

Tuberculosis Contact Tracing

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Summary Contact tracing is an essential component of tuberculosis (TB) control. Additional information includes contacts of cases with multi-drug resistant TB, contacts with immune suppression and HIV, and contact tracing in aged care facilities and the elderly.

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Applies to Area Health Services/Chief Executive Governed Statutory Health Corporation, Board Governed Statutory Health Corporations, Affiliated Health Organisations - Non Declared, Affiliated Health Organisations - Declared, Public Health System Support Division, Community Health Centres, Public Health Units, Public Hospitals

Audience Administration, clinical, nursing, emergency departments

Distributed to Public Health System, Community Health Centres, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, NSW Department of Health, Public Health Units, Public Hospitals, Private Hospitals and Day Procedure Centres, Private Nursing Homes

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This Policy Directive may be varied, withdrawn or replaced at any time. Compliance with this directive is **mandatory** for NSW Health and is a condition of subsidy for public health organisations.

TUBERCULOSIS CONTACT TRACING

This Policy is to be read in conjunction with the following Policy Directives:

PD2005_071 Chemotherapy

PD2005_072 Preventive therapy

PD2008_019 Tuberculosis Principles for management of people with TB in NSW

PD2008_016 Tuberculin Skin Testing

Introduction

Contact tracing is an essential component of tuberculosis (TB) control and relies on prompt notification of the disease. Decisions about the extent of contact tracing are to be guided by sound clinical and epidemiological indications.

The aims of contact tracing are to:

- identify other people who may have been infected following contact with a person found to have TB,
- counsel people found to have latent TB infection (LTBI) and offer them treatment for LTBI, and
- identify further cases of TB among those in contact with the index case.

Timing and extent of contact tracing investigations

The estimated risk of transmission should guide the priority and rapidity of the contact tracing investigation.

Individuals have a right to be informed about substantial risks to their health and recommended courses of action to manage these risks. However, advising people of their potential exposure to TB can cause individual, organisational and community concern and must therefore be undertaken following a comprehensive, yet timely, risk assessment of the infectivity of the source case and development of a contact screening strategy. Where it has been determined that a person requires screening, TB service staff should notify the person of their potential exposure, the risk, and screening recommendations without delay. TB staff should undertake the following steps:

1. Categorise the case according to the likely degree of infectiousness
2. Obtain a list of contacts and categorise the contacts according to their estimated risk of exposure to TB, that is, high, medium and low risk of exposure
3. Assess all high risk contacts of suspected and confirmed pulmonary and laryngeal infectious TB cases first
4. Where there is evidence of transmission of infection to high risk contacts, assess and screen medium risk contacts

Title: Tuberculosis Contact Tracing

5. Consult with the NSW Tuberculosis Program Manager when:
 - the case works in a hospital, school, child care facility, or resides in an institution or long-term care facility,
 - screening may be indicated for more than 25 contacts; or
 - there is doubt about the priority or extent of contact screening required.

6. In most cases contact screening in relation to smear positive index cases will be initiated before the diagnosis of TB is confirmed on culture. TB contact investigations may be withheld, pending culture results, if nucleic acid amplification (NAA) test results for *Mycobacterium tuberculosis* (MTB) are negative and the clinical probability of TB in the index case is assessed as low.

Convening an expert panel to develop a contact tracing strategy

It is recommended that the TB service should convene an expert panel to develop a contact tracing strategy when screening large groups (> 25 people) or for other difficult issues. Before convening an expert panel, advice may need to be sought from a person from the affected community or affected facility to assist in developing a screening strategy.

The expert panel should include the treating physician, the Area TB Coordinator, the Public Health Unit Director or Public Health physician and (where available) a laboratory expert. In order to maintain the privacy of an individual or facility and to avoid potential conflicts of interest in relation to the workplace or facility, it is recommended that the expert panel is limited to the people described above. Other relevant parties should be briefed as appropriate prior to and following the expert panel meeting.

Where the contact screening activity involves intra or interstate service providers the relevant TB Coordinators should be included in the decision making process.

Who should undertake contact tracing activities

TB contact tracing is an important public health activity that should be carried out by the Area Health Service TB Prevention and Control Service. The exception is where the TB Prevention and Control Services assesses that another service or organisation is more appropriate to undertake the screening activity. In that case, screening can be undertaken by others in collaboration with, and under the coordination of, the TB Prevention and Control Services/ Chest Clinics.

Contact tracing and the Public Health Act

Obtaining information on contacts from other agencies or organisations must be done in compliance with privacy laws. To assist agencies and other organisations to cooperate with the provision of information without breaching privacy laws, it is recommended that a formal inquiry be commenced under

Title: Tuberculosis Contact Tracing

section 71 of the *Public Health Act* 1991. Under section 71 of the *Public Health Act*, 1991, the Director-General of the Department of Health can inquire into a significant matter relating to the health of the public. The power to commence such an inquiry [under section 71(1)] has been delegated from the Director-General to the Department's Chief Health Officer, Deputy Chief Health Officer and also Medical Officers of Health/Directors of Public Health Units. Separate authorities need to be issued [under section 71(2)] to specified persons to allow those authorised persons to enter premises and inspect records relevant to the inquiry. The power to authorise persons under section 71(2) has also been delegated to the same officers.

When using the Public Health Act powers, sensitivity to the circumstances of the contact tracing activity and its scope must be considered. Advice from the NSW Department of Health's Legal Branch should be obtained in all cases before these powers are used to ensure that the inquiry is properly constituted (there should be a written determination of the inquiry and its scope) and appropriate.

Categorise the infectiousness of the case

The likely degree of infectiousness of the case, determined from the clinical, radiological, bacteriological and nucleic acid test findings, can be categorised as follows:

High infectiousness

- sputum smear positive, or
- laryngeal involvement, or
- chest x-ray cavitation, or
- evidence of transmission to other contacts.

Medium infectiousness

- sputum smear negative, but sputum culture positive or nucleic acid test positive, or
- pleural disease (without pulmonary involvement), or
- bronchial washing smear positive.

Low infectiousness

- sputum smear negative and culture negative.

It is recommended that where doubt exists as to whether the patient has *MTB* or a *Mycobacterium* other than tuberculosis (*MOTT*), nucleic acid testing be undertaken to identify the organism. Patients who have disease or colonisation due to *MOTT*, and not *MTB* do not require contact tracing.

Sputum smear positive patients should be considered as having active TB unless:

Title: Tuberculosis Contact Tracing

- a) the nucleic acid test is negative and clinical suspicion of tuberculosis is low, OR
- b) the culture is negative for *MTB* and positive for MOTT.

To determine the likely degree of infectiousness of the case, sputum samples should be sought in all cases of tuberculosis, including people with extra-pulmonary TB.

Transmission of TB from children aged less than 10 years of age is rare, although it has been reported in association with the presence of pulmonary disease.

Determining the infectious period

Determining the infectious period is necessary in order to identify priority groups for contact tracing. In general, the infectious period should be considered to be 3 months before the TB diagnosis unless there is a clearly defined date of symptom onset. In some circumstances, an earlier start date should be used (i.e. in the event of a protracted, symptomatic illness or if the case has large lung cavities which imply prolonged illness and infectiousness).

The patient should be considered no longer infectious for the purpose of contact tracing if:

- effective treatment has been given for equal to or longer than two weeks (as confirmed by subsequent *Mycobacterium tuberculosis* drug susceptibility tests), and
- symptoms have diminished, and
- there is evidence of a mycobacteriologic response (i.e. a decrease in grade of sputum smear positivity detected on sputum smear microscopy).

The presence of multi-drug resistant organisms can extend the period of infectiousness.

Any patient with signs of extended infectiousness (regardless of their culture susceptibility results) should be reassessed for previously unidentified contacts.

More stringent criteria for determining the end of the infectious period should be applied for patients who are returning to congregate living settings (i.e. nursing homes, homeless shelters, correctional facilities). These people should have at least three consecutive acid fast bacilli (AFB) negative results from sputum collected 8 to 24 hours apart. At least one of these should be an early morning specimen.

Assigning priority in screening

Contacts should be categorised into the following risk groups:

High risk group

- Frequent, prolonged and close contact in an enclosed environment during the infectious period

Title: Tuberculosis Contact Tracing

- This group may include:
 - all people living in the same household or dwelling,
 - close relatives and friends, and
 - close work colleagues who share the same indoor small work area on a daily basis.

Medium risk group

- Frequent but less intense contact with the index case.
- This group may include: other close relatives, friends, classroom schoolmates, work colleagues and neighbours who are not included in the high risk group.

Obtaining details of medium risk contacts is not necessary initially, and need only be pursued if there is evidence of transmission in the high risk group.

Low risk group

- This group includes: other contacts at school or in the workplace or social environments not included in high or medium risk groups.

Obtaining details of low risk contacts is not necessary initially, and need only be pursued if there is evidence of transmission in the high risk and medium risk groups.

It is difficult to be prescriptive about the overlap between groups, and each screening activity needs to be evaluated and developed on an individual basis. After contact tracing has been carried out in each risk group, an evaluation of the results should be carried out to determine if transmission has occurred.

Factors to consider when undertaking TB contact assessment and screening

The risk of progression from latent to active TB is increased in:

- children aged less than five years,
- people with HIV infection,
- people receiving equal to or greater than 15mg of prednisone or its equivalent for more than four weeks,
- people receiving other immunosuppressive agents such as multiple cancer chemotherapy agents, anti rejection drugs for organ transplantation and tumor necrosis factor (anti-TNF α) antagonists,
- people with certain other medical conditions such as cancer, silicosis, diabetes mellitus, and renal failure and
- people who have undergone gastrectomy or jejunioileal surgery.

Where contacts are known to have risk factors for progression from latent to active TB (as described above), they should be offered screening regardless of the extent of exposure to an infectious case.

Title: Tuberculosis Contact Tracing

Air volume, exhaust rate and circulation predict the likelihood of transmission in an enclosed space. Dilution of infectious TB particles is influenced by the volume of air, local circulation and room ventilation.

The likelihood of infection depends on the intensity, frequency and duration of exposure.

Timing and extent of contact screening

Screen high risk contacts first

High risk contacts of highly infectious cases should be screened within seven days of diagnosis.

High risk contacts of cases of medium and low infectiousness should be screened within two weeks of diagnosis.

Contact tracing high risk contacts of extra pulmonary TB cases may be undertaken to identify a source case. Where TB infection is thought to be acquired in the distant past, contact screening may not be necessary.

Screening of medium and low risk contacts

Screening should progress to the medium risk contacts group only if there is evidence of transmission, that is, suspected recent tuberculin skin test (TST) conversion, in the high-risk group. Screening should progress to the low risk group only if there is evidence of transmission in the medium risk group.

As a guide, if ten or more close high risk contacts have been tested and none have evidence of TB infection, testing of more remote contacts is usually unnecessary. If fewer than ten contacts have been tested, and all are TST negative, careful consideration should be given to the theoretical risk of infection before stopping the contact investigation.

Screening procedures

The screening procedures are outlined below. The management of contacts depends upon the findings at the first and subsequent visits, as shown diagrammatically in Figures 1 and 2.

First assessment

At the contact's first visit, a brief clinical history should be taken to:

- Clarify the exposure risk and define the period of potential exposure to the person with infectious TB to determine the appropriate time to undertake TST screening
- Record bacillus Calmette Guerin vaccination (BCG) status, previous evidence of latent TB, weight
- Check for symptoms of tuberculosis

Title: Tuberculosis Contact Tracing

- Check for presence of coexisting medical conditions which may increase the risk of progression from latent to active TB
- Check for circumstances that may interfere with the TST result (see section 10 – Interpretation of TST results in Policy Directive PD2008_016 Tuberculin Skin Testing).

In contacts with a history of TB or LTBI in the past, TST is not useful for assessing recent infection and a chest x-ray should be done to assess evidence of active disease.

All contacts in whom LTBI has not been documented including those who report a history of LTBI or TB disease should have a TST.

The TST reaction is read 48 to 72 hours later. If it is :

- positive, arrange for chest x-ray and physician review,
- negative, repeat in eight to ten weeks after the last exposure to an infectious case of TB.

Definition of negative and positive TST results can be obtained from PD2008_016 Tuberculin Skin Testing.

Second TST

The second TST should occur eight to ten weeks after the last exposure to an infectious case of TB. It is not required for contacts of extra-pulmonary cases or if first TST was done ten weeks or more after the last contact with the infectious case.

The TST reaction is read 48 to 72 hours later:

- If positive, arrange for chest x-ray and physician review,
- If negative, no further routine follow-up is required.

Immuno suppressed people must have a chest x-ray, and be referred to a physician for further management.

Follow up for specific contact groups

TST positive people

The recommended management for people identified as TST positive is either treatment for LTBI or chest x-ray follow up as per Policy Directive PD2005_072 Preventive Therapy. In the absence of multi drug resistant (MDR) TB, treatment for LTBI is generally recommended if the person is thought to be recently infected and the risk factors for drug reactions is low.

In people with a positive TST, it is imperative that active TB is excluded before commencing treatment for LTBI.

Title: Tuberculosis Contact Tracing

If treatment for LTBI is not given, the person is to be counselled about the future risk of TB and advised to seek medical care if symptoms develop. For those who do not receive treatment, in the absence of MDR TB chest x-ray follow-up is required at baseline, and again at six months, 12 months and 24 months as the risk of developing tuberculosis is highest within the first two years following infection with TB.

Children

All child contacts aged less than five years old should have a medical assessment and TST at their initial assessment. High risk child contacts aged less than five years old who are TST negative on the first visit should be referred to a physician for treatment for LTBI pending the outcome of further TST assessment.

Children aged five years old or older who are TST negative and symptom free do not generally require a chest x-ray.

Children who are TST positive should be immediately referred for a physician's assessment as a priority.

Pregnant women

Pregnant women who are contacts of active TB should have a TST undertaken. Women found to be TST positive should be referred for clinical assessment. If they have no symptoms, chest x-ray and treatment of LTBI may be deferred until after delivery provided that the woman is counselled and carefully monitored for symptoms of TB. If the woman develops symptoms an urgent referral to a chest clinic should be made.

Contacts of cases with Multi Drug Resistant TB (MDR TB)

Contacts who have received a diagnosis of TB infection attributed to an MDR TB case should be discussed at an MDR TB expert panel. Treatment of LTBI using isoniazid and rifampicin is unlikely to have any benefit in these people. The contact should be monitored by chest x-ray at baseline, six, nine, 12, 18 and 24 months and then annually for the next three years for a total of five years. The contact should also be counselled about the signs and symptoms of TB disease and their contact with MDR TB should active TB arise and they need to seek care in the future.

Contacts with immune suppression and HIV

High risk contacts with immuno suppressive conditions (including HIV infection) that render TST unreliable who are placed on treatment for LTBI should receive a full six months of LTBI treatment regardless of their TST result.

Title: Tuberculosis Contact Tracing

Education

Contacts should be advised about the nature of TB infection, its mode of transmission and symptoms, and the need to adhere to the prescribed follow up plan and treatment for latent TB (if provided). Where contacts develop signs and symptoms of active TB they should be counselled to seek urgent medical attention.

Contact tracing among airline passengers¹

Aeroplane travellers with infectious TB can pass the infection to other passengers in the same aeroplane. Current evidence indicates that this is only likely where the level of infectivity of the index case is moderate to high, and the flight is prolonged. In addition, the people at greatest risk are those seated in the immediate vicinity of the case.

Information about airflow in large jets supports the above. Air changes are frequent (from 6 to 20 per hour), and while 50 per cent of air is recirculated, High Efficiency Particulate Air (HEPA) filters are used in Boeing aircraft. The general direction of airflow is from the ceiling (enters at multiple duct outlets) to the floor (exits at floor grilles). Air eddies generally move laterally within each half of the cabin. In theory there is not a great deal of air movement longitudinally along the cabin.

There are also practical considerations in that follow up of contacts in this situation is often delayed, and highly resource intensive, particularly in terms of staff time. Positive tuberculin results are often difficult to interpret because of this delay, and due to the fact that many travellers are overseas-born from high prevalence countries.

Recommendations

Contact tracing is generally only necessary when:

- the case is sputum smear positive (and would have been so at the time of travel), and
- the total flight time was over eight hours.

Those offered screening should be:

- passengers seated in the same row, and within two rows in front of and behind the case. Where the case was in a group of seats adjacent to the windows of the aeroplane, there should not be a need to screen passengers seated on the far side of the aircraft, unless the activities of the person with infectious TB while on board could have infected a greater number of people,
- any friends of at risk passengers (or friends of the case) who moved from elsewhere in the aircraft to spend large amounts of flight time near the index case,
- airline staff, only if they spent the majority of the flight working or seated near the index case.

Procedure

To initiate airline contact tracing:

- have the index case indicate which seat number they occupied, if known, and identify relevant row numbers for contact tracing as above,
- obtain the required passenger seating list from the airline. If the case is unable to remember their seat number, the entire list for the section of the plane (eg. economy class) will be required, after which the appropriate seats can be identified. Most airlines keep these records for approximately three months,
- to determine follow-up addresses, obtain copies of appropriate landing cards from the Commonwealth Department of Immigration and Citizenship (Border Systems and Data Initiatives Section). It may be simplest to request all cards, both to speed up the process and in case unexpected contacts (such as friends, as above) are identified; contact tracing can then proceed as usual, both intra and interstate,
- alternatively, the airline can nominate a medical practitioner to liaise with the NSW Department of Health Chief Health Officer (or their nominated delegate) to receive the name of the index case in medical confidence. Identifying passenger information provided to the airline is provided in medical confidence and is to be treated as highly confidential and not to be released to other people. The medical practitioner will then identify from the airline's records passengers and staff who may have been exposed to the index case. The airline's nominated medical practitioner will advise the NSW TB Program Manager of the contacts names and addresses to facilitate contact tracing.

Contact tracing in aged care facilities and the elderly

Elderly people (i.e. >70 years of age) may have tuberculin reactions that are difficult to interpret due to anergy or a high rate of LTBI that is unrelated to the infection from the index case. For these reasons the contact screening procedure is undertaken by chest x-ray evaluation and monitoring for symptoms of TB. In aged care settings, the primary objective of screening is to identify and treat contacts with active TB disease, rather than latent infection. Hence, TST are generally not helpful in contact investigations in aged care facilities.

Elderly people who receive chest x-ray screening and who have a normal baseline chest x-ray should have a follow up chest x-ray at six months, 12 months and 24 months after the baseline chest x-ray. If a period of greater than eight weeks has elapsed between last TB exposure and first chest x-ray, elderly people with a normal baseline chest x-ray can be followed up yearly for two years. With their consent the person's general practitioner should also be informed about their TB exposure and about the signs and symptoms of TB.

Title: Tuberculosis Contact Tracing

Data to inform contact tracing evaluations

In order to evaluate the effectiveness of contact tracing the following data items should be collected for all contact tracing investigations and entered into the Notifiable Diseases Database:

- number of contacts screened,
- number of contacts diagnosed with active TB,
- number of contacts demonstrating TST conversion, and
- number of contacts commenced on treatment for latent TB.

Reference

1. Tuberculosis and Air Travel. Guidelines for Prevention and Control. 2006. Second Edition. World Health Organisation.

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Director-General

Figure 1: Management of contacts whose baseline tuberculin skin test is negative

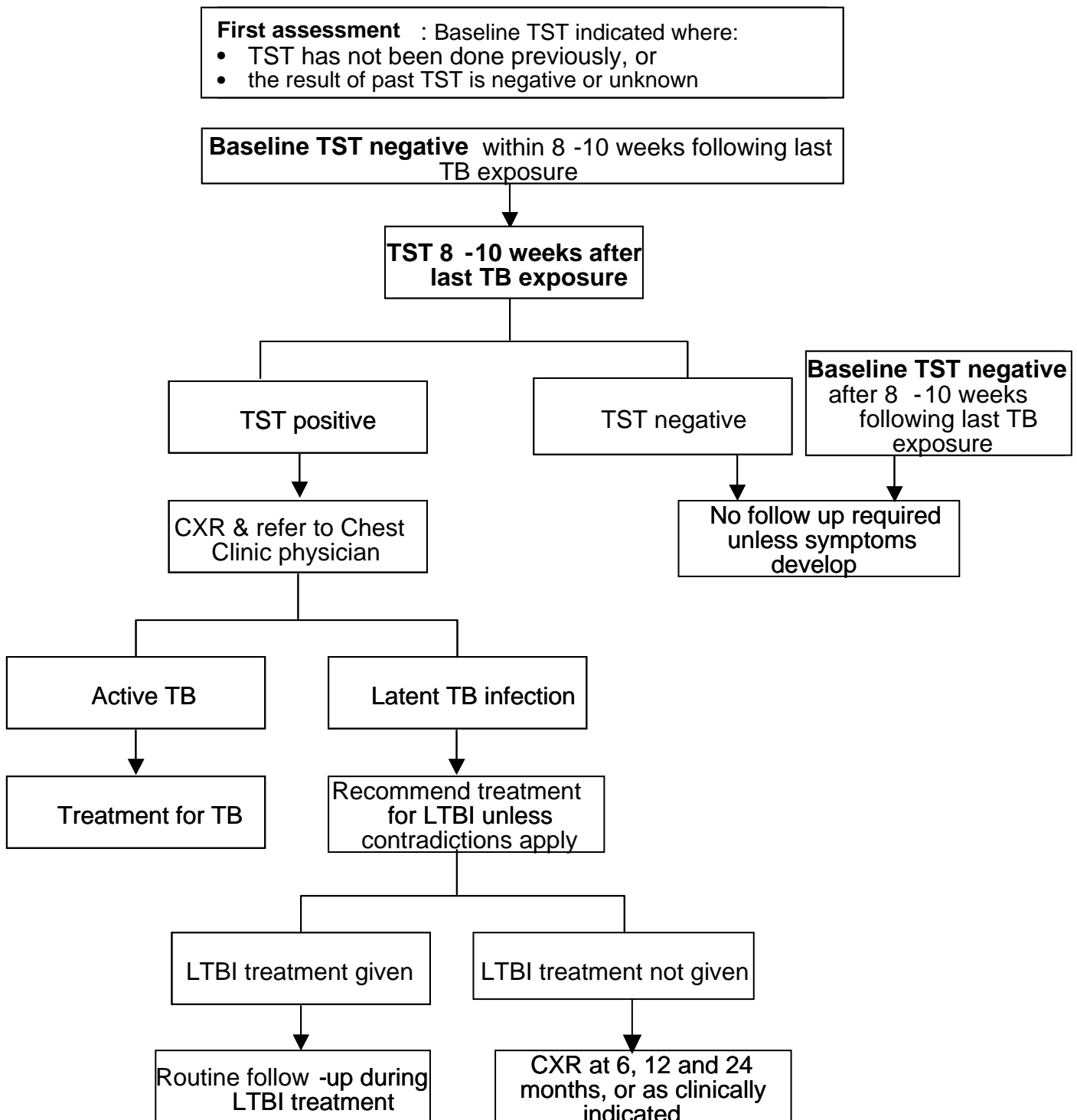


Figure 2: Management of contacts whose baseline tuberculin skin test is positive

