once the process has started, there should be regular dissemination of information relating to contact management by the NTP to paediatricians, government health departments and district health or district TB officers.

## **9. RECORDING AND REPORTING**

- Children with TB should always be included in the routine NTP recording and reporting system.
- It is crucial to notify the NTP of all identified TB cases in children, register them for treatment and record their treatment outcome. The registration of TB patients is done at the District Chest Clinic.

- All children diagnosed and treated as TB in General Health Institutions (including those admitted to wards) should be registered at the relevant Chest Clinic within one month of diagnosis
- At the end of the treatment course for each child with TB, the District TB Control Officer should record the outcome in the District TB Register.

### 9.1 DEFINITIONS OF STANDARD TREATMENT OUTCOMES OF SMEAR-POSITIVE PULMONARY TB

<b>Cured</b>	Patient who is sputum smear-negative in the last month of treatment and on at least one previous occasion. <i>(What is generally practised is to check for sputum clearance at the end of the fifth month and at the end of treatment)</i>
<b>Completed treatment</b>	Patient who has completed treatment but who does not meet the criteria to be classified as cured or treatment failure.
<b>Defaulted</b>	Patient whose treatment was interrupted for 2 consecutive months or more.
<b>Died</b>	Patient who dies for any reason during the course of treatment.
<b>Treatment failure</b>	Patient who is sputum smear-positive at 5 months or later after starting treatment.
<b>Transferred out</b>	Patient who has been transferred to another recording and reporting unit and for whom the treatment outcome is not known.

- Four of the above standard outcomes are also applicable to children with smear-negative pulmonary or extrapulmonary TB (treatment completion, default, death and transfer out).
- The District TB Control Officer compiles and sends the District Quarterly Reports of all cases registered and their treatment outcomes to the Central Office of the NPTCCD.
- The Central Office verifies that that the District Reports are correct, complete and consistent.
- Recording and reporting two age groups for children (0-4 years and 5-14 years) in the TB registers is necessary to order anti-TB drugs in child-friendly formulations for young children. It is also useful for monitoring trends of case-finding and treatment outcomes.
- Cohort analysis is the key management tool for evaluating the effectiveness of the NTP. A cohort is a group of patients diagnosed and registered for treatment during a specific time period (usually 3 months).

- Just as evaluation of treatment outcome in new smear-positive pulmonary TB patients is used as a standard indicator of NTP quality for adult patients, evaluation of treatment outcome by cohort analysis in children is a valuable indicator of programme quality for child TB patients.

## **10. BCG VACCINATION IN CHILDREN**

- BCG is a live attenuated vaccine derived from *M.bovis*.
- The WHO expanded programme on immunization recommends BCG vaccination as early as possible after birth.

- It should be given intradermally in a dose of 0.05ml.
- Children with known primary immunodeficiencies should not receive BCG vaccination.
- It is generally accepted that after effective BCG vaccination there is protection against the more severe types of TB such as miliary TB and TB meningitis, which are most common in young children.
- The immune response to BCG vaccination may be reduced in HIV-infected individuals and the conversion to a positive TST after BCG is less frequent in HIV-infected individuals.
- Although there have been several reports of disseminated BCG disease in HIV-infected individuals, BCG appears to be safe in the vast majority of cases.
- Since the benefits of BCG vaccination outweigh the risks, the WHO recommends a policy of routine BCG vaccination for all neonates.
- A child who has not had routine neonatal BCG immunization and has symptoms of HIV disease/ acquired immunodeficiency syndrome should not be given BCG later because of the risk of disseminated BCG disease.

### **10.1 ADVERSE REACTIONS FOLLOWING BCG VACCINATION**

- 1-2% of children may develop complications following BCG vaccination.
- These most commonly include local abscesses, secondary bacterial infections, suppurative adenitis and local keloid formation.
- Most reactions will resolve over a few months.
- Infants with non-healing ulcer at the vaccinated site should be given INAH 5 mg/kg-day for six months.
- Suppurative adenitis needs surgical drainage. If a persistent sinus or a non-healing ulcer develops, INAH should be given for 6 months.
- Significant non-suppurative adenitis should be given INAH 5mg/kg daily. However, if it does not regress, a surgical opinion will have to be obtained.
- Some children with persistent adenitis may benefit from surgical excision.
- Children who develop disseminated BCG disease should be investigated for immunodeficiencies and treated for TB using a first-line regimen (except pyrazinamide, to which *M.bovis* is uniformly resistant).
- Management of adverse reactions in HIV-infected children or children with other immunodeficiencies is more complicated and may require specialist referral.

### **10.2 ABSENCE OF BCG SCAR**

- BCG scar may be absent in a significant proportion of BCG vaccinated children.
- BCG scar should be inspected and recorded in the Child Health Development Record (CHDR) at each immunization visit.
- If the BCG scar is absent at the 6 months visit, revaccination of BCG should be scheduled for 7-8 months of age or 6-8 weeks before/after a live vaccine. Information regarding revaccination should be entered in the CHDR.
- Children below 5 years of age with no evidence of BCG scar or documentation of a scar at any time may be revaccinated just once.

- If there is close contact with a sputum smear positive patient, revaccination should not be done during the six months of INAH prophylaxis.
- BCG scar may disappear after some time. In such cases revaccination is not necessary.
- Revaccination is not routinely indicated after 5 years of age. However, if administration is considered under special circumstances, it should be preceded by a Mantoux test.
- The dose of BCG for children over one year is 0.1ml.

## **11. PERINATAL AND NEONATAL TB**

Infants may acquire TB by transplacental spread through the umbilical vein to the fetal liver, by aspiration or ingestion of infected amniotic fluid, or via airborne inoculation from close contacts.

### 11.1 SYMPTOMS, SIGNS AND DIAGNOSIS

- The clinical presentation of neonatal TB is non-specific but is usually marked by multiple organ involvement. The neonate may look acutely ill. Fever, lethargy, respiratory distress, hepatosplenomegaly, lymphadenopathy or failure to thrive may indicate TB in a neonate with a history of exposure.
- Any neonates with suspected congenital TB should have a chest x-ray, tuberculin test, direct smear and culture of tracheal aspirates, gastric washings, urine and CSF for acid-fast bacilli. However, tuberculin testing is not very sensitive in this situation.
- Biopsy of the liver, lymph nodes, lung, or pleura may be needed to confirm the diagnosis.

### 11.2 TREATMENT

#### ***Pregnant women with active TB:***

- Isoniazid, rifampicin, pyrazinamide and ethambutol, used in recommended doses during pregnancy, have not been shown to be teratogenic to the fetus.
- Recommended treatment is as for adults.
- All pregnant and breastfeeding women on isoniazid should be given pyridoxine 10 to 12.5 mg per day.
- Streptomycin should be avoided as it is potentially ototoxic to the fetus.
- Breastfeeding is **not** contraindicated for babies of mothers with TB and should be initiated and continued.

#### **Neonates with active TB:**

- These babies should be treated with isoniazid, rifampicin and pyrazinamide for two months followed by isoniazid and rifampicin for a further four months. If the disease is severe (miliary or meningeal TB), streptomycin should be used in the initial two months of treatment and the continuation period of treatment should be extended to 10 months. All such infants should also receive pyridoxine supplementation.
- When the CNS is involved, initial therapy also includes prednisolone 2mg/kg/day for 4 weeks and then gradually tapered off.

### 11.3 PREVENTION OF TB IN A BABY BORN TO A MOTHER DIAGNOSED WITH INFECTIOUS PULMONARY TB



- Once a pregnant woman has been on treatment for at least 2-3 weeks, she is generally no longer infectious.
- If a pregnant woman with TB has been on effective anti-TB treatment for several weeks before delivery, it is less likely that the baby will become infected.
- The risk is highest if a mother is diagnosed at the time of delivery or shortly thereafter.
- BCG vaccination should be withheld in the immediate neonatal period.
- If a pregnant woman is found to have pulmonary TB shortly before delivery, then the baby, and if possible, the placenta, should be examined for evidence of congenital TB infection and, if found, the baby treated.
- A breastfed infant has a high risk of infection from a mother with smear-positive pulmonary TB and has a high risk of developing TB.
- The infant should receive 6 months of isoniazid preventive therapy, followed by BCG immunization. Breastfeeding can be safely continued during this period.
- An alternative policy is to give 3 months of isoniazid and then perform a TST. If the test is negative, isoniazid should be stopped and BCG vaccination given. If the test is positive, isoniazid should be continued for another 3 months, after which it should be stopped and BCG given.

## **12. GENERAL MANAGEMENT PROTOCOL**

- Children with suspected or diagnosed TB are managed by a wide spectrum of care providers with varying levels of expertise and experience.
- To provide the best care for these children, it is essential to clarify roles and responsibilities of those involved in their management.
- All providers of TB care should manage TB patients in conjunction with the NTP.
- Any first level health care worker who suspects the possibility of TB in a child should refer the child to either, a Chest Clinic, a Hospital Paediatric Unit or the nearest Government Health Institution.
- Definitive diagnosis of childhood TB is best made by a Consultant Paediatrician or a Respiratory Physician.
- Once the diagnosis is made, the child should be registered at the relevant Chest Clinic and appropriate treatment commenced.
- It is the responsibility of the clinician managing these patients, either in the government or private sector, to ensure proper registration with the relevant Chest Clinic.
- The Chest Clinics would take steps to provide the necessary drugs, free of charge, to all patients registered including those treated in the Private Sector.
- The Chest Clinics should shoulder the responsibility for arranging daily supervised treatment, regular follow-up and monitoring of progress.

***All services of the NTP, including those for testing and monitoring are provided completely free of charge to all patients.***

## REFERENCES

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3. National Programme for Tuberculosis Control and Chest Diseases. General Manual for Tuberculosis Control (2<sup>nd</sup> Edition)