Policy 4.1  Tuberculosis (active and latent) in Children

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<td>WA Tuberculosis Control Program policy 4.1</td>
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<tr>
<td>Policy Statement</td>
<td>This document describes the management of active and latent tuberculosis in children</td>
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<tr>
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<td>Presentation of TB in children</td>
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<td>Primary preventive treatment</td>
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Related WA TB Control Program Policies

1.1 Diagnosis of tuberculosis – Laboratory
1.2 Diagnosis of tuberculosis – Clinical
2.1 Medical treatment of tuberculosis (adults)
2.2 Case management of tuberculosis
3.1 Diagnosis of latent tuberculosis infection
3.2 Treatment of latent tuberculosis infection
4.1 Tuberculosis (active and latent) in children
4.2 Management of tuberculosis in prisoners and immigration detainees
4.3 Tuberculosis (active and latent) in pregnant women
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5.1 BCG Vaccination
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7.1 Notification of tuberculosis and enhanced surveillance data
8.1 Diagnosis and management of Hansen’s disease
9.1 Management of confidential information for the WA Tuberculosis Control Program
9.2 Client record management policy for the WA Tuberculosis Control Program
9.3 Fees and charges associated with tuberculosis and leprosy treatment

Document Control

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Policy 4.1  Tuberculosis (active and latent) in Children

1.0 Introduction

The basic principals for the diagnosis, investigation and treatment of tuberculosis (TB) in adults discussed in other WA TB Control Program policies apply to children. This policy addresses differences in the clinical features and approach to the assessment and treatment of tuberculosis in the paediatric setting, particularly in young children.

Clinical, diagnostic and management differences between TB in children and TB in adolescents and adults are:

1) Children are at higher risk of disease following primary infection compared with adults, especially the very young (<5yrs of age) and immune compromised.

2) Children less than 5 years old are at higher risk of developing severe disseminated forms of TB compared with adults e.g. miliary and meningeal TB.

3) Paediatric TB is usually paucibacilliary with limited risk of TB transmission, unless lung cavities are present as is frequently the case in older adolescent children (>10yrs of age).

4) TB in children usually occurs within 12 months of infection. It is therefore an indicator of recent transmission.

5) The majority of children are infected by a household source case, usually one of the parents, but extended family and any other caregivers should also be considered.

2.0 Presentation of Tuberculosis

Pulmonary tuberculosis (including intra-thoracic lymph node disease) is the most common form of TB in children and refers to disease involving the lung parenchyma or lower airways. Extra-pulmonary forms account for around 25% of cases in children and includes cervical lymphadenitis, spinal TB, pleural effusion, abdominal TB, miliary TB and tuberculous meningitis (Graham, Marais, & Gie, 2009). The type of TB disease experienced by the patient is dependent on the effectiveness of the immune response to contain a recent M.tuberculosis infection. The immune response improves with age as the immune system matures (Graham, Marais, & Gie, 2009). Therefore infants and younger children are more at risk of developing disease after primary infection, including TB meningitis and disseminated forms of TB. The majority of disease manifestations occur in the first 6-12 months following primary infection.
The majority of children that are infected with *Mycobacterium tuberculosis* do not develop TB (i.e. active disease). Children infected but without active disease are generally referred to as having latent TB infection (LTBI).

Early in their disease course the majority of children with tuberculosis have few symptoms and signs. Children with TB can present with a range of clinical symptoms and signs that depend on the major site of disease involvement. Diagnosing TB in children can be difficult because the symptoms and signs are often non-specific, children are often unable to express their symptoms, and respiratory specimens for examination are difficult to obtain from young children. The most important clue to suggest TB as a possible diagnosis is recent contact with an infectious TB case.

### 2.1 Symptoms and signs

Children with TB may have minimal symptoms and signs, but the following are suggestive of TB disease (Marais, Wright, Gie, & al, 2006; Marais, Gie, Schaaf, & al, 2006):

**Common symptoms**
- A persistent non-remitting cough, more often non-productive, of more than 2 weeks duration, not improved with standard antibiotic therapy;
- Weight loss or failure to thrive;
- Reduced playfulness or increased tiredness; and
- Enlarged, non-tender cervical lymph nodes (greater than 2cmx2cm), +/- fistula.

**Less common symptoms**
- Respiratory distress (uncommon and more likely in neonates and infants);
- Haemoptysis (uncommon and more likely in older children);
- Unexplained and persistent fever;
- Excessive night sweats; and
- Lethargy, headache, irritability +/- progressive neurological signs (suggestive of TB meningitis).

The risk of progressing from infection with *M. tuberculosis* to active disease is greater in children than adults. Most active TB in children develops within 12 months of becoming infected. The risk of developing TB meningitis or military TB is highest in infancy (Table 1).
Table 1: Age-specific risk for disease development following primary TB infection

<table>
<thead>
<tr>
<th>Age at primary infection</th>
<th>Disease presentation</th>
<th>Risk of disease following primary infection %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>No disease</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>30-40%</td>
</tr>
<tr>
<td></td>
<td>TB meningitis or miliary disease</td>
<td>10-20%</td>
</tr>
<tr>
<td>1-2 years</td>
<td>No disease</td>
<td>70-80%</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>10-20%</td>
</tr>
<tr>
<td></td>
<td>TB meningitis or miliary disease</td>
<td>2-5%</td>
</tr>
<tr>
<td>2-5 years</td>
<td>No disease</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>TB meningitis or miliary disease</td>
<td>0.5%</td>
</tr>
<tr>
<td>5-10 years</td>
<td>No disease</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>TB meningitis or miliary disease</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td>No disease</td>
<td>80-90%</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>10-20%</td>
</tr>
<tr>
<td></td>
<td>TB meningitis or miliary disease</td>
<td>&lt;0.5%</td>
</tr>
</tbody>
</table>

(Marais, Gie, Schaaf, & al, The natural history of childhood intra-thoracic tuberculosis: a critical review of literature from the pre-chemotherapy era, 2004)

3.0 Investigations for Tuberculosis

Direct microscopy and culture of clinical specimens is the first line investigation for tuberculosis. As treatment for TB treatment is prolonged, complex and with the potential for drug side effects, diagnostic specimens should be collected before treatment is initiated. Culture is also important because drug susceptibility testing for \(M.tuberculosis\) isolates ensures the appropriateness of treatment.

Microbiological examination of respiratory specimens should be considered in all cases of TB, even when the primary presentation is with extra-pulmonary TB as asymptomatic coexistent pulmonary TB may be present. Obtaining respiratory specimens increases the chance of obtaining a positive culture and has public health implications in older children.

Due to the paucibacillary nature of TB in children, mycobacterial culture is frequently negative despite a high clinical suspicion of active TB infection. In these cases, diagnosis may be based on clinical or radiological signs of TB, a history of contact with active tuberculosis, and a positive TST or IGRA test indicating \(M.tuberculosis\) infection.
3.1 Microscopy and Culture of respiratory specimens

Microscopy and culture of respiratory specimens is the most reliable and cost effective method of diagnosing infectious cases of pulmonary tuberculosis. The optimal method of specimen collection in children depends on the age, location and skill of the available staff. Appropriate respiratory specimens in children include:

a) Two to three early morning gastric aspirates: in young children, consecutive early morning gastric aspirates obtained via a nasogastric or orogastric tube is frequently performed. Early morning gastric aspirates need to be obtained while a child is fasting and before a child is ambulant.

b) Two to three expectorated sputum samples: in older children productive of sputum, expectorated sputum samples can be obtained.

c) Two to three induced sputum samples: after pre-treatment with inhaled bronchodilators and hypertonic saline, secretions can be obtained by expectoration (older children) or naso/oropharyngeal suction (younger children).

d) Bronchoalveolar lavage (BAL) sample: BAL samples may be indicated in specific situations.

Getting at least 2-3 respiratory specimens using any combination of the most feasible options available is recommended. Primary TB infection in young children is often paucibacillary and so the yield from microscopy and culture for acid-fast bacilli is low even when samples are available for examination. A negative culture should not be used to exclude TB in a child.

3.2 Direct nucleic acid amplification testing (NAAT)

Nucleic Acid Amplification Testing (NAAT) or Polymerase Chain Reaction (PCR) testing is available through PathWest, the state’s laboratory service and the state’s Mycobacterium Reference Laboratory (MRL) situated on the Queen Elizabeth II (QEII) hospital site in Nedlands. NAAT/PCR is used for diagnosis but should not take preference over microscopy and culture for tuberculosis, especially if there is a limited amount of sample. NAAT/PCR may be also used to detect some forms of drug resistance (GeneXpert). NAAT/PCR is usually laboratory-initiated following consultation with a consultant Clinical Microbiologist who takes into consideration the test limitations, clinical and public health issues. All new smear-positive clinical samples, regardless of specimen origin and clinical presentation are considered for NAAT.

For more detail on laboratory methods of diagnosing tuberculosis please see the WA TB Control Program policy 1.1 Laboratory Diagnosis of Tuberculosis.
3.3 Chest X-ray

Chest x-ray is frequently used to assist with the diagnosis of pulmonary tuberculosis in children. A chest X-ray (both anterior-posterior and lateral) should be requested for all patients suspected of having TB whether the primary site is pulmonary or extra-pulmonary as the two forms of the disease may coexist.

Chest X-ray appearances that are suggestive of pulmonary tuberculosis in children include (International Union Against Tuberculosis and Lung Disease, 2010):

- Hilar and mediastinal lymphadenopathy;
- Parenchymal infiltrates;
- Lobar or segmental collapse / consolidation; and
- Pleural effusion or pericardial effusion (forms of extrapulmonary TB and tend to occur in older children).

Cavitatory disease is unusual in children but more common in adolescents and adults with pulmonary TB.

There are no radiological features that are pathognomonic for pulmonary TB in children, and there is overlap with radiological abnormalities due to other causes of lung disease in children. Nevertheless, if there are characteristic x-ray changes of TB in a patient considered at high risk for TB, then TB should be assumed until an alternative diagnosis is proven.

3.4 Tuberculin Skin Test (TST)

The TST is an indirect test that indicates a cellular immune response from previous sensitisation with mycobacterial antigens. A positive result cannot distinguish between M.tuberculosis infection and active TB disease. A positive TST does provide supportive evidence for TB infection or disease (similar to documented TB exposure) especially when there is no history of contact with TB, but should be interpreted within the clinical context. A negative TST does not exclude the possibility of TB infection or disease.

3.5 Interferon gamma Release Immunoassays (IGRAs)

Interferon Gamma Release Immunoassays (IGRAs) are blood tests that detect cell mediated immune responses to M.tuberculosis specific antigens. The QuantiFERON-TB Gold In-Tube test (QIFN) is used in Western Australia. The antigens tested against are present in all M.tuberculosis but are absent from BCG vaccine strains and most other mycobacteria.
In essence a positive QIFN provides the same information as a positive TST, with a greater amount of specificity, especially in BCG vaccinated individuals. Importantly, a negative result does not rule out active disease and all results should be interpreted within the relevant clinical context. The QIFN test does not replace any of the standard diagnostic investigations to confirm or exclude TB disease.

Further information on tuberculin skin testing and IGRAs is provided in the WA TB Control Program Policy 3.1 *Diagnosis of Latent TB infection (adults).*

### 3.6 Other diagnostic tests

The diagnosis of extrapulmonary tuberculosis is usually based on exposure history, clinical presentation, radiology and microbiological sampling. Obtaining specimens for microscopy and culture (e.g. CSF in suspected tuberculous meningitis, lymph node in suspected tuberculous lymphadenitis) should be undertaken where possible. An HIV test should be considered in all children with suspected TB.

### 4.0 Active Tuberculosis

Standard therapy for TB in children generally follows the same principals for the treatment of TB in adults. Combination regimens are used and, like in adults, treatment is divided into an intensive phase where the aim is to rapidly eliminate the majority of organisms and prevent drug resistance, followed by a continuation phase using a lesser number of drugs to eradicate dormant organisms.

Children have smaller bacterial loads than adults and the risk of developing drug resistance is less. A basic regimen of 6 months of isoniazid and rifampicin with pyrazinamide added in the first 2 months intensive phase cures over 99% of cases of drug susceptible pulmonary TB in children (Starke, 2004). A fourth drug e.g. ethambutol should be considered in children with extensive pulmonary disease, disseminated forms of TB (e.g. TB meningitis, miliary TB) or if there is a high risk of isoniazid resistance.

Treatment regimens for TB can be annotated according to the following standard format:

![Annotation of TB Drug Regimens Diagram](image)

Letters abbreviate drug names

Prefix No. indicates number of months

Subscript No. indicates number of times drug is taken per week. If no number, then treatment is daily.
Treatment issues in childhood TB include:

1. Doses should be calculated according to the child’s weight.
2. Doses should be recalculated as the child gains weight and condition improves.
3. The method of delivery needs to be considered in young children (e.g. crushed pills, drug suspensions).
4. Where possible daily regimens are preferred to intermittent dosing.
5. Children are dependent on care-givers for treatment adherence.
6. If there is no isolate available from the patient then treatment regimens should be based on proven or probable drug sensitivities of the source case.

First line treatment regimens for TB in children are given in Table 2.

**Table 2: Treatment regimens for children recommended by WHO**

<table>
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<tr>
<th>TB Disease</th>
<th>Intensive Phase</th>
<th>Continuation Phase</th>
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<tbody>
<tr>
<td>Extensive pulmonary disease</td>
<td>2HRZE</td>
<td>4HR</td>
</tr>
<tr>
<td>Pulmonary TB and HIV positive</td>
<td>2HRZE</td>
<td>4HR</td>
</tr>
<tr>
<td>Pulmonary TB or TB peripheral lymphadenitis and HIV negative</td>
<td>2HRZ</td>
<td>4HR</td>
</tr>
<tr>
<td>TB meningitis*</td>
<td>2HRZE</td>
<td>10HR</td>
</tr>
<tr>
<td>Osteoarticular TB</td>
<td>2HRZE</td>
<td>10HR</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>Refer to a paediatrician experienced in TB</td>
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* In addition to antituberculous therapy, children with TB meningitis or pericarditis should be offered corticosteroids

The WHO recommends the following dosages of anti-tuberculosis medicines in children (World Health Organisation, 2010; Graham S., 2011):

Isoniazid (H) – 10mg/kg (range 5-15 mg/kg); maximum dose 300mg a day
Rifampicin (R) – 15mg/kg (range 10-20 mg/kg); maximum dose 600mg a day
Pyrazinamide (Z) – 35mg/kg (30-40 mg/kg)
Ethambutol (E) – 20 mg/kg (15-25 mg/kg)

Children’s weight should be monitored frequently during treatment and medication doses adjusted accordingly.
4.1 Ethambutol use in children

There have been concerns with the use of ethambutol in young children due to potential optic neuritis, but a comprehensive review done by the WHO indicated that ethambutol is safe to use in children if recommended doses are adhered to (Graham S., 2011). Limiting ethambutol use to the initial intensive phase of treatment and only to children with extensive disease (likely high organism loads) also decreases the potential for toxicity. Children requiring longer-term ethambutol treatment should have regular vision assessment or ophthalmology review.

4.2 HIV Co-infection

In children several HIV-related diseases may present in a similar way to TB e.g. viral or bacterial pneumonia, lymphocytic interstitial pneumonitis, bronchiectasis and pneumocystis carinii pneumonia. There may be multiple and concurrent opportunistic infections so the presence of one of the above infections does not exclude TB being present (World Health Organisation, 2006).

The clinical assessment and investigation of TB in an HIV infected child should be the same as in an HIV uninfected child. The interpretation of tuberculin skin testing in the presence of HIV infection is less reliable. An immunocompromised child may have a negative tuberculin skin test despite having TB.

HIV-infected children with all forms of pulmonary and extra-pulmonary TB should be treated with four drugs in the initial intensive phase of TB treatment (Cotton, Graham, Jaspan et al, 2010) and followed by at least four months of rifampicin and isoniazid in the continuation phase. A longer continuation phase may be need if there has not been complete resolution of TB after 6 months therapy. A ten month continuation phase is recommended for TB meningitis or osteoarticular TB.

Daily therapy is preferred to intermittent therapy in HIV infected patients.

4.3 MDR-TB

Multidrug-resistant TB (MDR TB) is defined as TB bacteria that are resistant to at least isoniazid and rifampicin. Extensively drug-resistant TB (XDR TB) is resistant to at least isoniazid and rifampicin plus any fluoroquinolone, and at least one of three injectable second-line injectable drugs (capreomycin, kanamycin, and amikacin).

Drug regimens are designed on a case-by-case basis according to drug sensitivities. If diagnostic specimens are culture negative, then susceptibility results of the index case should guide treatment. MDR-TB should be managed by a paediatrician familiar with second line antituberculosis agents.
Preventive therapy for MDR TB can and should still be considered in high-risk exposure, when drugs to which the index case is sensitive to are used. However, there is no evidence on which to base this potentially toxic therapy. The alternative is for contacts of MDR-TB to be monitored by chest x-ray at regular intervals for at least two years. Longer follow up may be justified and is at the discretion of the treating physician.

Importantly, the contact and the contact’s family doctor must be made aware of the seriousness of MDR-TB and the need to assess the contact for active disease whenever that contact presents with symptoms suggestive of tuberculosis disease.

5.0 *M. tuberculosis* Infection (Latent disease)

The identification and treatment of latent *M. tuberculosis* infection in children is important to reduce the risk of developing active TB disease in the short term, but also to reduce the lifelong risk of TB reactivation. This incorporates i) early identification of paediatric contacts of active TB cases and ii) post-migration screening and treatment of high-risk groups as detailed in other Western Australian TB Control Program polices.

The preferred regimen for preventive therapy in children at the WA TB Control Program is 3 months of rifampicin and isoniazid although 6 months isoniazid monotherapy can also be used. Combination therapy with rifampicin and isoniazid for three months (3RH) has been shown to be equivalent to isoniazid monotherapy in terms of effectiveness and safety (National Institute for Health and Clinical Excellence, 2011; Ena & Valls, 2005). Isoniazid monotherapy for six months is considered in children with chronic comorbidities and concurrent administration of medications that may interact with rifampicin (e.g. antiretroviral medications; immunosuppressants).

Pyridoxine supplementation is not routinely offered to children but is considered in breastfeeding children, children with nutritionally deficiencies or milk and meat deficient diets and HIV infection. Children’s weight should be monitored frequently during treatment and medication doses adjusted accordingly.

6.0 Primary Preventive therapy

Following high-risk exposure to an infectious case of TB, young children are at high risk of developing primary TB infection. Infected children may initially have a negative TST or Quantiferon test and a normal chest x-ray. These children may rapidly develop active TB before the follow up contact tracing visit and before a TST or Quantiferon can become positive.

All children under 5 years old who are considered a close or household contact of a case of infectious TB (adult or adolescent with bacteriologically confirmed pulmonary TB) should be clinically and radiologically screened for active TB disease. If active TB is excluded, children less than two years old should be started on preventive treatment and a very low threshold should exist for doing the same in children less than 5 years old, particularly in
the setting of a microscopically sputum smear positive parent with TB. Commencement of preventative treatment immediately following the exposure aims to prevent the development of primary TB infection.

The preferred regimen for primary preventive therapy in children at the WA TB Control Program is isoniazid and rifampicin. Exceptions to this would be if there is i) clinical suspicion or microbiological confirmation of isoniazid resistant tuberculosis or ii) intolerance to either first line agent. Therapy should be continued for at least 8-12 weeks after their last potential exposure. A TST and/or Quantiferon should be performed prior to discontinuation of primary preventive therapy. If either test is positive and the child is asymptomatic then complete the full course of preventive Rx. If any symptoms suggestive of TB disease develop, the child should be reassessed for active TB.

7.0 Perinatal tuberculosis

Transmission of TB from a mother to the foetus is most likely to occur when the mother has disseminated TB or develops infection in pregnancy, as suggested by a pleural effusion. Babies born to mothers with sputum smear-positive TB are at high risk of respiratory transmission post-delivery. Perinatal tuberculosis encompasses tuberculosis acquired by the baby while i) in-utero, ii) intrapartum and iii) in the postnatal period.

Tuberculosis acquired by the foetus in-utero from haematogenous spread via the umbilical cord, or in-utero aspiration or ingestion of infected amniotic fluid is rare. It should be considered if the mother has been diagnosed with genital tract TB, especially if late in the pregnancy, and the neonate develops signs of sepsis.

Tuberculosis infection acquired after delivery occurs from airborne infection from the mother, an adult family carer or another infectious adult with whom the infant has had contact (including health care workers).

7.1 Medical management

The diagnosis of perinatal tuberculosis is difficult and frequently delayed. If the neonate exhibits any signs or symptoms of TB infection then a thorough assessment and investigation should be undertaken for bacterial confirmation of *M. tuberculosis* infection. Symptoms and signs that should raise suspicion of TB in a neonate born to a mother diagnosed with active TB would be fever, respiratory distress, hepatosplenomegaly, jaundice, lymphadenopathy or an abnormal chest x-ray. The clinical features can be subtle and difficult to differentiate from other congenital/ neonatal infections. Standard anti-TB therapy should be commenced after appropriate specimens have been collected.

After active TB has been excluded in the baby, a neonate born to a mother with active pulmonary, miliary or disseminated tuberculosis should receive primary preventive therapy as per normal contact tracing procedures (see section 6.0 above).
If during the period of preventive therapy the infants develops clinical symptoms, signs or radiological appearances suggestive of active TB then appropriate investigations should be done to exclude active TB and a complete course of anti-TB treatment considered.

Contact tracing among the rest of the family and other close contacts of the infected mother must also be performed. This is to ensure that others are not infected with TB.

8.0 Contact Tracing

The principals and procedures for contact tracing in active tuberculosis (TB) in Western Australia are discussed in the WA TB Control Program policy 6.1 Contact tracing for tuberculosis. Below are salient points relating to contact tracing in children.

8.1 Child as the index case

Children with TB are generally less contagious than adults because they:
- Rarely produce sputum;
- Have less cavitatory disease;
- Have low concentration of organisms in bronchial secretions; and
- Lack the tussive force necessary to suspend infectious particles of the correct size in the air (Starke, 2004).

Children are as infectious as adults if they exhibit lung cavities or are sputum smear positive. As the age of a child increases and their social interaction expands, community acquisition and transmission of TB becomes more relevant.

Active TB diagnosed in a young child usually indicates recent infection with the most likely source of infection being a close family member or close contact of the child. Contact tracing procedures should begin with the immediate family and expand as necessary.

8.2 Child named as a contact of active TB

8.2.1 Household or close contact

Household contacts are defined as those children (or adults) who share a bedroom, kitchen, bathroom or sitting room with the index case and have prolonged exposure. Children with a cumulative total exposure to a smear positive case of TB exceeding eight hours within a restricted area equivalent to a domestic room are at similar risk to household contacts and should also be included for contact tracing (National Institute for Health and Clinical Excellence, 2011). Such an indication may apply to a school or institutional setting.

If a child has been named as a household or close contact of an index case of either pulmonary or extra-pulmonary tuberculosis then the child should be assessed for symptoms and signs indicative of active TB disease.
Flowcharts for contact tracing procedures in children for household or close contacts are provided in Appendix A Algorithm for the investigation of a HOUSEHOLD or CLOSE contact of TB (more than 5 years old) and Appendix B Algorithm for the investigation of a HOUSEHOLD or CLOSE contact of TB (less than 5 years old).

8.2.2 Casual contact

Casual contacts are those children (or adults) who have had minimal exposure to the index case and the total cumulative exposure time is less than 8 hours. For healthy low-risk casual contacts, a single skin test performed 8-12 weeks after exposure would be sufficient to detect new TB infection. All casual contacts with symptoms or signs of TB infection should be medically assessed regardless of TST history. An algorithm for the management of a causal contact is provided in the WA TB Control Program policy 6.1 Contact tracing for tuberculosis.

The components of contact tracing include:

1. Interview
All contacts should be questioned for symptoms of active TB. Other relevant history would include any previous tuberculin skin test (TST) result, previous TB exposure or treatment, BCG immunisation and co-existing medical conditions of the contact.

2. Chest x-ray should be performed in:
   - Any child, regardless of age, with symptoms compatible with active TB disease.
   - All household or close contacts of TB (irrespective of TST or QIFN).
   - Any child, regardless of age, with a positive TST reading or IGRA result.

3. TST and/or IGRA should be performed in:
   - ALL household or close contacts of microscopically smear positive pulmonary TB.
   - A TST or IGRA should not be done if there has been a previous positive result or documented past TB.

4. Paediatrician review should be arranged for:
   - All children with symptoms suggestive of active TB disease.
   - All children with a positive TST and/or IGRA or TST/IGRA conversion
   - All children <5 years regardless of TST result
   - Other high risk children regardless of TST result (e.g. immunosuppressed children).

A positive TST reading of 5mm is considered indicative of M.tuberculosis infection in a child less than 5 years old. For further information regarding TST interpretation please see the WA TB Control Program policy 6.1 Contact tracing for tuberculosis.
9.0 BCG Disease

BCG disease can be categorized as (Hesseling, Rabie, Maris, & al, 2005):

I. Local disease – This involves a local process at the site of vaccination e.g. BCG injection site abscess or severe BCG scar ulceration.

II. Regional disease – Involvement of any regional lymph nodes or other regional lesions beyond the vaccination site e.g. ipsilateral axillary gland enlargement, suppuration or fistula.

III. Distant disease - Involvement of any site beyond a local or regional ipsilateral process e.g. BCG isolated from pulmonary secretions, cerebrospinal fluid, urine etc

IV. Disseminated disease – BCG confirmed from >1 remote site and/or at least blood or bone marrow culture.

Medical and/or surgical treatment of local and regional disease is influenced by the severity of disease, age of the patient and degree of immunosuppression. Distant and disseminated disease requires BCG-specific therapy. BCG immune reconstitution syndrome, BCG-IRS, is defined as BCG disease that presents in an HIV infected child within 3 months after the initiation of anti-retroviral therapy (Hesseling, Rabie, Maris, & al, 2005). It can occur with local, regional, distant or disseminated disease as described above.

The management of BCG disease is specialized, and children with BCG disease should be referred to a paediatrician experienced in TB treatment. *Mycobacterium bovis* (including all BCG strains) is inherently resistant to pyrazinamide and treatment may require higher doses of other first-line TB or additional medications (World Health Organisation, 2006).

10.0 BCG Vaccination

The Bacille Calmette-Guérin (BCG) vaccine is the only vaccine available for TB. BCG vaccination does not prevent transmission of TB infection to an individual but in immune competent neonates and infants, BCG reduces the likelihood of TB infection progressing to disease or if disease occurs, lessens the chance of a severe outcome. BCG vaccination is not offered routinely in Western Australian given the low incident of TB in Australia. However, it may be indicated for certain groups based on an assessment of increased risk.

For more information on BCG vaccination, including the indications for use, please see the Department of Health Western Australia Information Circular IC 0062/09 *BCG Vaccination Schedule for Tuberculosis Control* and the WA TB Control Program policy 5.1 *BCG Vaccination*. 
11.0 Works Cited


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**Endorsing Authority**

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<th>Policy or Procedure Sponsor</th>
<th>Medical Director, WA TB Control Program</th>
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**References (Standards)**

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**Feedback or comments related to this policy should be addressed to the Paediatric Consultant, WA TB control program [Christopher.Blyth@uwa.edu.au](mailto:Christopher.Blyth@uwa.edu.au)**
Appendix A: Algorithm for the investigation of a HOUSEHOLD or CLOSE contact of TB (more than 5 years old)

1. **Interview and chest x-ray for ALL household contacts**
   - **Active TB suspected on interview or chest x-ray**
   - **Signs or symptoms of active TB absent**
     - **Previous TST positive, (do not repeat TST)**
     - **TST for ALL contacts if no previous TST or if previous TST negative**
       - **TST positive or TST conversion**
         - Medical review
         - Assess for active TB
       - **TST negative**
         - Medical review
         - Re-interview and repeat TST 3 months post exposure
         - Second TST negative
         - Second TST negative
1. **Medical review**
   - **Offer LTBI treatment**
   - **Discharge**
Appendix B: Algorithm for the investigation of a HOUSEHOLD or CLOSE contact of TB (less than 5 years old).

Interview and chest x-ray for symptoms and signs of active TB

- Signs or symptoms of active TB present → Active TB suspected
- Signs or symptoms of active TB absent → Re-assess for symptoms and signs of active TB at 8-12 weeks post exposure

Consider Primary Preventive treatment

- Active TB suspected → Perform TST and/or IGRA at 8-12 weeks post exposure
- Re-assess for symptoms and signs of active TB at 8-12 weeks post exposure → TST and/or IGRA positive → Medical review for active TB; TST and/or IGRA negative → Medical review and continue preventive treatment; TST and/or IGRA negative → Cease preventive treatment