

TUBERCULOSIS

Information

Historically, Tuberculosis (TB) was a major cause of morbidity and mortality in Canada. It is still a major concern in other parts of the world, yet there are some significant decreases in rates globally. Further information regarding global epidemiology is available in the [Canadian Tuberculosis Standards, 7th edition, 2013](#).

In Canada, the rate of incidence of tuberculosis for 2011 was 4.7 cases per 100,000 people and in the past 10 years pulmonary tuberculosis accounts for the majority of cases.

Tuberculosis has become increasingly concentrated among three populations over the decades: foreign-born Canadians from tuberculosis-endemic countries, aboriginal peoples, and socially marginalized individuals. Over the past decade, an average of eight people in Nova Scotia were diagnosed with tuberculosis annually, an incidence of 0.8 cases per 100,000 people.

While the treatment success rate for TB is high, there is still a significant challenge with multidrug-resistant (MDR) TB, primarily in other parts of the world.

A number of factors influence the risk that a person infected with TB bacteria will develop active TB disease (i.e. the time since infection, age). Without risk factors, active TB disease develops in about 10% of infected, but otherwise healthy, adults in their lifetime (5% within 2 years of infection and 5% after 2 years). In young children the risk of disease after infection is inversely related to age, with very high risk (up to 40%) in infants. In both children and adults, a number of immunocompromising conditions will increase the risk of disease after infection.

The Bacille Calmette-Guerin (BCG) vaccine has been used to prevent TB. Historically it has been provided in several provinces/territories of Canada and is used globally. Clinical trials have demonstrated conflicting results regarding the efficacy of the BCG. The BCG is not recommended for routine use in the Canadian population but may be beneficial in certain high-incidence situations. See the [Canadian Tuberculosis Standards](#) for further information. Also, for BCG vaccine usage in Canada (current and historical), refer to phac-aspc.gc.ca/tbpc-latb/bcgvac_1206-eng.php

For the purpose of this manual, the following descriptions will be used:

Active Tuberculosis (disease): Active clinical disease that is usually symptomatic and for which microbiological tests are usually positive and radiologic tests usually abnormal. Active TB (disease) can be:

- *Pulmonary TB* – TB of the lungs and conducting airways (i.e. laryngeal TB)
- *Respiratory TB* – TB of the lungs and conducting airways, pleurisy (non-primary) and intrathoracic lymph nodes, mediastinum, nasopharynx, nose (septum) and sinus (any nasal)
- *Extra-Pulmonary TB (non-respiratory)* – TB that is outside the lungs and respiratory tract (i.e. bone TB, lymph node TB, miliary TB)

Latent Tuberculosis Infection (LTBI): The presence of latent or dormant infection with *Mycobacterium tuberculosis*. Cases with LTBI have no evidence of clinically active disease, i.e. no symptoms and no evidence of radiographic changes that suggest active disease. They are non-infectious.

Case definition

CONFIRMED CASE

A confirmed case can be either of the following:

- **Laboratory confirmed case:** Cases with *Mycobacterium tuberculosis* complex demonstrated on culture, specifically *M. tuberculosis*, *M. africanum*, *M. canetti*, *M. caprae*, *M. microti*, *M. pinnipedii* or *M. bovis* (excluding *M. bovis* Bacillus Calmette-Guerin [BCG] strain).
- **Clinically confirmed case:** In the absence of culture proof, cases clinically compatible with active tuberculosis that have, for example:
 - chest radiographic changes compatible with active tuberculosis
 - active non-respiratory tuberculosis (meningeal, bone, kidney, peripheral lymph nodes, etc.)
 - pathologic or post-mortem evidence of active tuberculosis
 - favourable response to therapeutic trial of anti-tuberculosis drugs

Causative agent

Tuberculosis disease is caused by infection with organisms of the *Mycobacterium tuberculosis* complex [*Mycobacterium tuberculosis* complex includes *M. tuberculosis* (including *M. tuberculosis* subsp. *canetti*), *M. bovis*, *M. bovis* BCG strain, *M. africanum*, *M. caprae*, *M. microti* and *M. pinnipedii*].

In North America, *M. tuberculosis* is by far the most common of the *M. tuberculosis* complex. This organism is never considered a part of the normal human flora.

Mycobacteria are rod-shaped bacteria which do not stain readily, and so do not stain with the gram stain. Once they are stained, they resist de-colorization by acid alcohol and are therefore called acid-fast bacilli (AFB). Mycobacteria, including the *M. tuberculosis* complex, are slow-growing organisms that may take weeks to develop colonies on solid media. A subgroup of species may form colonies within a week, and are referred to as “rapid growers” but the rapidity of their growth is relative to the other mycobacteria. The term “non-tuberculous mycobacteria” (NTM) includes all mycobacterial species except those that cause tuberculosis.

There are more than 100 species of NTM with varying degrees of pathogenicity and variable prevalence from one geographic region to the next. Unlike TB, NTM infection is not spread from person-to-person, and NTM disease is not notifiable. NTM are widely distributed in the environment including water, both fresh and salt, and soil. These agents may be cultured from clinical specimens but, with the exception of *M. kansasii*, should be isolated from multiple specimens from non-sterile sites before they are considered to have any clinical significance. Most commonly, NTM cause opportunistic infections in immunosuppressed hosts, although some can cause superficial infections in people with particular exposures (for example, *M. marinum* infection in people working with tropical fish tanks), and outbreaks of superficial infection with rapid-growing mycobacteria have occurred at spas.

Source

Humans. Animals may be infected but are rarely a source of infection to humans.

Incubation

The incubation period for TB is variable; the period of time between infection with *M. tuberculosis* and development of disease can be a period of weeks to decades. Most infected individuals do not ever progress from infection to disease. Infants, young children and individuals who are immunocompromised are at increased risk of progression to primary active tuberculosis (active disease following initial infection). Reactivation following latent infection is also more likely in immunocompromised persons, most notably those with HIV. Infection with *M. tuberculosis* can usually be identified through a tuberculin skin test, within eight weeks of exposure to the bacteria.

Transmission

TB is spread by the inhalation of airborne organisms. Infectious particles are generated when individuals with pulmonary or laryngeal TB cough, sneeze, sing, play wind instruments or, to a lesser extent, speak. Cough-inducing procedures such as bronchoscopy are associated with an increased generation of infectious, aerosolized particles. Aerosolization may also occur in laboratory and autopsy procedures or during activities such as the irrigation of TB-infected wounds. Once

infectious particles have been aerosolized, they are spread throughout a room or building by air currents and can be inhaled by another individual.

Although extra-pulmonary (non-respiratory) TB does not contribute significantly to the transmission of TB, infection control precautions are nevertheless strongly recommended if there is any possibility of aerosolization of bacteria, as may be the case in wound care, surgical procedures and post-mortem examination.

Communicability

Persons with latent TB infection (LTBI) are not infectious. In some people, TB bacteria overcome the defenses of the immune system and begin to multiply, resulting in the progression from latent TB infection to active TB disease. Persons with TB disease are considered infectious and may spread TB bacteria to others.

The communicability of tuberculosis depends on the infectiousness of the TB case, the degree of contact (in terms of the likelihood of the contact having breathed the same air as the TB case when he or she was infectious) and the susceptibility of those contacts. It is important to consider the potential infectiousness of the TB case. Factors that indicate a high degree of infectivity may include:

- sputum is smear-positive
- case has laryngeal TB or pulmonary TB
- case has an abnormal chest X-Ray (cavities)
- case has a productive cough
- other factors that are associated with increased infectiousness include age, coughing, sneezing and singing. Children under age 10 are generally considered less infectious than adolescents and adults. Active TB disease in young children is rarely infectious, but it is usually a sign of a recent infection.

Because the start of the infectious period cannot be determined with precision by available methods, a practical estimation is necessary. Helpful details in determining the infectious period are the approximate dates that TB symptoms were noticed, mycobacteriologic results, and extent of disease (especially the presence of large lung cavities, which imply prolonged illness and infectiousness). See [Exclusion section](#) for further information on infectious period of cases.

The environment in which the contact occurs is also important in assessing infectiousness. Transmission is rarely thought to occur outdoors; however, indoor environments that are poorly ventilated, dark and damp can lead to increased concentration and survival of *M. tuberculosis*.

Most cases with extra-pulmonary disease alone are not infectious, but it is very important to exclude concomitant pulmonary involvement.

Symptoms

Symptoms of respiratory TB may include cough, pleuritic pain, fever, night sweats and unexplained weight loss. Infants and young children may be asymptomatic or may present with fever and non-productive cough, and chest radiography may demonstrate unilateral, patchy parenchymal infiltrates, or paratracheal or hilar adenopathy, or both.

The classic symptom of pulmonary TB is a chronic cough of at least 2 weeks' duration. This cough is initially dry but after several weeks to months will become productive. Hemoptysis, anorexia, weight loss, chest pain and other symptoms are generally manifestations of more advanced disease.

Diagnostic testing

Diagnostic Testing for Active TB

Chest Radiography is the usual first step in evaluation of an individual with pulmonary symptoms; however, it has limitations in the diagnosis of pulmonary TB. Chest x-ray is an integral part of TB disease diagnosis but should also be followed by microbiological tests for TB disease.

Specimens for mycobacteria are of critical importance and need to be collected and handled appropriately. Specimens may include sputum, bronchial aspirate, gastric aspirate or other. Specimens should be collected in dry sterile containers. There may be risk of aerosolization of organisms as a result of coughing during collection if a person has TB, and precautions should be taken to avoid exposure. Usually three sputum specimens from non-sterile sites are advised. The conventional collection of first morning sputum has been shown to be inconvenient to patients and therefore, recently published research has focused on the “same day” or “frontloaded” diagnosis of TB using specimens collected on the same day. At least three sputum specimens can be collected on the same day, a minimum of 1 hour apart and tested with microscopy as well as culture. Specimens should be refrigerated at 4°C and should be transported to the laboratory promptly, ideally within 24 hours.

Further testing information is available in the [**Canadian Tuberculosis Standards, Chapter 3.**](#)

After receipt in the laboratory, specimens undergo a process of decontamination and concentration prior to preparation of a smear and culture. The smear is stained with a fluorescent stain (auramine) and is usually available on the day after specimen processing, but on request can be read the same day. The number of organisms on the smear is quantified from rare to 4+, which indicates very large numbers of organisms seen. The culture is performed on solid medium and also in liquid medium, which decreases the time to detection by about half the time taken

for growth on solid medium. *M. tuberculosis* complex may be detected in a few days when the sample has a high number of organisms (4+ on the smear) but more typically takes 1-2 weeks. If low numbers of organisms are present, growth may take longer and specimens are held for 6 weeks for liquid media and 8 weeks for the accompanying solid medium.

M. tuberculosis complex is identified by a DNA probe to the level of the complex. Isolates are referred to the National Reference Centre for Mycobacteriology for susceptibility testing, identification to the species level, and for typing.

Reports are generated after the smear is read, and when growth occurs or is negative. New smear positives are phoned but the species cannot be provided on the basis of the smear. Further reports are sent when susceptibilities are available.

Diagnostic Testing for Latent Tuberculosis Infection (LTBI)

The goal of testing for LTBI is to identify individuals who are at increased risk for the development of TB disease and therefore would benefit from treatment of LTBI. *Only those who would benefit from treatment should be tested*, so a decision to test presupposes a decision to treat if the test is positive. [See [Canadian Tuberculosis Standards, Chapter 4.](#)]

Tuberculin Skin Test (TST)

Information on proper TST procedures is available in the [Canadian Tuberculosis Standards, Chapter 4.](#)

Interferon Gamma Release Assay (IGRA)

The IGRA is a serology test that can be used in the diagnosis of LTBI. Interferon gamma release assays have been developed to determine whether a person has been exposed to *M. tuberculosis*. These serology tests are based on the production of gamma interferon by T lymphocytes when exposed to antigens to which they have been sensitized by previous exposure.

Guidelines differ in countries that use the IGRA test. In some countries it has been used to replace the TST. In Canada, there has been careful analysis of the roles of each test. The most commonly used indication for IGRA testing in the Canadian guidelines is to resolve possible false positive TST where a person has received BCG previously. While the TST may be falsely positive as a result of BCG immunization, the IGRA antigens are selected to provide a more specific result for *M. tuberculosis*. There are nontuberculous mycobacteria that share these antigens and consequently, infection with these organisms may give a positive IGRA test result.

IGRA testing does not distinguish between active tuberculosis and latent tuberculosis infection, and the sensitivity of testing is similar to the TST. Unfortunately, testing does not correlate completely with the TST, and the interpretation of TST negative/

IGRA positive results is controversial. IGRA is also not indicated for serial testing, which might be used in workplace screening, for example.

There are two tests that are commercially available. The one used for patients in Nova Scotia is the QuantiFERON® TB Gold (Cellestis). Specimens are collected in tubes that are coated with antigens from *M. tuberculosis*, and also in tubes with a positive control and a negative control. The set of tubes must be carefully handled to maintain viability of the cells and, after incubation, are sent to Saint John, New Brunswick, for processing. As the time limits are short between the time blood is collected and required processing, and invalid test results may occur because of errors in collection or handling, the test can only be ordered by certain specialists (Infectious Disease physicians, Respiriologists and Medical Officers of Health) and is only available from a limited number of facilities in the province at this time. For further details, check with the laboratory.

Treatment of active TB disease

The overall goals of treatment are [1] to cure the individual case and [2] to minimize the transmission of *M. tuberculosis* to other persons. The four first-line drugs used in Canada to treat TB are isoniazid (INH), rifampin (RMP), pyrazinamide (PZA) and ethambutol (EMB). The treatment regimen for TB should take into account the possibility of multidrug-resistant TB, especially among the foreign-born, given that this condition is not uncommon in parts of the world from which many people are emigrating.

If individuals are prescribed INH, pyridoxine (vitamin B6) should be given to minimize the risk of neuropathy in people with risk factors for pyridoxine deficiency (such as malnourished or pregnant individuals) or for neuropathy (patients with diabetes or renal insufficiency). B6 supplements are not routinely needed otherwise.

Please see the [Canadian Tuberculosis Standards, Chapter 5](#), for extensive information regarding treatment of tuberculosis.

PUBLIC HEALTH MANAGEMENT AND CONTROL

Case management

The treating physician and Public Health share responsibility for case management during the prolonged period required for follow-up and treatment.

Case follow-up

Follow-up of cases should begin **as soon as reported to Public Health** and take the following steps:

- Review clinical, laboratory, and radiological information with the case's physician and the MOH. Determine extent of PH follow-up based on this information.

Note: As soon as a suspect active case of TB has been reported, Public Health should ensure that all the necessary investigations to confirm the diagnosis and determine the degree of infectiousness have been initiated.

- Collect information on multiple factors relevant to a TB investigation, including (but not limited to) the following. Most of this information is ideally collected from the physician yet should be discussed with the case as well:
 - identifying demographic information (i.e. residence, employment, first language, etc.)
 - history of previous exposure to TB
 - history of previous TB disease and treatment
 - symptoms of the illness and date of onset
 - chest radiograph results (and other diagnostic imaging studies)
 - diagnostic specimens that were sent for histologic or bacteriologic analysis
 - concurrent medical conditions and other diagnoses (i.e., substance abuse, mental illness, or dementia) that impinge directly on the interview
 - recent travel
- Conduct the interview in person (i.e., face to face) in the hospital, the case's home, or a convenient location that accommodates the case's right to privacy (see [Canadian Tuberculosis Standards](#)). Appropriate infection control precautions should be in place (fit-tested N95 mask for interviewer).
- Several interviews may be necessary to gather all the information necessary for case management. At the initial interview, the case may not be oriented to the contact investigation because of social stresses related to the illness (i.e., fear of disability, death, or rejection by friends and family). Additional interviews may need to be scheduled when the case has had time to adjust to the disruptions caused by the illness and has become accustomed to the interviewer, which facilitates a two-way exchange. The number of additional interviews required depends on the

amount of information needed and the time required to develop consistent rapport.

- Review treatment protocol with the attending physician/specialist. The case will not be required to make any payments for TB medications recommended as part of national treatment standards.
- Document information on the [Tuberculosis Case Report Form](#) (and other pertinent information for public health management purposes).
- Obtain information on contacts (recommended to be initiated within 3 working days of reported case) and initiate contact tracing when information has been collected [see [Contact tracing section](#)].

Ongoing monthly (minimum) follow-up of case throughout treatment is recommended to ensure that case is taking anti-TB medications as prescribed. Use the documentation tool "[Tuberculosis Case Treatment Monthly Monitoring Form](#)," following up with monthly blood-work monitoring, attending physician visits, wearing masks as appropriate, and following other recommended public health measures.

- The case's attending treating physician should be contacted to discuss monitoring of compliance and also at any time there is any concern of noncompliance.
- If the physician has any concerns that compliance is poor or unknown it is important that the investigator be informed as soon as possible. In such cases, PH will communicate with the case to:
 - ensure that the case is educated regarding the risks of inadequate treatment of tuberculosis
 - ensure that the case is aware of the benefits from treatment
 - determine what factors are decreasing the chance of compliance
 - if necessary, determine best strategies to foster compliance with the case: bi-weekly visits, treatment regime modifications, Directly Observed Therapy [DOT]‡, etc.
- Ensure case is adequately treated for tuberculosis. A case of TB is considered adequately treated when they complete a treatment protocol of 6 or 9 months or when a minimum of 80% of the prescribed doses have been taken.
- Throughout the follow-up, discuss case as needed with MOH.

The PH investigator should consider dialogue with the attending physician regarding any or all of the following:

- Define the role of PH in case management and contact tracing.
- Discuss exclusion if necessary.
- Consider HIV testing.
- Review the treatment regime.
- Review the need to notify PH should the treatment protocol change or be discontinued.

- Discuss the need to notify PH of concerns of non-compliance.
- Consider short duration [few months, not all at once] of each prescription for anti-TB therapy [may aid in recognizing compliance issues if they develop].
- Discuss the need for Directly Observed Therapy (DOT[‡]).

Poor compliance with prescribed anti-tuberculous therapy is the most common reason for treatment failure. DOT is one way to monitor adherence with therapy. DOT may be given daily, or 2 to 3 times a week. DOT has been evaluated in a variety of settings and with different types of observers, resulting in considerable debate over its effectiveness for all individuals in all settings.

Current recommendations are that DOT should be considered for the following individual risk factors:

- disease due to multidrug-resistant organisms
- treatment failure or documented relapsed disease
- injection drug use/other substance abuse
- homelessness or unstable housing
- suspected non-adherence or previous non-adherence
- major mental illnesses
- children and adolescents

Please see [Tuberculosis – Directly Observed Therapy Record](#).

Exclusion (Isolation)

Suspect active TB cases should be isolated and remain in isolation until TB diagnosis is confirmed or ruled out. **Confirmed TB cases** should be isolated for the time period that they are considered infectious. A decision should be made on whether self-isolation at home or isolation within a healthcare facility is most appropriate.

Self-isolation can be a very difficult time for the case and his/her family. Provide encouragement, guidance, and reinforcement during this time.

There are a number of steps that can be taken to reduce transmission during the self-isolation period:

- Restrict public activities.
- Avoid public transportation.
- Restrict visitors to home.
- Wear mask to all medical and lab appointments; surgical mask is sufficient.

[‡]*Directly Observed Therapy (DOT): watching the case swallow each dose of medication*

Please refer to the latest edition of the [Canadian Tuberculosis Standards](#) for further information on isolation criteria.

In consultation with the Medical Officer of Health (MOH), patients with **smear-positive, culture-positive** drug-susceptible respiratory TB should be **kept under airborne precautions** (see [Canadian Tuberculosis Standards, Chapter 15](#) for further details of home/facility precautions) until:

1. there is clinical evidence of improvement
2. there is evidence of adherence to at least 2 weeks of effective multidrug therapy based on the known antibiotic sensitivity of the patient's organism **AND**
3. three consecutive AFB sputum smears test negative (specimens can be collected within 1 hour of each other on the same day; early morning collection is not considered necessary)

Criteria for discontinuation of isolation precautions should **never** be based on a fixed interval of treatment but, rather, on evidence of clinical and bacteriologic improvement and evidence of the adequacy of the treatment regimens (see section below). Determination of isolation discontinuation should be made in collaboration with Public Health (PH) and specialist. When the case is unable to self-isolate based on the PH nurse and MOH's assessment, then hospitalization is the preferred option.

Education

The main priority in infectious cases is to ensure that no new individuals are exposed to the case until the case is rendered non-infectious by appropriate treatment. Educate the case and/or family about tuberculosis and prevention measures, providing access to surgical masks, fact sheets, and websites, as indicated. In certain instances, this education may be extended beyond the family to include co-workers and employers.

Advise case to consult with a pharmacist regarding common side effects of the TB medication regime. Educate about the potential for treatment-related side effects and the risk of not completing the prescribed regimen.

Contact tracing

The goals of contact tracing are to:

- identify and initiate treatment of secondary cases of active TB disease
- identify and treat the source case who infected the index case, if the index case is under 5 years of age
- identify contacts with LTBI in order to offer preventive treatment

Contact tracing must be initiated in consultation with the MOH.

A contact investigation must be undertaken if the case has confirmed or suspected active respiratory, pulmonary or miliary TB. All are considered as potentially infectious. Cases that are laryngeal, sputum smear-positive or have cavitory disease on chest x-ray are significantly more infectious than non-laryngeal, smear-negative or non-cavitory cases.

Definitions of Case/Contact/Exposure criteria [as per [Canadian Tuberculosis Standards](#)]

Index case: the first case or initial active case from which the process of contact investigation begins.

Source case: the person who was the original source of infection for secondary case(s) or contacts. The source case can be, but is not necessarily, the index case.

Contact: a person identified as having come in contact with a case of active disease. The degree of contact is usually further defined on the basis of closeness and duration. TB contacts may be classified as household, close non-household, casual, or community:

- **Household contacts** are those who regularly sleep in the same household as the infectious case on ongoing basis [i.e. three or more times per week]. This may include members of an extended family, roommates, boarders, “couch-surfers”, etc. Household members often have the greatest exposure to the TB case.
- **Close non-household contacts** are those who have regular, extensive contact with the index case and share breathing space daily or almost daily but do not sleep in the same household most of the time. This may include caregivers, regular sexual partners, close friends and extended family. They also include daycare and primary/secondary school classroom contacts, and co-workers who work in close proximity. The amount of time that high school classmates spend in the same room as the case will depend on the number of shared courses; prioritize those who share the most actual time together. Similarly, in almost all workplaces it is possible [and important] to define the group of colleagues who spend the most time in the same air space as the case. Regular contacts in specialized health care settings such as dialysis units or rehabilitation programs may also qualify. It is not social closeness to the TB case but, rather, the amount of time in a shared airspace that is the critical issue. For example, computer personnel may report working very closely with others in their group but spend little time together in shared air space if the work is largely done electronically.
- **Casual contacts** are those who spend time regularly but less frequently with the infectious case. These may include high school classmates who share fewer courses with the case or classmates in college/university classes; less exposed colleagues at work; members of a club, team, weekly children’s play-group or other social/recreational/religious group; extended family members who are seen

occasionally; other students on a school bus.

- **Community contacts** are those living in the same community or attending the same school or workplace but in a different classroom or area of the workplace. Individuals who have only transient or occasional exposure are in this group.

For contacts in hospital settings, it is important to work closely with the Occupational Health/Infection Control departments to determine potential contacts in rooms that share air circulation.

Principles of contact investigation

1. Prioritizing the work
2. Rapid initiation of contact investigation
3. Assessment of transmission risk

PRIORITIZING THE WORK

Prioritize the work based on the infectiousness of the case, extent of exposure and immunologic vulnerability of those exposed. This enables the most effort to be put into contacts who are most at risk of being infected and/or most at risk of developing active TB disease if they are infected. Contact investigation is iterative; it should be expanded if initial follow-up results indicate that transmission has occurred.

Those with the most exposure to a case of TB and those with the highest risk of progression to active TB if infected should be considered as the highest priority for contact tracing.

The *highest priority* contacts include:

- household contacts, including those exposed as “household members” in congregate settings such as homeless shelters, jails and long-term care facilities [generally, roommates or cellmates]
- contacts who are close non-household or casual contacts **AND** who are at high risk of progression of LTBI to TB disease [i.e. age under 5 years, HIV, dialysis, transplant, silicosis]
- contacts exposed [i.e. without an N95 mask] during bronchoscopy, sputum induction, autopsy, intubation or other aerosolizing medical procedures [see [Canadian Tuberculosis Standards, Chapter 15](#)].

Medium priority contacts are the close non-household contacts who are not at high risk of rapid progression from LTBI to active TB. Most close non-household contacts fall into the medium-priority group.

Casual contacts are *low priority*. It is generally recommended that the investigation

be expanded to this group only if there is evidence of transmission or the case is considered to be extremely infectious (i.e. laryngeal TB). However, the specific circumstances should always be considered. For example, a choir group meeting once per week may pose significantly more risk than a weekly outdoor soccer game; children riding on a long daily school bus in winter, with windows usually closed, may have considerable exposure.

It is rare for community contacts to need investigation. Such an investigation should take place only in very unusual circumstances and consultation with the MOH.

Contacts may be grouped as follows:

High priority – household contacts plus close non-household contacts who are immunologically vulnerable, such as children under 5 years.

Medium priority – close non-household contacts with daily or almost daily exposure, including those at school or work.

Low priority – casual contacts with lower amounts of exposure.

Table 1: Priority Investigation of Contacts

	Laryngeal TB	Respiratory TB (including Pulmonary TB) with Sputum Smear Positive or Cavitory Disease	Respiratory TB (including Pulmonary TB) with Sputum Smear Negative
High Priority Contacts	Yes	Yes	Yes
Medium Priority Contacts	Yes	Yes	Consider if evidence of transmission in high priority contact group
Low Priority Contacts	Yes (consider from the outset)	Consider if evidence of transmission in high and medium priority contact groups	

RAPID INITIATION OF CONTACT INVESTIGATION

Rapid initiation of contact investigation allows for prompt identification of contacts who may already have active TB disease and/or initiation of treatment of LTBI for newly infected contacts before disease develops.

Note: If the clinical suspicion of pulmonary TB in the case is sufficiently strong enough to begin TB treatment pending microbiologic confirmation, then investigation of household contacts should begin promptly, especially for any children under 5 years old, HIV-infected contacts and others at high risk of disease progression if infected.

ASSESSMENT OF TRANSMISSION RISK

The degree of infectiousness of the TB case is significant in determining the extent of the contact investigation.

- Sputum status is the most reliable indicator of infectiousness. The “worst” result [i.e., most positive sputum] is used to evaluate infectiousness. Laryngeal TB cases are 4 to 5 times more contagious than smear-positive pulmonary cases.
- Cavitory disease on chest x-ray has been linked to higher infectiousness, independent of smear status.
- Priority should be given to contact tracing during the period when the TB case had respiratory symptoms [i.e. cough]. The Centers for Disease Control and Prevention in the US recommends cases with smear-positive or symptomatic disease should be considered to have been infectious for three months before onset of respiratory symptoms or the first positive finding consistent with TB, whichever is longer. Asymptomatic cases with a negative smear and no cavities seen on chest x-ray should be considered to have been infectious for four weeks before the date that TB was suspected.
- Coughing is the least reliable indicator of infectiousness but can be linked to it, mainly in households. Singing and similar activities [i.e. playing wind instruments] can increase risk of transmission.
- Children under 10 with TB are generally not considered infectious but any child presenting with adult type pulmonary TB [cough, cavitation on chest x-ray, smear-positive sputum] should be considered infectious and contact investigation undertaken. High school students can be very infectious of TB [often large number of contacts and often extensive disease when diagnosed].
- Active TB [pulmonary or extra-pulmonary] in children under 5 years old should lead to an immediate search for an infectious source case. Reverse contact investigation of the child’s close contacts should be done to identify the source case.

Note: If TB is strongly suspected, investigation of close contacts, especially susceptible contacts, should occur while final confirmation of the diagnosis is awaited.

Conducting a contact investigation

Obtain contact information from the TB case

Visit the case's home, and if necessary, place of work/school and take a detailed history. Look for environmental clues (i.e., toys suggesting the presence of children).

The following information should be obtained (use case's period of infectiousness as your guide):

- Gather a list of contacts. (See [TB Contact Line List](#).)
- Ask about household setting: household contacts and their ages, including anyone who regularly sleeps in the home or visitors who may have stayed at the home.
- Inquire about place of work, school, church, and play and other places where case may spend time, including description of settings. Ask specifically regarding congregate settings (i.e., high school, university, correctional facility, homeless shelter, or nursing home).
- Obtain information regarding transmission settings that the case attended during the infectious period. All possible sites of transmission should be listed, regardless of how long the case spent at the sites. Topics to discuss include where the case spent nights, met with friends, worked, ate, visited, and sought health care, and social gatherings that may have occurred during the period of infectiousness (i.e., weddings, funerals, community events).
- Ask for the names of contacts and the approximate types, frequencies, and durations of exposure for each transmission setting.
- Ask specifically about contact with children and their ages and/or anyone else who is high risk for progression (i.e. immunosuppressed) to active TB.
- Inquire about route of transportation to work/school/other (bus, car, etc.).
- Ask the case if he/she knows of anyone with signs and/or symptoms of TB.
- Determine if the case travelled during the estimated infectious period (routine and non-routine). If yes, obtain details of trip, including means of transportation. Please see PHAC "Canadian Tuberculosis and Air Travel Guidelines" document ([phac-aspc.gc.ca/tbpc-latb/pdf/guideform_tbaircraft09-eng.pdf](http://phac.aspc.gc.ca/tbpc-latb/pdf/guideform_tbaircraft09-eng.pdf)) regarding criteria for reporting and contact investigation when case traveled on a large jet aircraft.

It is important to gather as much detailed information about the contacts as possible to assist in the screening process. This information should include names, dates of birth, addresses, phone numbers, e-mail address, and current general health. Recent illnesses among contacts should be discussed. It may be helpful to inform the case that family members and/or close friends will be interviewed to assist in gathering contact information. All possible settings of transmission should be identified and efforts made to find contacts in those settings.

Assure the case that their diagnosis of TB is *confidential* and will not be shared with their contacts. Give the case the option to inform their contacts. Explain to the case that if the contacts have not contacted PH within a week, a public health nurse will follow up with the named contacts.

Interview the priority contacts

The priority contacts should be interviewed and information should be collected regarding the type and intensity of the contact, presence of symptoms, risk of progression to active TB if infected, history of treatment of TB disease or LTBI, and previous known exposure to infectious TB disease see [[“*Tuberculosis Contact Form*”](#)]. The purposes of the “*Tuberculosis Contact Form*” are to:

- assign priority for investigation of contacts
- assist with determining if investigation needs to be expanded
- assist with identifying source case
- assist with interpretation of the contact’s TST and other clinical information

Ideally, the [“*Tuberculosis Contact Form*”](#) and the [“*TB Contact Line List*”](#) should be used together, yet situations may arise where this is not logistically possible or necessary.

Determine the need for contact TST and medical evaluation

Children < 5 years of age who are contacts of a case of active TB require special assessment. Information should be discussed with the MOH. The MOH may elect to consult a Pediatric Infectious Disease (PID) consultant directly or facilitate the necessary consultation through the contact’s primary care provider. The consultation with PID will determine the most appropriate testing for the child (i.e. IGRA, chest x-ray, TST). The PID consultant will facilitate the most efficient method for assessment depending on the location of the child.

For all other contacts, once active disease has been excluded, all exposed close high and/or medium priority contacts should receive a TST unless there is a history of prior treatment of TB documented prior to positive TST.

Ideally the TST should occur at the first encounter. For contacts, a skin test result is critical, and documentation of a previous positive result should be obtained before omitting the skin test from the diagnostic evaluation. The TST should be carried out and interpreted regardless of BCG* vaccination status.

See [Appendix A](#) for an information sheet intended for the public, *Tuberculin Skin Test: General Information*.

*The interpretation of the positive TST result should ignore the history of vaccination with BCG when:

- BCG was given in infancy, and the person tested is now aged 10 years or older
- there is a high probability of TB infection: close contacts of an infectious TB case, Aboriginal Canadians from high-risk communities, or immigrants/visitors from countries with high TB incidence
- there is a high risk of progression from TB infection to TB disease (HIV/AIDS, cancer, diabetes, etc.)

BCG should be considered the likely cause of a positive TST if BCG vaccine was given after 12 months of age **AND** the person is

- Canadian-born non-Aboriginal **OR**
- an immigrant/visitor from a low TB incidence country

International TB incidence rates are available at phac-aspc.gc.ca/tbpc-latb/itir-eng.php

NOTE: Information on proper TST procedures is available in the [Canadian Tuberculosis Standards, Chapter 4.](#)

Management of a positive TST should occur in two distinct steps:

STEP 1 – DECIDING THAT A TST IS POSITIVE:

The health professional reading the TST must decide whether the test is positive. This is based on the size, using the criteria listed in Table 2 ([below](#)) as a guide. Once a TST is considered positive, the individual should be referred for medical evaluation. There is no clinical utility in performing a TST in the future once a test that was properly performed and read is considered positive.

A web-based interactive algorithm (tstin3d.com) has been developed to facilitate three-dimensional interpretation of TST and IGRA testing.

Conversion of the TST from negative to positive can take up to 8 weeks after infection. Therefore, if the initial skin test is performed within 8 weeks of the last exposure to the infectious case and is negative, a second skin test should be carried out at least 8 weeks after the contact was broken.

If the second TST remains negative and the individual has no signs and/or symptoms of TB, no further follow-up is required.

Table 2: Interpretation of the TST and Cut-Points for Treatment of Latent TB Infection Considerations

TST Reaction Size (mm induration)	Situation in which reaction is considered Positive* and indication for LTBI treatment**
0-4 mm	<p>In general this is considered negative, and no treatment is indicated[†]</p> <p>Children under 5 years (In NS, pending Pediatric Infectious Disease consult) and high risk of TB disease[‡]</p>
≥ 5 mm	<p>HIV infection</p> <p>Contact with infectious TB case within the past 2 years</p> <p>Presence of fibronodular disease on chest x-ray (healed TB, and not previously treated)</p> <p>Organ transplantation (related to immune suppressant therapy)^{‡‡}</p> <p>TNF alpha inhibitors (can cause immune suppression)</p> <p>Other immunosuppressive drugs (i.e. corticosteroids ≥15 mg/day of prednisone for 1 month or more; risk of TB disease increases with higher dose and longer duration)</p> <p>End-stage renal disease</p>
≥10 mm	<p>TST conversion (within 2 years)</p> <p>Diabetes, malnutrition (<90% ideal body weight), cigarette smoking, daily alcohol consumption (>3 drinks/day)</p> <p>Silicosis</p> <p>Hematologic malignancies (leukemia, lymphoma) and certain carcinomas (i.e. head and neck)</p>

* The goal of testing for LTBI is to identify individuals who are at increased risk for the development of TB disease and therefore would benefit from treatment of LTBI. Only those who would benefit from treatment should be tested, so a decision to test presupposes a decision to treat if the test is positive [see [Canadian Tuberculosis Standards, Chapter 4](#)].

** Age ≥ 35 years is **not** a contraindication to treatment of LTBI if the risk of progression to active TB disease is greater than the risk of serious adverse reactions to treatment.

† Treatment with INH of people with HIV infection who were TST negative (0-4 mm) and/or anergic was of no benefit in several randomized trials. Other authorities suggest this treatment may be considered in the presence of HIV infection or other cause of severe immunosuppression AND high risk of TB infection (contact with infectious TB, from high TB incidence country or abnormal chest x-ray consistent with prior TB infection). Hence any decision to give treatment should be individualized in consultation with a TB expert.

‡ If first TST is negative, begin treatment immediately. Repeat TST 8 weeks after exposure to infectious TB case ended. Treatment can be stopped in a healthy child if repeat TST is negative. In children < 6 months of age the immune system may not be mature enough to produce a positive TST, even if the child is infected.

‡‡ LTBI therapy is often given to people in whom transplantation is planned but before the actual transplantation.

NOTE: All subjects with a reaction of 10+ mm on the first or second TST should be considered positive and referred for medical evaluation. The decision to treat should be individualized.

Those who have a reaction of 10+ mm on the second TST of a two-step TST do not need a TST in the future as there is no clinical utility. They should be referred for medical evaluation, as performed for those with a positive first TST.

STEP 2 – MEDICAL EVALUATION:

A TB skin test is not recommended for diagnosing active tuberculosis because it is only partially sensitive and some studies indicate that up to 20-30% of individuals with active tuberculosis will have a false negative reaction and not be able to mount a skin test response at the time of diagnosis. A medical evaluation is appropriate if the person's TST is positive.

This should include assessment of symptoms suggestive of possible active TB, risk factors for TB, such as contact history or other medical illnesses, and chest radiography.

Chest x-ray is usually recommended for:

- all contacts with symptoms of TB, even if their TST is negative
- contacts who are previously known to be skin test positive
- all other contacts exempted from TB skin testing

Children 5 years and under may require a chest x-ray regardless of TST status. [In NS this will be determined following a Pediatric Infectious Disease consult.]

HIV positive and severely immune suppressed individuals require a chest x-ray.

NOTE: Special precautions must be exercised when investigating close contacts who are pregnant. Consult MOH and/or specialist. Pregnancy does not constitute a contraindication to the TST. However, when a pregnant contact has a new positive TST or a TST conversion, or is symptomatic, she should undergo a single view [posterior-anterior] chest radiograph with double [front and back] shielding of the abdomen. If possible, and especially if the individual circumstances permit [for example, if the case is asymptomatic and the period of chest radiograph deferral would be a matter of a few weeks], chest radiography should be avoided in the first trimester.

In the presence of symptoms or abnormal chest x-ray, sputum for acid-fast bacteria smear and culture should be considered. Collection of sputum samples is decided on a case-by-case basis and is not recommended for healthy contacts with normal chest radiographs.

In persons without evidence of active TB, a recommendation should be made regarding therapy for LTBI, based on interpretation of the TST.

See [Appendix B, Physician Letter: Contact of Tuberculosis](#) to find a letter regarding contact investigation and ordering of chest x-ray.

Preventative therapy for contacts

Determine the need for preventative therapy for contacts. See below for chemoprophylaxis information.

Next steps

If there is no evidence of infection in the high/medium priority contact group it is unlikely that further investigation of the low priority contacts will be necessary.

If, however, evidence of infection is found in high/medium priority contacts, then extension of the contact tracing protocol to low priority contacts becomes important. Discuss this with the MOH. See [Table 1: Priority Investigation of Contacts](#).

Chemoprophylaxis

Chemoprophylaxis or preventative treatment refers to the treatment after tuberculosis infection has occurred but before active TB disease is present. Treatment of LTBI is started only after active TB disease has been excluded.

Treatment of LTBI is recommended for persons with an increased risk of developing active TB disease (see [Table 1](#)). **The standard regimen of first choice is 9 months of daily self-administered Isoniazid (INH).** The optimal duration is 9 months, yet shorter alternative regimens (such as 6 months of daily, self-administered INH or 3-4 months of INH/Rifampin combinations) may also be used to better facilitate completion rates. Intermittent regimens for individuals with concerns regarding compliance have also been suggested as additional alternatives as needed. More specific information regarding chemoprophylaxis of LTBI can be found in the [Canadian Tuberculosis Standards, Chapter 6](#).

Public Health role in chemoprophylaxis of contacts

- The PHN should send a letter to the physician of a contact for whom preventative therapy is being considered (see [Appendix D, Physician Letter: Treatment of LTBI](#), and [Appendix E](#) for a public information sheet, *Tuberculosis: General Information*).
- If chemoprophylaxis is indicated then ensure contacts are aware that Public Health will cover the cost of the drugs necessary for tuberculosis chemoprophylaxis (i.e. INH and Rifampin) if the individual does not have third-party coverage. Drugs prescribed that are not recommended as part of national treatment standards must be discussed with the MOH prior to approval.

- If individuals are prescribed INH, pyridoxine (vitamin B6) should be given to minimize the risk of neuropathy in people with risk factors for pyridoxine deficiency (such as malnourished or pregnant individuals) or for neuropathy (patients with diabetes or renal insufficiency). B6 supplements are not routinely needed otherwise.

Physicians need to be aware that they are responsible for monitoring the compliance of contacts to whom they prescribe chemoprophylaxis. Under exceptional circumstances Public Health may consider this as a further role.

Immunization

Bacille Calmette-Guerin (BCG) is not recommended as a public health measure to decrease the risk of developing active TB disease following exposure. BCG will not prevent the development of active TB in individuals who are already infected with *M. tuberculosis*. See the [Canadian Immunization Guide](#) for information around other recommended usage of BCG.

Exclusion

Exclusion of contacts of TB is not necessary unless they have active disease.

Education

All contacts must be advised that they should see a physician if they develop symptoms suggestive of active tuberculosis (i.e. cough, pleuritic pain, fever, night sweats, unexplained weight loss, etc.).

All contacts who are approached should be provided with information about tuberculosis, the way it is transmitted, and the types of treatment and chemoprophylaxis available (see *Tuberculosis: General Information sheet, Appendix E*).

Surveillance guidelines

Refer to the Nova Scotia Surveillance Guidelines for Notifiable Diseases and Conditions at novascotia.ca/dhw/populationhealth/surveillanceguidelines

Appendices

A. Tuberculin Skin Test: General Information

B. Physician Letter: Contact of Tuberculosis

C. Physician Letter: Treatment of LTBI

D. Physician Letter: Positive Tuberculin Skin Test [TST]

E. Tuberculosis: General Information

Appendix A: Tuberculin Skin Test (TST): General Information

The test

The Tuberculin Skin Test (TST) can show if you have been exposed to the tuberculosis (TB) bacteria at any time in the past. A small amount of tuberculin is injected just under the skin of the lower part of the arm. For a short time after the needle is given, a small raised area under the skin may appear at the site of injection.

Who should not have the test?

If any of the following apply to you please tell the nurse or doctor before the test is done. TST may not be indicated for the following:

- severe blistering in reaction to a previous TB test
- active TB or history of treatment for TB infection or disease
- extensive burns or eczema
- allergy to the components of the solution, or an allergic reaction to a previous TB skin test
- major viral infections or certain immunizations received within the last four weeks [ask your nurse or doctor]

The result

Your arm will need to be looked at by a health care provider 48-72 hours after the test to see if there is a positive or negative reaction. The result of the test may vary from no reaction at all to a red raised area with some surrounding redness.

Occasionally someone very sensitive to the tuberculin may have some blistering at the site of the test. This will usually clear up without treatment.

Sometimes after the test is read and after reviewing your medical history it may be recommended that a chest x-ray be done.

Appendix B: Physician Letter: Contact of Tuberculosis

Date: _____

Dear Dr. _____,

Re: _____

Address: _____

Date of Birth: _____

Tuberculin Skin Test Result: _____

Your patient named above is a contact of a case of tuberculosis and was screened as part of the tuberculosis contact tracing process. A recent chest x-ray is the final piece of this assessment; therefore **Public Health is requesting that you order a chest x-ray for this patient and that you send a copy of the report to Public Health, Attention** _____. **The confidential fax number is** _____.

Should the result of the investigation indicate that your patient might benefit from chemoprophylaxis, the patient will be referred back to you.

If your patient has or develops respiratory symptoms, he or she should be evaluated for any evidence of tuberculosis disease. In the presence of symptoms or abnormal chest x-ray, sputum for acid-fast bacteria smear and culture should be taken.

For further information about our contact tracing process or about chemoprophylaxis, please do not hesitate to call.

Yours truly,

Public Health Nurse

Phone

Contacts of active cases

Date:

Dear Dr. _____,

RE: Treatment of Latent TB Infection (LTBI)

I am recommending that your patient _____ go on a nine-month course of INH (Isoniazid) for the treatment of LTBI. INH is recommended in a dose of 10mg/kg per day for children, up to a maximum of 300 mg per day. For adults the dose is 5 mg/kg to a maximum of 300 mg daily. Alternative treatment duration and dosing may be necessary when adherence is a concern. The addition of vitamin B6 (pyridoxine) in a dose of 25 mg is indicated when there is poor nutrition, alcoholism, HIV co-infection, pregnancy, diabetes or uremia, or other disorders that might predispose to neuropathy.

If your patient does not have third party coverage, he/she should tell your office which pharmacy they prefer to use for prescriptions so the public health nurse can be contacted to make arrangements for coverage of treatment. The public health nurse will make arrangements for the pharmacy to bill Public Health for the cost of TB drugs.

Physicians are primarily responsible for monitoring the compliance of contacts to whom they prescribe chemoprophylaxis.

Your patient should have serology for liver function done prior to starting chemoprophylaxis and should be monitored for signs of liver toxicity during this therapy.

Please contact the public health nurse at _____ to arrange for coverage of drug treatment or if you have any further questions or need more information.

Yours truly,

Medical Officer of Health

Appendix D: Physician Letter: Positive Tuberculin Skin Test (TST)

Dear Dr. _____,

Name of Patient: _____ DOB: _____

Reason for test:
Date Purified Protein Derivative (PPD) test administered [#1]: Result:
Date PPD test administered [#2]: Result:

This is to inform you that your patient had a positive TST at Public Health and is being referred to you for further medical follow-up which includes a CXR and symptom inquiry to rule out active disease.

Treatment of latent tuberculosis infection [LTBI] is recommended for persons with an increased risk of TB disease. INH is recommended in a dose of 10 mg/kg per day for children, up to a maximum of 300 mg per day. For adults the dose is 5 mg/kg to a maximum of 300 mg daily. Alternative duration and dosing therapy, particularly when adherence may be a concern, is also effective when necessary. The addition of vitamin B6 [pyridoxine] in a dose of 25 mg is indicated when there is poor nutrition, alcoholism, HIV co-infection, pregnancy, diabetes or uremia, or other disorders that might predispose to neuropathy. If you wish to consult with the Medical Officer of Health on the appropriateness of medication for your patient, please call _____.

The cost of medications for treatment of LTBI is covered by Public Health if the patient does not have third-party coverage.

If you have any questions, or if you wish to request that Public Health cover the cost of your patient's medication, please contact Public Health at _____.

Yours truly,

Public Health Nurse

Appendix E: Tuberculosis: General Information

What is TB?

Tuberculosis (TB) is a disease caused by germs that are spread from person-to-person through the air. TB usually affects the lungs, but it can also affect other parts of the body, such as the brain, kidneys, or the spine. A person with TB can die if they do not get treatment.

What are the symptoms of TB?

The general symptoms of TB disease include feelings of sickness or weakness, weight loss, fever, and night sweats. The symptoms of TB disease of the lungs also include coughing, chest pain, and the coughing up of blood. Symptoms of TB disease in other parts of the body depend on the area affected.

How is TB spread?

TB germs are put into the air when a person with TB disease of the lungs or throat coughs, sneezes, speaks, or sings. These germs can stay in the air for several hours, depending on the environment. Persons who breathe in the air containing these TB germs can become infected. The germs may reach your lungs and from there they can go to other parts of your body.

What can I do to prevent the spread of TB to others?

- Take your medication as directed.
- Until Public Health says you can't pass TB germs to others:
 - Cover your mouth and nose with a tissue or mask when you cough or sneeze [for more information and to obtain masks, discuss with Public Health].
 - Wear mask to medical and lab appointments.
 - Restrict public activities.
 - Restrict visitors at your home.
 - Do not use public transportation.
 - If possible, keep windows open in your home.
 - Don't spend time in closed spaces with others.

What is the difference between latent TB infection and TB disease?

A person with latent TB infection	A person with active TB disease
Usually has a skin test or blood test result indicating TB infection	Usually has a skin test or blood test result indicating TB infection
Has a normal chest x-ray and a negative sputum test	May have an abnormal chest x-ray, or positive sputum smear or culture
Has TB bacteria in his/her body that are alive, but inactive	Has active TB bacteria in his/her body
Does not feel sick	Feels sick and may have symptoms such as coughing, fever, and weight loss
Cannot spread TB bacteria to others	May spread TB bacteria to others
Should consider treatment for latent TB infection to prevent active TB disease	Needs treatment for active TB disease

People with *latent TB infection* have TB germs in their bodies, but they are not sick because the germs are not active. These people do not have symptoms of TB disease, and they cannot spread the germs to others. However, they may develop TB disease in the future. They are often prescribed treatment to prevent them from developing TB disease, once the doctor determines that they don't have active TB disease.

People with *TB disease* are sick from TB germs that are active, meaning that the germs are multiplying and destroying tissue in their body. They usually have symptoms of TB disease. People with TB disease of the lungs or throat are capable of spreading germs to others. They are prescribed drugs that can treat TB disease.

What should I do if I have spent time with someone with latent TB infection?

A person with latent TB infection cannot spread germs to other people. You do not need to be tested if you have spent time with someone with latent TB infection. However, if you have spent time with someone with active TB disease or someone with symptoms of TB, you should be tested.

What should I do if I have been exposed to someone with TB disease?

People with TB disease are most likely to spread the germs to people they spend time with every day, such as family members or co-workers. **If you have been**

around someone who has TB disease, you should contact your doctor or your local public health office.

How do you get tested for TB?

There are two tests that can be used to help detect TB infection: a skin test or a TB blood test. The tuberculin skin test is performed by injecting a small amount of fluid [called tuberculin] into the skin in the lower part of the arm. A person given the tuberculin skin test must return within 48 to 72 hours to have a trained healthcare worker look for a reaction on the arm.

What does a positive test for TB infection mean?

A positive test for TB infection only tells that a person has been infected with TB germs. It does not tell whether or not the person has progressed to TB disease. Other tests, such as a chest x-ray and a sample of sputum, are needed to see whether the person has TB disease.

What is Bacille Calmette-Guèrin (BCG)?

BCG is a vaccine for TB disease that is used in many countries, but it is not generally recommended in Canada. BCG vaccination does not completely prevent people from getting TB. It may cause a false positive tuberculin skin test, but persons who have been vaccinated with BCG can still be given a tuberculin skin test. Results of the test will take into consideration whether BCG has been given in the past.

Why is latent TB infection treated?

If you have latent TB infection but not active TB disease, your doctor may want you to take a drug to kill the TB germs and prevent you from developing TB disease. The decision about taking treatment for latent infection will be based on your chances of developing TB disease. Some people are more likely than others to develop TB disease once they have TB infection. This includes people with HIV infection, people who were recently exposed to someone with TB disease, and people with certain medical conditions. Treatment of latent TB infection is with a medication prescribed by a physician.

How is TB disease treated?

TB disease can be cured by taking several drugs for 6 to 12 months. It is very important that people who have TB disease finish the medicine, and take the drugs exactly as prescribed. If they stop taking the drugs too soon, they can become sick again; if they do not take the drugs correctly, the germs that are still alive may become resistant to those drugs. TB that is resistant to drugs is harder and more expensive to treat. In some situations, staff of the local public health office or other healthcare providers may meet regularly with people who have TB to watch them take their medications. This is called Directly Observed Therapy (DOT). DOT helps the person complete treatment in the least amount of time.

MEDICAL SURVEILLANCE

Immigrants to Canada represent many origins, cultures, language groups and life experiences. For instance, certain migrants may come from countries with limited public health and clinical care, and inadequate supply of medicines and supervision of treatment. It is very important that healthcare providers understand the ethnic and cultural needs of the populations they serve. The following website is an example of one of many resources that public health nurses and other health care providers can access to assist with the medical surveillance experience: cdc.gov/tb/publications/guidestoolkits/EthnographicGuides/default.htm

Follow-up of individuals placed under surveillance for latent Tuberculosis (TB) infection

Background

Within Canada, foreign-born persons account for a high percentage of reported TB cases, and the incidence rate remains highest in the Canadian-born Aboriginal population ([Tuberculosis in Canada 2012 Pre-Release](#)). Also, foreign-born cases are six times more likely to be drug-resistant and ten times more likely to be multidrug-resistant than Canadian-born cases.

Very little TB infection in foreign-born individuals is acquired in Canada. Most latent tuberculosis infection (LTBI) in these populations is acquired abroad prior to arrival in Canada, and may be reactivated over time. Large numbers of new immigrants to Canada originate from regions of the world where local TB incidence and prevalence rates are several times greater than those observed in Canada. This means that the foremost domestic TB prevention and control activities in the foreign-born are directed at preventing activation or reactivation in those already infected with TB. Immigrants and refugees with LTBI are at highest risk of TB disease within the first five years of their arrival.

All individuals applying for permanent residency in Canada and certain individuals applying for temporary residency are required to undergo an immigration medical examination (IME), which includes TB screening.

The components of the IME are:

- history and complete physical examination
- chest x-ray for those 11 years of age and older (or younger if deemed necessary)
- HIV testing for those 15 years of age and older (or younger if deemed necessary)
- syphilis serology for those 15 years and older (or younger if deemed necessary)
- urinalysis

- any other test deemed necessary as per applicant’s health history

The conclusion of the IME is one of the following three determinations:

- admissible
- inadmissible
- admissible with conditions – requirement for Public Health Surveillance (i.e. inactive tuberculosis, treated syphilis)

If the conclusion of the IME is that the client is admissible with conditions, then the following two conditions are imposed on an entrant:

1. They must report to a public health authority for medical examination, surveillance or treatment

AND

2. They must provide proof of compliance to the Public Health Liaison Unit, Citizenship and Immigration Canada (formerly known as the Medical Surveillance Unit), with the condition imposed.

Once the compliance information is received, the terms and conditions are removed. Compliance with medical surveillance is defined throughout Canada as keeping the first appointment with the healthcare provider or being assessed by the healthcare provider for the condition requiring assessment .

Prospective immigrants applying from within Canada and those applying from abroad who are examined and found to have active respiratory or pulmonary TB are promptly treated and must complete their treatment prior to the finalization of their immigration application.

Migrants found to have evidence of inactive TB are allowed entry to Canada but they are required to sign a Medical Surveillance Undertaking Form (IMM 0535). As per the [Canadian Tuberculosis Standards](#), Citizenship and Immigration Canada defines inactive pulmonary TB as follows:

- a history of treated active TB **AND/OR**
- an abnormal chest x-ray suggestive of TB **AND**
 - two chest x-rays taken at an interval of 3 months apart with stable appearance and three negative sputum smears and cultures **OR**
 - two chest x-rays taken at an interval of 6 months apart with stable appearance

The “In-Canada Public Health Follow-up” handout is provided to applicants who performed the immigration process in Canada (including the IME). Currently, this handout is given prior to the applicant having the entire immigration process approved. A Tuberculosis handout is given along with the IMM 0535 to foreign nationals who executed their process abroad, once they have the immigration

process approved. The “In-Canada Public Health Follow-up” sheet instructs the entrant to telephone the public health authority in their area of residence in Canada within 30 days of entry. The handout includes a list of provincial/territorial public health authority contact telephone numbers for each condition.

Canada Border Services Agency (CBSA) sends the original copy of the IMM 0535 to the Citizenship and Immigration Canada (CIC) Public Health Liaison Unit (PHLU). The activities of CIC PHLU [cic.gc.ca/english/department/mission.asp] include checking the legibility/completeness of the information on the IMM 0535. Every attempt will be made to capture an in-Canada contact address/telephone number of entrants placed under medical surveillance. The PHLU will then provide the IMM 0535 or the “In-Canada Public Health Follow-up” letter to the public health authority of the entrant’s declared destination in Canada. The PHLU’s standard is to notify the provincial/territorial public health authorities within 48 hours of receipt of the documents from CBSA.

Follow-up by public health

1. Upon receiving a Medical Surveillance Form (IMM 0535) or the “In-Canada Public Health Follow-up” letter, initiate follow-up, checking the form for complete address and “S” code.
 - If the document is incomplete, the document should be faxed back to the PHLU at 613-952-3891 or sent via mail to:
Public Health Liaison Unit (PHLU)
Citizenship and Immigration Canada
219 Laurier Avenue West, 3rd Floor
Ottawa, ON K1A 1L1
 - Ensure S code [Box 8] – 2.02 is checked off on form. This indicates that surveillance is for inactive tuberculosis.
 - Box 10 – Serial No. indicates status of immigration applicant: F = student; U = work permit; W = immigrant; C = visitor.
 - If it is not clear what code is assigned, or if no code is assigned at all, first contact the PHLU or you may want to call the CIC call centre (1-888-242-2100).

The other codes listed are for the following diseases:

- 2.01 Active tuberculosis
- 2.02U Urgent referral*

*PHLU recommends that individuals with the 2.02U code (or any individual who has URGENT written on the IMM 0535 form) should be seen within 7 days of arrival in Canada. This code is given to individuals meeting the definition of **Complex Pulmonary TB Inactive (PTI)**. In February 2006, CIC implemented the “Guidelines for Complex PTI requiring Urgent Referral to Provincial/Territorial Public Health Authorities.” These guidelines were put into place to identify clients who are at high risk of reactivating their pulmonary TB. Priority should be given to the follow-up of a Complex PTI case as such cases are at a higher risk of reactivating.

- 2.04 Adequately treated positive syphilis serology
2. Once address is complete and and code confirmed 2.02 for inactive TB surveillance, contact the client either by phone or home visit. If client's English language fluency is inadequate a home visit may be appropriate, particularly if a family member can interpret. Consider accessing an interpreter for assistance.
 3. Interview the client. Document the nursing assessment on the [**Tuberculosis Medical Surveillance Follow-up Form**](#).
 4. Advise client to arrange a medical evaluation, potentially including a chest x-ray. Ideally the client should be assessed by a family physician/nurse practitioner from whom the client will be receiving ongoing medical care.
 5. Prior to the client's medical assessment, Public Health contacts the client's family physician/nurse practitioner, informing them that the client is under medical surveillance undertaking for inactive tuberculosis and that an assessment for TB is necessary. At this time, Public Health may discuss any details of their assessment (if applicable) with the physician/nurse practitioner. During the initial assessment of these individuals by the physician/nurse practitioner, active TB should be ruled out with special attention to symptoms or signs of active TB. If these are present, chest radiography and sputum smears and cultures should be performed as deemed appropriate. For further information see [**Canadian Tuberculosis Standards**](#), Chapter 6. If a chest x-ray is to be requested the requisition form for chest x-ray should indicate "Chest x-ray is necessary for medical purposes." Advise physician/nurse practitioner to fax or mail chest x-ray results to Public Health.
 6. It is important to note that documents and radiographs pertaining to the Immigration Medical Exam may inform the evaluation and establish the reason for referral. If an immigration medical file is requested, fax your request to the PHLU in Ottawa [613-952-3891]. The request may also be mailed to the Unit [see above for address]. If the requested file is in one of their missions overseas, PHLU staff will make the request on behalf of Nova Scotia.

The request should include:

- name/title of requestor
- address of requestor
- name of individual for whom the request is made
- date of birth
- IMS/IME file number [Box 10 of the IMM 0535]

Once a copy of the medical file and the original chest x-ray is sent to PHLU from overseas, a CD copy of the chest x-ray may be made by PHLU staff and the CD and file will be forwarded to the requesting public health authority within Nova Scotia as necessary. This will mean that Public Health will no longer need to return chest x-rays to CIC and may dispose of the copy as per their district health authority protocol. Once both chest x-ray reports are available, Public Health will arrange for the hospital's Radiology Department to compare films.

7. Discuss information received from Public Health and family physician's/nurse practitioner's assessment with the Medical Officer of Health to determine a Public Health recommendation. This may include an assessment for LTBI, including TST.

Please refer to "Guidelines for the Investigation of Individuals Placed Under Surveillance for Tuberculosis Post Landing in Canada" ([CCDR October 2001, Vol. 27, Number 19](#)) and [Canadian Tuberculosis Standards, Chapter 13](#). An algorithm from these resources is included below (see [Figure 1](#)).

8. The Confirmation of Compliance Form can be faxed or mailed to the PHLU in Ottawa once compliance has been achieved [see above for contact info]. As per the [Canadian Tuberculosis Standards](#), compliance with medical surveillance is defined throughout Canada as keeping the first appointment with the healthcare provider or being assessed by the healthcare provider for the condition requiring surveillance.

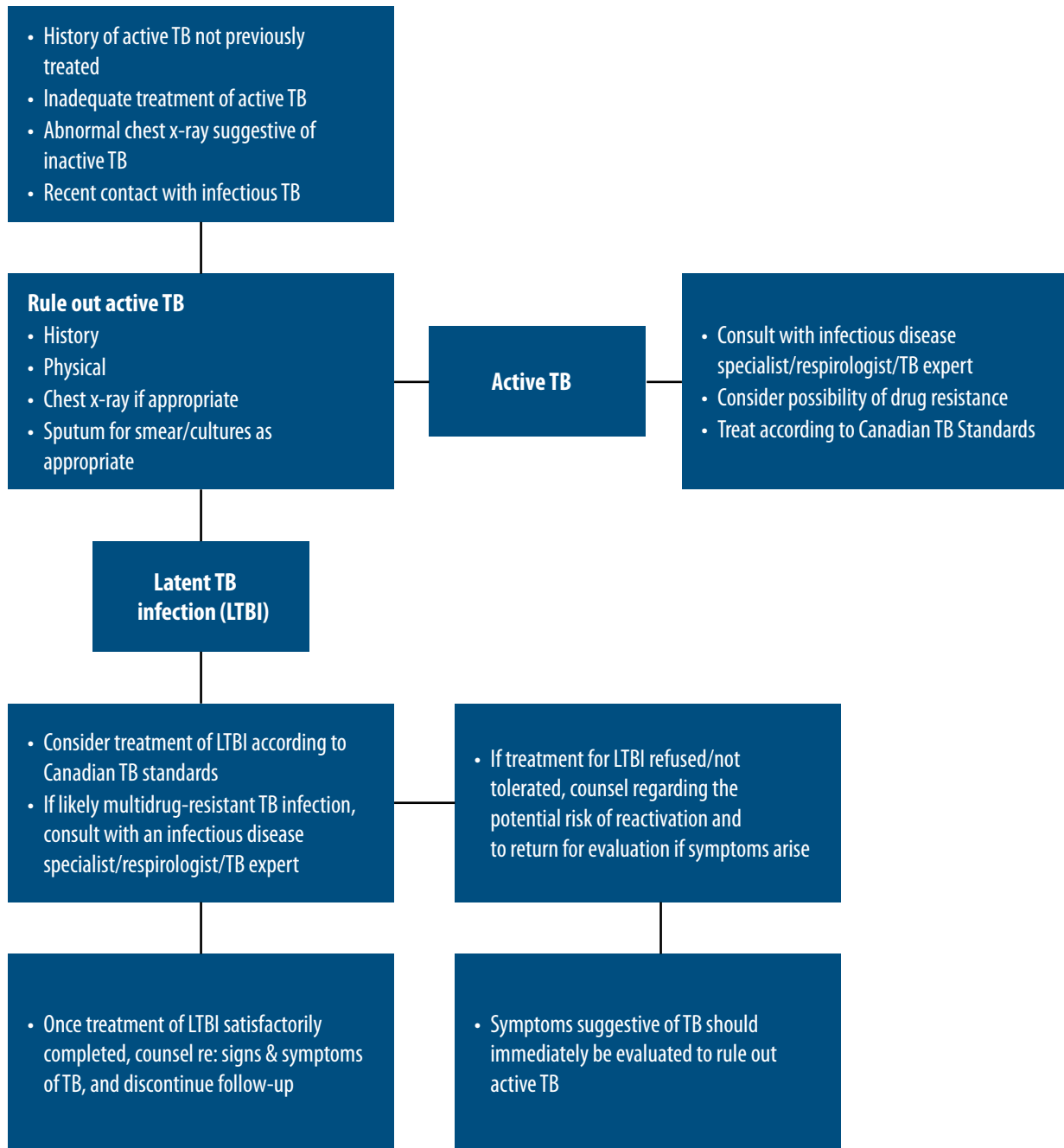
General questions pertaining to medical surveillance may be addressed to:
Citizenship and Immigration Canada

Health Branch

Public Health Liaison Unit (PHLU)

E-mail: nat-med-surveillance@cic.gc.ca

Figure 1: Follow-up of Persons placed under Medical Surveillance for Tuberculosis (TB)



REFERENCES:

- American Academy of Pediatrics. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2009
- BC Centre for Disease Control. [2012] *TB Manual February 2012/For professionals to help manage tuberculosis*. Retrieved from: bccdc.ca/dis-cond/comm-manual/default.htm
- Centres for Disease Control and Prevention. [2012]. *Ethnographic guides Promoting Cultural Sensitivity*, CDC. Retrieved from: cdc.gov/tb/publications/guidestoolkits/EthnographicGuides/default.htm
- Centres for Disease Control and Prevention. [2011] *Get the Facts about TB Disease*. Retrieved from: cdc.gov/tb/publications/pamphlets/default.htm
- Centers for Disease Control and Prevention. Guidelines for the investigation of contacts of persons with infectious tuberculosis; recommendations from the National Tuberculosis Controllers Association and CDC, and Guidelines for using the QuantiFERON®-TB Gold test for detecting *Mycobacterium tuberculosis* infection, United States. MMWR 2005;54(No. RR-15): 1-62
- Centres for Disease Control and Prevention. [2010] *Latent Tuberculosis Infection: A Guide for Primary Health Care Providers*. Retrieved from: cdc.gov/tb/publications/LTBI/treatment.htm
- Centres for Disease Control and Prevention. [2011] *Tuberculosis [TB] Fact Sheets Tuberculosis: General Information*. Retrieved from: cdc.gov/tb/publications/factsheets/general/tb.htm
- Health and Welfare, Idaho. [2007] *Case Management Treatment Plan for Active TB Disease*. Retrieved from: healthandwelfare.idaho.gov/Health/DiseasesConditions/Tuberculosis/TuberculosisForms/tabid/854/Default.aspx
- Manitoba Health.[2009]. *Tuberculosis (TB) Protocol*. Retrieved from: gov.mb.ca/health/publichealth/cdc/protocol/index.html
- National Advisory Committee on Immunization. *Canadian Immunization Guide, 2012*,. Public Health Agency of Canada, 2012. Retrieved from: phac-aspc.gc.ca/publicat/cig-gci/
- Guide errata and clarifications, March 2008. Available at: phac-aspc.gc.ca/publicat/cig-gci/errarta-eng.php
- Nova Scotia Department of Health and Wellness. [2008]. *Nova Scotia Immunization Manual*. Retrieved from: novascotia.ca/dhw/cdpc/info-for-professionals.asp
- Public Health Agency of Canada. [2001]. Canadian Guidelines for the Investigation and Follow-up of Individuals under Medical Surveillance for Tuberculosis after arrival in Canada. CCDR 2001; 27, 157-164. Retrieved from: publications.gc.ca/collections/Collection/H12-21-27-19.pdf
- Public Health Agency of Canada. [2013]. *Canadian Tuberculosis Standards, 7th Edition*. Retrieved from: phac-aspc.gc.ca/tbpc-latb/pubs/tbstand07-eng.php
- Public Health Agency of Canada. [2009]. Case Definitions for Communicable Diseases under National Surveillance. CCDR 2009; 35S2, 1-123. Retrieved from: phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/35s2/index-eng.php
- Public Health Agency of Canada. [2011]. *Guidance for Tuberculosis Prevention and Control Programs in Canada*. Retrieved from phac-aspc.gc.ca/tbpc-latb/pubs-eng.php#gr
- Public Health Agency of Canada. [2008]. *Tuberculosis Fact Sheets*. Retrieved from: phac-aspc.gc.ca/tbpc-latb/fi/trans-eng.php
- Public Health Agency of Canada. [2011]. *Tuberculosis Prevention and Control Publications and Educational Materials*. Retrieved from: phac-aspc.gc.ca/tbpc-latb/pubs-eng.php#gr
- Sanofi Pasteur Canada. [2012]. *Tubersol product monograph*. Retrieved from: sanofipasteur.ca/index.jsp?siteCode=SP_CA&codeRubrique=69&lang=EN
- The Lung Association. [2009]. *Tuberculosis Information for Health Care Providers Fourth Edition*. Retrieved from: lung.healthdiary.ca/Guest/SearchResults.aspx?C=42&M=0&K=&N=&S=1&P
[Tuberculosis in Canada 2012 Pre-Release](#)