Tuberculosis (TB)

INTRODUCTION

The 2023 addition of the Communicable Disease Manual (CDM) TB Chapter is the first time TB has appeared in the Chief Public Health Officer (CPHO) CDM. Previous updates to TB content or the NWT TB Program were found in the NWT TB Manual, last released in 2014. This manual was all inclusive for clinical management, public health management, clinical procedures, treatment protocols, infection control and program guidelines and often had duplicate information from the Canadian Tuberculosis Standards 7th Edition. It also overlapped clinical procedures best addressed from health authority operations policy and protocols as well as, policies from areas of specialty like infection control.

The release of the Canadian TB Standards 8th Edition (CTBS) prompted an Office of the CPHO (OCPHO) review and has resulted in a different approach to how we address TB in the NWT. There are now 3 companion documents for practitioners as they relate to TB management in the NWT:

1) A Clinical Practice Information Notice (CPI) that endorses the Canadian TB standards 8th Edition (CTBS) as the approved standard reference for the prevention, diagnosis and management of TB disease and TB infection. Found here: https://www.hss.gov.nt.ca/professionals/sites/professionals/files/resources/cpi-179-nwt-tb-program.pdf
2) NWT TB Program Standards that are the minimum standards for TB program delivery in the NWT not explicitly found in the CTBS found here: https://www.hss.gov.nt.ca/professionals/sites/professionals/files/resources/nwt-tb-program-standards.pdf
3) This CDM - TB Chapter found here: https://www.hss.gov.nt.ca/professionals/sites/professionals/files/resources/cdc-tuberculosis.pdf

Please note: Information and directives from the CPHO that provide supplementary *NWT Public Health Act (PHA)* and related legislated CD control measures and public health surveillance needs are released through CPHO Practitioner Alerts. These supplementary approved directives, control measures, and guidelines are found here: https://ournthssa.ca/post_category/cpho-practitioner-alerts/

The purpose of the CDM-TB chapter is to provide guidelines that are intended to support the implementation of CD prevention and controls pursuant to the *NWT PHA* and related legislation and ensure NWT health care providers (HCPs) are familiar with the identification of and reporting requirements for TB that are legislated under the *NWT PHA*. Guidelines include information on the:

- Public health control measures and the management of TB cases and contacts to prevent the spread or outbreaks of TB
- Managing TB surveillance programs used to identify and monitor those persons at high-risk for developing TB disease

This manual is not intended to provide individual clinical case management advice. For individual clinical management please follow approved Health & Social Services (HSS), and HSS Authority (HSSA) standards, policies, guidelines, and procedures, and the HSSA facility/regional process for

consultation with the regional medical supports, obstetrician, pediatrician, and/or the local public health unit (PHU) and/or specialist as appropriate.

CHAPTER CONTENT

TB disease (previously referred to as active TB) is a clinical disease that is usually symptomatic and for which microbiologic tests are usually positive and radiologic tests are usually abnormal. TB disease can be pulmonary or extra-pulmonary, and while all TB disease must be treated, it is pulmonary TB that is mainly infectious and of public health concern. TB disease is differentiated from TB infection (previously referred to as Latent TB Infection) which is the presence of latent or dormant infection with *Mycobacterium Tuberculosis (MTB)*. Clients with TB infection have no evidence of clinically active disease, no evidence of radiographic changes that suggest TB disease and negative microbiologic tests; they are non-infectious.

The CDM -TB Chapter uses the same format found in all other chapters of the CDM but provides guidance in 2 sections, TB disease (Section1) and TB infection (Section 2). It frequently references and links to both the CTBS and the NWT TB Program Standards as appropriate.

Click here for a Glossary of Terms.

Section 1 – Tuberculosis Disease

1.1 CASE DEFINITION

Confirmed Case

Laboratory Confirmed Case

Cases with MTB complex demonstrated on culture, specifically *MTB, M. africanum, M. canetti, M. caprae, M. microti, M. pinnipedii* or *M. bovis* (excluding bacilli Calmette-Guerin [BCG] strain).

Cases with laboratory detection of *MTB* complex by nucleic acid amplification testing (NAAT, such as GeneXpert) **and** clinical findings consistent with current TB disease.

Clinically Confirmed Case

In the absence of a positive culture, cases clinically compatible with TB disease may have the following:

- Chest x-ray (CXR) changes compatible with TB disease
- Clinical evidence of extra-pulmonary TB disease (i.e., meningeal, bone, kidney, peripheral lymph nodes)
- Pathologic or post-mortem evidence of TB disease
- Favourable response to therapeutic trial of anti-TB medications

Suspect or Probable Case

High index of suspicion of TB in whom empiric treatment is being contemplated

Outbreak Case Definition

Two or more cases of TB disease are identified within less than 1 year of each other, with a known epidemiologic link (e.g., cases reside in same homeless shelter)

OR

Two or more cases of TB disease are identified within less than 1 year of each other, with a plausible epidemiologic link and both cases having an isolate with identical genotype (e.g., one case resides in a homeless shelter and one case works in a soup kitchen not known to be frequented by homeless shelter resident)

OR

Two or more of identified contacts are diagnosed as secondary cases of TB disease (confirmed by genotyping if available) during a contact investigation.

1.2 DIAGNOSIS

Testing for TB using chest radiography for screening and diagnostic microbiology for confirmation is indicated for everyone considered at high risk for TB and with signs and symptoms of TB.

Diagnostic Microbiology

Every effort should be made to obtain a microbiologic diagnosis, which requires demonstration of acid-fast bacilli (AFB) on smear microscopy and/or culture and requires detection of *MTB* nucleic acids using NAATS.

- For more information, refer to the Alberta Provincial Laboratory Guide to Services

Mycobacterial culture is the gold standard for diagnosing TB disease. It is also required to do medication susceptibility testing to direct therapy. Cultures are performed on all specimens regardless of AFB smear and NAAT results and may take up to seven weeks to show positive results.

In all persons with suspected pulmonary TB, at least 3 (either spontaneous or induced) sputum specimens should be collected and tested with microscopy and culture. At least 1 specimen should be collected at first cough in the morning.

AFB-stained smears are the first bacteriological evidence of mycobacteria in a clinical specimen giving a quick and easy preliminary confirmation of the diagnosis. However, it is important to remember they do not differentiate between Non-Tuberculosis Mycobacteria (NTM) and *MTB* and either culture or DNA probe are necessary to tell the difference.

It is not always possible to culture *MTB*; therefore, a clinical diagnosis of TB is made in approximately 15-20% of cases based on appropriate clinical and/or radiological and/or pathological presentation as well as TB history context and treatment response.

Chest radiography is an integral part of the TB diagnostics algorithm but is not specific for the diagnosis of pulmonary TB and cannot provide a conclusive diagnosis on its own. Posterior and lateral CXR should be an integral part of TB diagnosis but should be accompanied by confirmatory microbiologic tests for TB disease because of its low specificity. In a rare setting, CXR may be negative in a high-risk individual with symptoms.

Typical findings in immune competent adults are:

- Position – infiltrates in the apical or posterior segments of upper lobes or superior segment of lower lobes, with or without cavitation but with no discernable adenopathy
- Volume Loss – due to destructive and fibrotic nature of TB disease
- Cavitation – this is seen at a later stage and depends on a vigorous immune response, therefore often not seen in immune compromised individuals

Tuberculin Skin Test (TST) and Interferon-Gamma Release Assay (IGRA) – should not be used for the diagnosis of TB disease in adults. They are indicative of TB infection only, not TB disease.

TB Diagnosis in Children

TB in children differs from that in adults in several ways:

- Diagnosis in young children can be difficult, since signs and symptoms are non-specific and young children cannot verbalize.
- The disease is often paucibacillary and yield of AFB smear microscopy and culture in children <10 years of age is low.
- In young children, especially infants there is a high risk of progression from infection to disease.
- Disease is often more severe and can be disseminated and even fatal.

TB disease in children is most often a clinical diagnosis that is made using a combination of:

1. A positive TST or IGRA;
2. Contact with an infectious source case;
3. Abnormal CXR with typical findings of TB disease; and
4. Compatible clinical signs or symptoms.

All children with suspected TB infection or disease must be assessed by a pediatrician with expertise in TB. Follow the HSSA facility/regional process for consultation with the regional medical supports, obstetrician, pediatrician, and/or the local PHU and/or specialist as appropriate.

- For more information, refer to the CTBS Chapter 9: Pediatric Tuberculosis

1.3 REPORTING

All HCPs must follow the NWT *Public Health Act*. Measures for contact tracing and legislative requirements are laid out within the *Reportable Disease Control Regulations* and reporting timelines are found in the *Disease Surveillance Regulations*.

Note: the only acceptable methods of reporting to the OCPHO are outlined below. Information provided outside of these methods will not be considered reported unless otherwise stated by a CPHO delegate.

Health Care Professionals

For **Part 1** Call immediately and written report within 24 hours

- Confirmed or suspect TB cases are to be reported to the OCPHO by telephone (867) 920-8646 **immediately** after diagnosis is made or opinion is formed, **AND**
- NWT Tuberculosis Form should be completed and sent to the OCPHO **within 24 hours**
- TB case/contact investigation must be initiated and the initial TB Investigation Contact Tracing Form must be reported to the OCPHO **within 72 hours**
- All outbreaks or suspect outbreaks are to be **immediately** reported by telephone to the OCPHO.
- NWT Tuberculosis Form Section 5 should be re-submitted to the OCPHO at the end of treatment verifying that treatment was completed or not completed

- **All TSTs and IGRAs are reportable tests**. IGRAs are reported through the lab information system (LIS) whereas TSTs are reported either by the electronic medical record (EMR) TST Exam Template or on the EMR through the TST Reporting Form.
    - OCPHO maintains a registry of all individuals who have been diagnosed with TB disease as well as those with TB infection which includes information on treatment and proof of completion. The EMR does not contain historical TB data. Clinicians needing comprehensive TB history for their clients should contact the OCPHO for TB registry data either by phone (867) 920-8646, or by email at CDCU@gov.nt.ca.
    - In accordance with the NWT *Public Health Act*, recalcitrant clients can be detained by an order from the CPHO for treatment of TB disease if the client is refusing treatment, deemed infectious, and poses a risk to the public. The OCPHO must be notified if a client misses' doses of their treatment regimen (See Appendix A).

Laboratories

- Report all positive results to the OCPHO by telephone (867) 920-8646 **AND** by fax (867) 873-0442 **immediately**

Additional Reporting Requirements:

Citizenship and Immigration Canada

All Immigration applicants, refugees, or students, who plan to remain in the country for more than six months, as well as certain visitors, are required to undergo an immigration medical at the time of their point of application. For more information see: Government of Canada: Medical Surveillance Those applying from outside of Canada with evidence of TB disease are denied entry until treatment has been completed.

- Immigration, Refugees and Citizenship Canada (IRCC) requires individuals found during their immigration medical examination to have previously treated TB, inactive pulmonary TB infection, extra-pulmonary TB, recent household/close contact with a person with TB disease or TB infection with a high risk of reactivation ***to undergo subsequent provincial/territorial TB surveillance*** within a specified timeframe following arrival. As a condition of entry, these individuals ***are required to report to or be contacted by a public health authority within 7-30 days of their arrival*** in Canada.
- The primary purpose of the post-landing medical surveillance program in Canada is to follow persons identified during the pre-landing exam to be at risk of developing pulmonary TB disease, and thus to prevent subsequent TB disease and transmission in Canada.

The OCPHO is notified directly from IRCC about high-risk individuals and will notify the appropriate PHU or Community Health Center (CHC) to follow up with clients for TB assessment within 7-30 days.

It is the responsibility of the public health provider to report client compliance in writing back to OCPHO. The OCPHO will notify IRCC that the client was compliant and reported within the time frame designated.

1.4 OVERVIEW

Causative Agent

MTB is the etiologic agent of TB in humans. The organism is a slightly curved bacillus, aerobic, non-spore forming and non-motile. Growth rates are very slow, with a doubling time of 15–20 hours. Other mycobacteria, including *M. bovis, M. africanum, M. microti, M canetti, M. caprae*, and *M. pinnipedii* are also capable of producing disease in humans, but these organisms are very rare in NWT and Canada. Generally, the many other environmental mycobacteria found in nature are infrequent causes of disease in humans. The reservoir for *MTB* is humans. The reservoir for *M. bovis* is animals. Here in NWT, the main reservoir are bison. We have not had any human cases of bovine TB reported in the territory since speciation has been available.

Clinical Presentation

TB disease can cause systemic manifestations or more specific symptoms depending on the organ affected by the disease.

Systemic symptoms consistent with TB include:

- Weight loss
- Fever
- Night sweats
- Fatigue or weakness
- Loss of appetite (anorexia)

Pulmonary TB can cause one or more of the following symptoms:

- Cough lasting at least 2-3weeks duration (dry initially then becomes productive)
- Sputum production, sometimes with hemoptysis
- Chest pain (pleurisy)
- Shortness of breath (dyspnea)

Symptoms of extra-pulmonary TB are dependent on the site affected.

- TB of the spine might produce back pain
- TB of the kidney may cause flank pain, urinary frequency, hematuria, and dysuria
- TB of the lymph nodes can result in lymphadenopathy (which may be painful if enlargement occurs rapidly)

Major Complications

Worldwide, TB continues to be among the top 10 causes of death.

TB Drug resistance continues to rise globally. Drug resistance can occur through inconsistent, interrupted treatment or it can be acquired during transmission from one person to the next.

TB drug resistance is defined as:

- Mono-resistant TB is defined as resistance to only 1 of the 4 first-line medications.
- Poly drug-resistant TB is defined as resistance to at least 2 first-line medications without resistance to rifampin
- Multi Drug Resistant TB (MDR-TB) is defined as resistance to isoniazid and rifampin with or without resistance to other first line anti-TB drugs.

- Extensively-drug-resistant TB (XDR-TB) is now, after being updated, divided into: Pre-XDR-TB, which is now defined as MDR-TB with additional resistance to any fluoroquinolone; and XDR-TB, which is defined as pre-XDR-TB with additional resistance to bedaquiline or linezolid.

In Canada, the major risk factors for drug-resistant TB (DR-TB) are foreign birth (83%) and previous treatment. In the most recent Canadian antimicrobial resistance surveillance report, resistance to at least one anti-TB drug was detected in 10.4% (n=168) of culture-positive *MTB* complex isolates. Of these isolates, 81.5% (n=137) were resistant to isoniazid, 25.6% (n=43) were resistant to pyrazinamide, 13.7% (n=33) were resistant to rifampin. In 2019, 11.9% (n=20) of resistant *MTB* complex isolates were MDR-TB and no *MTB* complex isolates were XDR-TB.

China, Russia, and India account for 50% of all MDR-TB worldwide.

Drug-resistant TB cases, confirmed or suspected, are difficult to clinically manage and must be referred to a TB specialist. Follow the HSSA facility/regional process for consultation with the regional medical supports, obstetrician, pediatrician, and/or the local PHU) and/or specialist as appropriate.

Transmission

Infection is transmitted almost exclusively by inhalation of the tubercle bacillus in droplet nuclei form. Droplet nuclei are created by individuals with pulmonary TB disease through coughing, sneezing, singing and other forceful expiratory efforts.

Transmission is predominantly from adolescents and adult clients who are able to generate an infectious aerosol; young children and infants are generally not infectious.

Duration of exposure needed for transmission is usually prolonged indoor exposure over many days or months, but in highly infectious individuals, duration can be as short as a few minutes. Person-to-person transmission of *MTB* is determined by certain characteristics of the source-case and of the person exposed to the source-person, and by the environment in which the exposure takes place. The virulence of the infecting strain of *MTB* might also be a determining factor for transmission.

The probability of transmission increases with the following:

- Bacterial burden (smear positivity) in the source client
- Cavitary or upper lung-zone disease on chest radiograph in the source client
- Laryngeal disease in the source client
- Amount and severity of cough in the source client
- Duration of exposure of the contact
- Susceptibility of the exposed contact
- Proximity of the contact to the source client
- Crowding and poor room ventilation
- Delays in diagnosis and/or effective treatment of the source client. The most effective way to reduce transmission is to promptly diagnose and treat clients with pulmonary TB disease.

Incubation Period

TB infection may persist for a lifetime. The risk of progression from infection to disease is greatest within 2 years after infection (about 5% will progress, although in the Indigenous People of the NWT, there appears to be a higher rate of primary progression). There is a further 5% risk of progression to disease over an individual's lifetime. Risk is increased substantially in individuals who are less than five years of

age and who have certain medical conditions such as human immunodeficiency virus (HIV). TST conversion/IGRA positivity generally occurs within 8 weeks of exposure and infection.

Period of Communicability

As long as viable tubercle bacilli are being aerosolized, untreated or inadequately treated individuals with pulmonary TB disease are infectious. Adequate treatment with medications renders most individuals non-infectious within a matter of weeks. Young children with pulmonary TB are often not infectious. Extra-pulmonary TB is not usually infectious however all extra pulmonary TB cases must be screened with sputum's and CXR to rule out co-existing pulmonary TB disease.

Clinical Considerations

TB is a treatable and curable infectious disease. All cases of TB disease must be treated. Treatment of drug susceptible TB disease should include 2 effective medications at all times and at least 3 effective medications in the intensive phase.

- Treatment for TB disease consists of 2 phases:
  1) **Intensive Phase** – consists of 3 or 4 susceptible medications used in combination to rapidly kill TB organisms and prevent the selection of drug resistant organisms. This treatment should last 2 months or 8 weeks.
  2) **Continuation Phase** – consists of a minimum of 2 susceptible medications. Treatment duration varies depending on drug regimen, site of TB disease, adherence, and risk of relapse.
- All TB disease cases in the NWT must receive Direct Observed Therapy (DOT) (see NWT TB Standard 4.0).
- People with TB disease should be provided with TB medications and appropriate treatment free of charge, regardless of insurance coverage or immigration documentation.
- Clients receiving treatment must be monitored for medication side effects and response to treatment (see NWT TB Standard 1.0).
- Special considerations need to be taken for certain conditions for TB treatment. These include pregnancy, breastfeeding, pediatric clients, the elderly, HIV positive individuals, renal failure, concurrent hepatic disease/risk, extra-pulmonary TB, and cases of DR-TB.
- For client-specific clinical management, practitioners must consult with an infectious disease or TB specialist.
- All children (age 16 and under) **must be** referred to a pediatrician.

1.5 PUBLIC HEALTH MEASURES

Key Investigations

Assess **risk** of transmission to others by reviewing newly diagnosed cases, specifically for the following:

- Symptoms which may indicate pulmonary TB disease such as cough. Pulmonary TB is infectious; extra-pulmonary TB is generally not infectious.
- Results of sputum smears and cultures for AFB – individuals whose sputum is smear positive are more infectious than those whose sputum smears are negative but culture positive.
- CXR findings – cavitary lesions suggest highly infectious disease.

- Duration of symptoms, especially cough, will assist in determining how long the individual has been infectious.
- Living situation of the individual – congregate or closed living situations such as group homes, corrections, and long-term care pose a greater transmission risk and may include vulnerable people. Household situation should be assessed for overcrowding conditions.
- Places that the individual has been since the symptoms began, especially those places where they spent the most time, including information about the characteristics of each place such as size, ventilation, and length of time spent there.
- Risk is greater in a small, enclosed, poorly ventilated room than a large, well-ventilated one.
- Context of NWT TB history; is client from a community with recent TB activity or outbreak or a community considered to be high-risk based on rates of historical TB.
- Foreign born individuals from countries with high rates of TB or individuals that travel to high incident TB countries for extended periods of time are also at greater risk.
- For those who have spent any time in a refugee camp risk of TB disease increases substantially.

Public Health Management of Cases

Prompt diagnosis and treatment of individuals with TB disease is the first priority for TB prevention and care.

- Practitioners must consult with a TB specialist for treatment protocol.
- Any children 16 years or less who have suspect or confirmed TB disease **must be** referred to a Pediatrician for case management and treatment.
- **Follow the HSSA facility/regional process for consultation with the regional medical supports, obstetrician, pediatrician, and/or the local PHU and/or specialist as appropriate.**
- All individuals with newly diagnosed TB disease should undergo baseline laboratory testing including HIV. Ideally, HIV testing should be performed at the time of diagnosis of TB.

DOT

All clients with TB disease, both in hospital and in community, must be given TB medication by DOT.

DOT must include documentation of directly observing ingestion of medications as well as documentation and reporting of any refused, missed, or vomited doses. Refused or missed doses must be reported to the OCPHO (See Appendix A).

A community discharge plan needs to be in place with the home CHC or PHU to ensure seamless DOT and monitoring is in place prior to discharge.

Treatment of TB is **publicly funded** which includes all first-line, second-line medications and pyridoxine (Vitamin B6). These TB medications are supplied by the hospital pharmacist while the client is an in-patient and supplied by the public health unit/health center free of charge when the client is discharged. **Under no circumstances should TB medication be dispensed by a pharmacist directly to a client.**

TB Recurrence Post Treatment

People treated for TB disease remain at high risk for recurrent TB (relapse or reinfection), particularly in the first 2 years post-treatment. People at high risk of TB recurrence include people with extensive or disseminated disease, cavitary and smear/culture positive disease, DR-TB, people with immune

suppressing co-morbidities and people with a history of treatment interruptions or non-adherence with an atypical treatment regimen. These clients should be considered for post-treatment monitoring over 12-24 months post-treatment. Consultation with a TB specialist is recommended.

Post-treatment TB lung disease is a term that encompasses diverse chronic lung disease and respiratory pathologies experienced by TB clients after treatment for TB disease. The CTBS comment that post-TB lung disease is diverse in presentation and likely underappreciated by clinicians. They recommend pulmonary function testing be performed on all people at the end of treatment for pulmonary TB or within 6 months of completing treatment. In areas with limited access to a pulmonary function laboratory, spirometry is an acceptable first line test.

Isolation

All clients in the NWT with pulmonary TB who are smear positive or culture positive, or have a positive GeneXpert PCR/NAAT must be isolated in a health care facility, placed on airborne precautions in an airborne infection isolation room (AIIR) with verified and monitored negative pressure.

Medical Travel

Clients travelling from small communities who do not require medevac should travel to the nearest NWT referral hospital wearing an N95 mask or surgical mask if N95 is not tolerated or available. These clients should have a reliable escort also wearing a mask that can ensure the TB case wears the mask at all times.

In the case of extended road travel by taxi or medical travel van, drivers should also mask, and no other clients should be transported within the same vehicle. **Consult with OCPHO if client is highly infectious.**

Hospital Admission

Clients admitted to hospital with a TB disease who are smear positive or culture positive, or have a positive GeneXpert PCR/NAT must remain on airborne precautions until:

- Completion of a minimum 14 days of daily anti-TB therapy by DOT **AND**
- Three successive sputum specimens are negative on smear **AND**
- There is clinical evidence of improvement **AND**
- Medication susceptibilities are known, and medication resistance is ruled out
- Discontinuation of isolation precautions is never based on fixed interval of treatment alone, but on evidence of clinical and bacteriologic improvement and evidence of adequacy of treatment regime.

Note: Discontinuation of isolation or from hospital must be approved by OCPHO.

Management of Suspect Cases

A suspect case is a client in whom TB disease is suspected by the clinician, but who does not meet the criteria outlined for either lab confirmed or clinical cases. All efforts should be made to ensure that appropriate investigations are completed so that the client can be classified as a confirmed case.

Suspect cases must be placed on airborne precautions in an airborne infection isolation room (AIIR) until three negative sputum samples/smears have been obtained and a TB specialist is consulted. Three sputum samples can be obtained an hour apart on the same day (see Appendix B).

Management of Contacts

- Whenever an individual is found to have pulmonary TB disease, a contact investigation is initiated to determine whether others may have TB disease or have become infected without evidence of disease. Contacts of a case of TB, who are newly infected should have a completed TB assessment within 7 days. Those who are found to have TB infection without disease should be offered preventative therapy within 30 days of assessment. (See Section 2 for TB Infection)
- The initial investigation consists of an interview with the case to determine contact names, approximate date of birth, addresses and telephone numbers of individuals they have spent time within places they have identified. Contacts are then also interviewed to assess their risk of infection.
- Contact investigation begins with identifying contacts who are at high-risk for infection (e.g., close household or close non-household contacts) and/or high-risk for progression to disease.
- Very vulnerable high-risk contacts include children less than 5 years of age, those with immune compromising conditions, and those with symptoms suggestive of TB disease.
- For TB disease in children a source case should be sought and identified.
- Vulnerable contacts also include those who have no prior exposure to TB as they are more susceptible to infection.
- Contacts exposed to a case are at higher risk for progression to TB disease within the 2 years after exposure.
- Several medical conditions place individuals, at higher risk of developing TB disease once infected.
- TST is the preferred test in contact tracing – see indications for TST/IGRA testing.
- TST is performed on contacts with no previous documentation of TB disease or positive TST in the past. Conversion of TST/IGRA from negative to positive (indicating TB infection) can take up to 8 weeks after exposure occurred; therefore, if initial test is done within eight weeks of last exposure to an infectious case and is not found to be positive, a second test should be performed at least 8 weeks after the last exposure occurred.
- IGRA may replace TST or be used in conjunction with TST in contact investigation but is not the first choice. Refer to indications for TST/IGRA testing or consult OCPHO for direction.
- If a result of TST is positive, further investigation with symptom inquiry, physical assessment, CXRs and sputum investigation are necessary to rule out TB disease.
- Once TB disease is ruled out all positive eligible contacts should be offered preventative therapy.
- Positive contacts who are unwilling or unable to take or complete preventative therapy, should have screening at least every 6 months for the initial 24 months after contact with a person with infectious TB disease. Screening of these individuals should consist of physical assessment, symptom inquiry, chest x-ray and three sputum samples for AFB.
- See reporting section for reporting requirements

Management of Pediatric Contacts

- The most efficient way to prevent pediatric TB disease is the prompt evaluation and treatment of children exposed to an infectious adult source case.
- All pediatric contacts should have a symptom inquiry and TST or IGRA. A CXR and physical exam should be included for all children less than 5 years old, children with TB symptoms and children older than 5 years of age with a positive TST or IGRA.
- Children less than 5 years of age with a negative TST or IGRA and no evidence of TB disease by examination or radiology may be given a "window" of preventive therapy to prevent the development of TB disease. Window prophylaxis is given as it may take up to 8 weeks after exposure for the TST or IGRA to convert to positive, indicating infection. During this time, untreated infection may progress quickly to severe disease in young children.
- Young children under five years of age who have been identified as high-risk contacts of a TB case require urgent consultation with Pediatrician/TB Specialist to initiate window preventative therapy as soon as possible (see Appendix D). **Follow the HSSA facility/regional process for consultation with the regional medical supports, pediatrician, and/or TB specialist as appropriate.**
- See reporting section for reporting requirements

Please note: TB disease in young children signals a recent infection and indicates the probability of an undiagnosed case amongst the child's close contacts. Therefore, when disease is diagnosed in children, contact investigation attempts to identify the source case.

Prevention

Surveillance of persons with TB Disease Post-Treatment

Generally, clients who have completed their treatment for TB disease are considered cured from TB and do not require on going follow-up or surveillance. However, the following clients are considered at high risk for TB recurrence (relapse or reinfection) particularly in the first 2 years post-treatment:

- Extensive or disseminated disease
- Cavitary smear/culture positive disease
- Drug-resistance disease
- Immune-supressing co-morbidities
- History of treatment interruptions, non-adherence to treatment
- Atypical treatment regimens

For these clients, it is recommended to provide follow-up every 6 months or yearly for 2 years with symptom inquiry and/or CXR and 3 sputum samples. Consultation with a TB specialist to determine frequency of surveillance is recommended.

Those clients who have been determined to have TB infection but in whom TB disease has been ruled out should be offered TB preventative therapy. This is discussed in detail in Section 2.

Vaccination

All eligible infants in communities of high risk in the NWT should be offered Bacille Calmette-Guérin (BCG) vaccine as per the NWT BCG vaccine policy.

BCG vaccine is implemented in high-risk TB endemic regions within NWT, Canada, and the world to protect infants and young children from serious complications of TB infection. Although BCG vaccine does not provide permanent or absolute protection against TB infection and disease, it does have a protective effect against TB meningitis and disseminated disease.

1.6 PUBLIC AND HEALTH PROFESSIONAL EDUCATION

TB is a disease of poverty. It is the epitome of inequity in public health; it is a social disease with a medical aspect. TB is an infectious disease that disproportionately affects those who are at risk. Unmet social determinants of health such as poverty, food insecurity and malnutrition, inadequate housing and overcrowding are significant risk factors for TB.

The History and Impacts of Tuberculosis in Indigenous Peoples of the NWT

The TB epidemic was brought to Canada by Europeans in the 18th century and then dispersed among the population. The sustained impact of colonialism still contributes to the high rates of TB we see today in the Northern Indigenous peoples. In Canada, colonization caused the removal of Indigenous people from their lands and territories and the forced relocation to government-determined settlement areas. The establishment of the reserve system, followed by the residential school's era, aggravated the impact of TB through over-crowding, poor nutrition, and inadequate sanitation. It is well documented that the social inequities which impact the social determinants of health continue to occur at higher rates in Canada's indigenous population.

TB was not just a medical tragedy for Canada's Indigenous people, often it was a family and community tragedy. TB struck hard in the north in the 1950s and 60s and thousands of people went to southern Canada for treatment. In 1950, the coast guard ship C.D. Howe made its first voyage to the Arctic. It was specially designed to cruise through ice and was outfitted with a small hospital including an operating room, a sick bay, a dental office, x-ray machine, and darkroom. The ship made annual summer trips to Inuit settlements across the Arctic, taking x-ray surveys and removing TB clients who were sick enough to require treatment in a southern hospital. Similar TB surveys and clinics took place throughout the land-based communities of the NWT. Starting in the 1930's, the Canadian government created racially segregated hospitals with the goal of treating TB in Indigenous People. These "Indian Hospitals" were poorly funded and staffed and lacked any translation or social services to keep clients informed and connected with family.

Indigenous people were removed from their families and homes and confined and isolated in "Indian Hospitals" for extended periods of time, away from home, usually with no contact. Some were never seen again. Adults died of the disease and were buried without their family's knowledge, while young children were sent from one hospital to the next without records or documentation of their whereabouts.

The majority of indigenous people from the NWT were sent to the Charles Camsell Hospital in Edmonton, the largest of all of the "Indian Hospitals" in Canada. The Charles Camsell began treating people in 1945 and closed in 1996. A class action lawsuit filed against the Canadian Government in 2018, alleges inadequate care and widespread sexual and physical abuse of Indigenous clients at TB hospitals. The class action suit seeks to provide compensation for victims of Indians Hospitals for long term negative health and psychological impacts associated with the hospitals.

The CTBS have dedicated a chapter in their new edition to improve the cultural competence of health providers delivering TB care to Indigenous Peoples of Canada. Their following recommendations are good practice statements for health providers to:

1. Educate themselves about the epidemiology of TB in the community, recognizing that the community's historical relationship with TB will contextualize present day TB care;
2. Recognize the specific social determinants of health affecting distinct Indigenous groups, with the aim of delivering quality TB care and closing the health equity gaps between Indigenous and non-Indigenous Canadians;
3. Understand the geography and climate of Indigenous communities, including that many Indigenous communities facing high rates of TB are isolated and not linked by roads to urban centers, with the result that healthcare is less accessible and the diagnosis and treatment of TB potentially delayed;
4. Acknowledge the Indigenous territory that one is occupying; work toward understanding and practicing cultural safety by self-reflection on power differentials and respecting cultural differences, including language; and incorporate cultural values to promote a safe and inclusive environment;
5. Recognize the specific social determinants of health affecting distinct Indigenous groups, with the aim of delivering quality TB care and closing the health equity gaps between Indigenous and non-Indigenous Canadians;
6. Acknowledge the role of on-going colonization, personal and systemic racism, and privilege as they relate to health equity in TB care delivery and take steps to prevent their harmful effects;
7. Promote self-resilience, self-advocacy, and empowerment by respecting the rights of Indigenous Peoples as outlined in the Clients' Charter of TB care and the United Nations Declaration on the Rights of Indigenous Peoples; and
8. Understand that each Indigenous group — First Nations, Inuit, and Métis — is historically and culturally distinct and may, therefore, have unique TB needs.

For more information about TB:

- The NWT Department of Health & Social Services: Indigenous Cultural Awareness and Sensitivity Training
- The Government of Canada:
    - Canada/Tuberculosis
    - Tuberculosis in Canada - 2010-2020 Summary Report
- Canadian Journal of Respiratory, Critical Care and Sleep Medicine: Canadian Tuberculosis Standards – 8th Edition
- World Health Organization (WHO): WHO/Tuberculosis
- United Nations Declaration on the Rights of Indigenous Peoples

1.7 EPIDEMIOLOGY

Global

Currently, TB is the second highest cause of death from an infectious disease worldwide and is the top killer of people infected with HIV. Globally, incidence rates of TB are increasing. In 1993, the WHO declared TB a global emergency. In 2008, the global rate was estimated at 139 cases per 100,000 population, with 9.4 million new cases reported. Many developing countries experience great difficulty with treatment and

control of the disease as a result of inadequate public health and TB control programs, widespread poverty and the spread of the HIV epidemic. The emergence of drug resistant strains is becoming an increasingly worrisome problem worldwide. It represents a problem not only in treatment of TB disease cases, but in their contacts as well. For more information see the World Health Organization website.

Canada

Canada continues to have one of the lowest reported rates of TB in the world with the overall incidence rate unchanged in the past 10 years at 4.5-5.1/100,000. However, there are pronounced disparities in certain populations and geographic regions such as foreign born, Indigenous and northern communities. The active rate in Inuit has been the highest in Canada for the past 2 decades. In 2020 the rate was 70.3/100,000 or 15 times the Canadian rate. (CTS) This does not apply to the NWT Inuit population. For more information on Inuit populations see the Inuit Tuberculosis Elimination Framework.

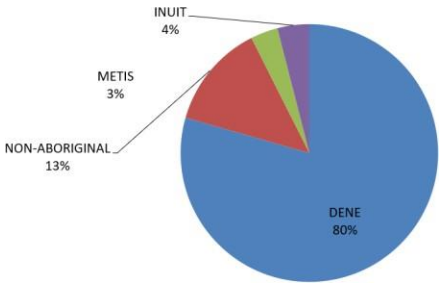
NWT

NWT TB Risk Map

Since 2010, NWT has consistently reported higher annual rates of TB disease than the national rates, although generally the rate has been declining. In 2020, the crude annual rate of TB disease in NWT was 8.8 per 100,000 compared to 4.7 per 100,000 nationally. Within the territory itself, there are rate differences with some regions reporting more cases, and others reporting very few to none. There have been significant outbreaks in the NWT in the last 30 years. Notably, a significant outbreak in the Tłı̨chǫ region occurred in 1994/1995 which went on for several years and seeded TB in other communities. There was a significant outbreak in Yellowknife in the homeless population in 2007 which again seeded TB in other communities. A recent OCPHO review of TB rates for the past 10 years showed that some regions such as the Tłı̨chǫ have rates above the NWT average, a result of the historical outbreak. Other regions such as the Beaufort Delta had rates which were very low, a reflection of very little TB activity over the past few decades. In communities such as Yellowknife, rates are not as high based on overall population, but it is considered a community at risk for TB given the large number of homeless and vulnerable populations and it is the community with the largest immigrant population from countries with high rates of TB.

As mentioned, the high active rate for Inuit in Canada does not apply to the NWT population. TB in the NWT is predominantly in the Dene population (80%) followed by non-aboriginal foreign born.

NWT Ethnicity Breakdown – Cases (1999-2020)



- For more information on the epidemiology of TB in the NWT see: Epidemiological Summary of Communicable Diseases HSS Professionals

1.8 REFERENCES

1. Alberta Health Public Health Notifiable Disease Management Guidelines Tuberculosis: https://www.alberta.ca/notifiable-disease-guidelines.aspx
2. Canadian Thoracic Society indorsing Canadian Tuberculosis Standards 8th Edition: https://cts-sct.ca/wp-content/uploads/2022/03/Media-Release-24March2022_Final-JS.pdf
3. Canadian Tuberculosis Standards, 8th Edition, 2022: https://www.tandfonline.com/toc/ucts20/6/sup1
4. Dr. R. Long (TB Specialist), personal communication, November 2022
5. NWT *Public Health Act*: https://www.hss.gov.nt.ca/en/about/legislation-and-policies
6. The time is Now – Chief Public Health Officer spotlight on eliminating TB in Canada (2018): https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis.html
7. Tuberculosis in Canada – 2010-2020 Summary Report: https://open.canada.ca/data/en/dataset/17ee0902-055e-415e-b7aa-d9bee1734d35
8. Tuberculosis in Canada – 2008-2018 Data: https://open.canada.ca/data/en/dataset/4dbb9bff-022d-4aab-a11d-0a2e1b0afaad
9. Tuberculosis in Canada, 2020: https://www.canada.ca/en/public-health/services/publications/science-research-data/tuberculosis-canada-2020-infographic.html
10. Notifiable Disease Online: https://diseases.canada.ca/notifiable/charts-list
11. World Health Organization: https://www.who.int/health-topics/tuberculosis#tab=tab_1
12. World Health Organization Global TB Program https://www.who.int/teams/global-tuberculosis-programme/overview

Section 2 – Tuberculosis Infection

2.1 CASE DEFINITION

TB infection (previously referred to as LTBI) which is the presence of latent or dormant infection with *MTB*. Clients with TB infection have no evidence of clinically active disease, no evidence of radiographic changes that suggest TB disease and negative microbiologic tests; they are non-infectious.

2.2 DIAGNOSIS

TST and IGRA

- Testing for TB infection using a TST or IGRA is indicated for everyone considered at high-risk for TB.
- TST or IGRA should not be done if client already has a documented and interpreted positive test result
- TST and IGRA cannot solely diagnose TB disease but in all cases where a TST or IGRA test is positive, TB disease must be ruled out with CXR and sputum for AFB and culture. Once the disease process is ruled out, the positive TST or IGRA can be considered to be indicative of TB infection (see Appendix E).
- The TST and IGRA test result should be considered with other factors, including the pre-test probability for the person being truly infected (exposure), the individual risk of developing TB disease and the ability of the test to identify persons at risk of TB disease (i.e., predictive value).
- A history of receiving the BCG vaccine may result in a positive TST in the future.
  If BCG vaccine is given in the first year of life, it is very unlikely to cause TST reactions of 10 mm or more in persons 10 years of age and older because tuberculin reactivity acquired through BCG vaccination in infancy generally wanes over time.
- Both the TST and IGRA are acceptable alternatives for TB infection diagnosis. Either test can be used for TB infection screening in any of the situations in which testing is indicated. However, there are preferences and exceptions:

An **IGRA** is the **preferred** test when:

- Children over 2 years of age and less than 10 years of age previously received a BCG vaccine against TB.
- Persons at least 10 years of age received a BCG vaccine after infancy (older than 1 year of age) or received a BCG vaccine more than once and/or are uncertain about when they received a BCG vaccine.
- Adequate training and quality assessment and control are NOT available for TST administration and/or reading, but personnel and facilities to perform IGRA are available in some NWT regions.
- A person is unable or unlikely to return to have their TST read.

The **TST** is the **preferred** test when:

- Serial testing is planned to assess risk of new infection (ie, conversions). This includes repeat testing in a contact investigation.
- Serial testing of health care workers or other populations (e.g., corrections staff or prison inmates) with potential for ongoing exposure. In these situations, IGRA are not acceptable.

There are multiple factors to consider when faced with a positive or negative TST or IGRA. Interpreting the result depends primarily on the clinical context. An online TST/IGRA algorithm has been developed to help facilitate the interpretation of these test.

If an HCP decides that a TST or IGRA is truly positive, there is no clinical utility in repeating the TST or IGRA in the future, so long as the test has been properly performed, read, and interpreted.

Clients with negative TST/IGRA results may still be offered preventative therapy for TB infection after assessment of the following circumstances:

- Known or potential exposure to a known case, especially within the past 2 years
- Clients who have high-risk for developing TB disease (children under 5, HIV, immune compromised)
- Foreign born clients from countries with high rates of TB disease
- Clients from communities at risk for TB (high rates, outbreaks)
- Clients with CXR changes indicative of TB infection (granulomas)

For more information on TB testing and diagnosis of TB infection, refer to the Alberta Provincial Laboratory Guide to Services and CTBS

2.3 REPORTING

All HCPs must follow the NWT *Public Health Act*. Measures for contact tracing and legislative requirements are laid out within the *Reportable Disease Control Regulations* and reporting timelines are found in the *Disease Surveillance Regulations*.

Note: the only acceptable methods of reporting to the OCPHO are outlined below. Information provided outside of these methods will not be considered reported unless otherwise stated by a CPHO delegate.

Health Care Professionals

For **Part 3** written report within 7 days

- Complete and fax (867) 873-0442 the NWT TB Form to the OCPHO for all clients suspected of TB infection within **7 days** after a diagnosis is made or an opinion is formed.
- A Public Health Officer (PHO) must notify the OCPHO of any recommended treatment for TB infection, including start dates, treatment interruption and discontinuation dates, via the NWT TB Form.
- All TSTs and IGRAs are reportable test. IGRAs are reported through LIS whereas TSTs are reported either by the EMR TST Exam Template or if not on the EMR through the TST Reporting Form.

Laboratories

- Report all Interferon-gamma release assay (IGRA) results to the OCPHO by fax (867) 873-0442.

2.4 OVERVIEW

Causative Agent

MTB is the etiologic agent of TB in humans. The organism is a slightly curved bacillus, aerobic, non-spore forming and non-motile. Growth rates are very slow, with a doubling time of 15–20

hours. Other mycobacteria, including *M. bovis, M. africanum, M. microti, M canetti, M. caprae*, and *M. pinnipedii* are also capable of infecting humans but these organisms are very rare in NWT and Canada. The reservoir for *MTB* is humans.

Clinical Presentation

TB infection may present with no signs or symptoms until it has progressed to TB disease. Lack of symptoms is not a reason to rule out TB infection. The clinician must look at entire context of exposure, epidemiology, individual susceptibility, and risk for acquiring TB infection and progression to TB disease.

Major Complications

A major complication for TB infection is progression to TB disease. Several risk factors, such as time since TB exposure, medical conditions, immune suppressive treatments, or social and lifestyle habits that affect host immunity, can affect an individual's risk for progression from TB infection to TB disease.

Transmission

TB infection is not transmissible unless it has progressed to TB disease. TB infection is always acquired through the inhalation of aerosolized droplet nuclei containing *MTB* after (usually prolonged) exposure to person with TB disease.

Incubation Period

MTB infection is contained initially by host defenses, and infection remains silent (latent). However, TB infection has the potential to develop into TB disease at any time.

Infection may persist for a lifetime as TB infection. The risk of progression from infection to disease is greatest within 2 years after infection (5% in otherwise healthy individuals). There is a further 5% risk of progression to disease over an individual's lifetime. Age less than 5 years and certain medical comorbidities such as HIV, will increase this risk of progression from infection to disease substantially.

TST conversion/IGRA positivity generally occurs within 8 weeks of exposure and infection in those with a robust immune system. Interpretation of negative TST or IGRA in those who have weakened or suppressed immunity should be cautioned and discussed further with a TB specialist.

Clinical Considerations

- The new TB infection regimens replace 9 months of Isoniazid (9H) as the previous first-line treatment. There are 2 new first-line treatment recommendations including Rifapentine and Isoniazid once weekly for 3 months (3HP), and Rifampin daily for 4 months (4R). This is a strong recommendation based on good evidence. Practitioners with a PHO designation from the CPHO can order these regimens.

- TB infection is not infectious therefore it is an individual client choice to take preventative therapy.
- **TB infection is not considered a public health harm or threat and therefore legislation does not support compelling those with TB infection to take medications under the *PHA*.** Practitioners should review with clients their current and future risks for progression from infection to disease and take into consideration their commitment to complete therapy.
- Preventative therapy for clients with TB infection does protect the public in the future. Curing TB infection before it progresses to TB disease and transmission through communities is a pillar of TB elimination in the NWT.
- Follow the recommendations in the CTBS, and approved HSS Clinical Practice Guidelines for the pathway of assessment, care, and treatment for adult and/or paediatric clients with (diagnosed or suspected) TB. See Table 1: CTBS Chapter 6.
- HCPs must always use their clinical judgement and continue to refer to the most recent territorial (see CPHO Health Alerts) and/or national guidelines (See CTBS), their health centre formulary, regional/territorial/organizational protocols, and consult with a Physician/NP and or specialist as appropriate.
- Special considerations need to be taken for certain conditions for TB treatment. These include pregnancy, breastfeeding, pediatric clients, the elderly, HIV positive individuals, renal failure, concurrent hepatic disease/risk, extra-pulmonary TB, and cases of drug resistant TB (DR-TB).
- For client-specific clinical management, practitioners must consult with an infectious disease or TB specialist.
- For those clients who cannot tolerate 3HP, alternate preventative therapy for TB infection should be discussed with a TB specialist.
- DR-TB cases, confirmed or suspected, are difficult to clinically manage and must be referred to a TB specialist.

All children (age 16 and under) **must be** referred to a pediatrician **Directly Observed Preventative Treatment (DOPT)**

Any regimen prescribed for TB infection must be administered via DOPT. Daily regimes may be approved CPHO for self-administration (see NWT TB Standard 3)

Physicians or NPs with a Public Health Officer (PHO) designation from the CPHO who have specialized education and training in TB may order first line therapies for TB infection directly for the client. The medications are ordered from the regional pharmacies (Stanton Territorial hospital or Inuvik hospital) and should be dispensed to the appropriate PHU or CHC to be administered by DOPT.

Providers without prescribing privileges and without PHO designation must complete the NWT TB Form and send to the OCPHO. The CPHO will review and recommend if preventative treatment for TB infection is indicated and authorized.

All TB medications for TB disease and TB infection, including newer drugs such as rifapentine, are publicly funded. Clients should have seamless access to these medications in the community through their community health center or public health unit.

Surveillance

Those clients who elect not to have or are not eligible for preventative therapy for TB infection, should be under appropriate surveillance for the development of TB disease. TB surveillance is discussed in the next section on public health measures.

2.5 PUBLIC HEALTH MEASURES

The WHO End TB Strategy ambitiously proposes to end the global TB epidemic by 2035. In their TB elimination strategy for low incidence countries, WHO identifies screening for TB disease and TB infection in TB contacts and selected high risk groups providing appropriate treatment. Identifying and treating TB infection is an effective fundamental public health action to reduce the burden of TB in the NWT and move towards achieving TB elimination goal.

Key Investigations

- The primary goal of testing for TB infection is to identify individuals who are at increased risk for exposure to and development of TB disease and who therefore would benefit from TB preventive treatment.
- Once a diagnosis of TB infection is made, practitioners must assess risk for progression to TB disease by assessing medical risk factors, social risk factors and individual risk factors.
- As a reminder those exposed to a case of pulmonary TB must be screened in a contact investigation (see Section 1.5 Management of Contacts)
- Routine mass screening of individuals outside of contact investigation of occupational screening programs is not recommended

Management of Clients with TB Infection

Preventative treatment for TB infection is optional and determined by the client's individual choice based on assessment, information, education, and a therapeutic partnership with the HCP or PHN involved in the client's care.

HCPs must review the client's TB history and risk assessment with client to determine if they are candidates for preventative treatment for TB infection. The client must be an informed, engaged participant in this process and understand their personal risk for progression to TB disease and why it is important to treat TB infection. Practitioners must complete an NWT TB Form and send to OCPHO. PHO Practitioners must indicate if they have initiated therapy for TB infection.

Any client initiated on preventative treatment for TB infection must receive support from the HCP and health care system to ensure safe monitoring for intolerance, side effects, adverse events, or treatment interruptions.

Preventative treatment for TB infection substantially reduces the risk that persons infected with M*TB* will progress to TB disease. However, preventative treatment for TB infection can be associated with adverse events, therefore the goal of preventative therapy is to treat those for whom preventative treatment carries substantially more benefit than potential harm.

Management of Contacts of those with TB Infection

There is no contact management or follow-up for TB infection as it is non-infectious. The only exception is new TB infection in young children when the source case is unknown. In this instance a contact investigation should take place to identify the source case. This is sometimes referred to as reverse contact tracing.

Individuals who are diagnosed with TB infection as a contact of someone with TB disease and have had TB disease ruled out should be offered preventative therapy if appropriate or placed on surveillance if unable to take preventative therapy.

Surveillance

There are 3 components for surveillance and targeted screening as part of strategy for critical to the prevention and control of TB:

1. Identification of persons with TB disease (clinicians must have a high index of suspicion in NWT, especially for persons presenting with symptoms of TB from identified communities or groups at risk (e.g. from Tłı̨chǫ region, foreign born).
2. Timely investigation of contacts of TB to identify further cases of TB disease, those infected with TB who have not yet progressed to TB disease and those at risk for TB infection and progression to TB disease.
3. Investigation of populations at risk for TB infection and progression to TB disease.

Surveillance in a Contact Investigation

Persons identified in a contact investigation who are unwilling or unable to take or complete preventative therapy for TB infection, should have:

- Screening at least every 6 months for the initial 24 months after contact with a TB disease case.
    - Screening should consist of symptom inquiry, physical assessment, CXR and collection of three sputum samples for AFB.
    - Exposure to a case within the past 2 years is a period of high risk for progression to TB disease.

Surveillance of Individuals/Populations at Risk for TB Infection and Progression to TB Disease

Screening, testing and treatment of individuals and populations at high risk for TB infection and subsequent progression to or reactivation of TB disease is a high priority and an essential strategy in TB elimination.

Ongoing or new risk factors for progression of TB infection to disease can include:

- Newly prescribed immunosuppressive drugs and therapies or any medical condition that can cause immune system impairment can cause reactivation/progression of TB infection to TB disease.
- Those immigrating from regions in Canada or from other countries with a high incidence of TB are also at greater risk of reactivation or development of TB disease from TB infection, particularly within the first two years of arrival to Canada.

Neither a TST nor IGRA should be used for testing people who have a low risk of infection and a low risk of progression to TB disease if they are infected. 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.

A TB risk assessment is an essential surveillance strategy in determining who is eligible for testing and treatment and who needs ongoing surveillance to detect the progression of TB infection to disease. Using risk assessment helps focus limited public health resources on those most likely to be exposed and become infected with TB and selects those most likely to progress to TB disease.

Risk Assessment Screen for TB Infection

In determining who should be tested/treated the clinician should ask the following questions:

- Has the client had an exposure to a known case and what are the details regarding the exposure? If yes, does the client have risk factors that increase their likelihood of infection or progression to disease?
- Is there a high suspicion the client is infected with MTB?
- What is the client's risk of reactivation of TB disease – HIV, Cancer, dialysis etc.? Is the risk for reactivation high?
- What is the client's risk of life-threatening disease?
- What do CXR, TST, IGRA and epidemiology tell us about risk for this client?
- What are the adverse/side effects of medications for TB infection in this individual?
- What is the client's interest and ability to take preventative therapy at this time in their life should they be offered?
- What are the public health consequences if the client is not offered preventative therapy? (e.g., does the client live in a congregate setting with other vulnerable individuals?)
- How long has the client had untreated TB Infection?

- Has anything in the client's health status changed that would increase their risk of progression to TB disease (e.g., a client just diagnosed with cancer, requiring immunosuppressive treatment)
- Is the client foreign born from a country with high incidence TB and/or have they had or plan to have extended visits to a country with high incidence of TB?
- Does the client perform high risk activities (ex. health care work in refugee camps) in highly endemic countries?

Foreign Born Individuals

There are important considerations for continued surveillance among high-risk foreign-born individuals from high incidence countries. For more information click here.

Routine mass screening of all migrants within Canada and NWTs is not recommended. There is great variability in the risk of TB disease among immigrants according to region of origin, migrant type, age at immigration and socioeconomic status. Refugees have roughly double the risk compared to other immigrants. The risk factors that apply to all Canadians; HIV status, transplantation etc., apply to assessing individual immigrants as well.

Only a small proportion (<3%) of all TB disease diagnoses among the foreign-born population made after arrival in Canada, are identified during the immigration post-landing surveillance program. This underscores the need for additional approaches to identify foreign-born persons with TB infection who are at increased risk of TB reactivation after arrival. Refer to the CTBS Chapter 13 "TB Surveillance and TB infection testing and treatment in migrants".

Community Surveillance Programs for Those Diagnosed with TB Infection

All community PHUs or CHCs should have a TB surveillance program that is reviewed annually to determine who needs follow-up screening, testing and treatment.

1. HCPs within the NWT should be aware of the population at risk for acquiring TB infection and test those who are eligible.
    - Either TST or IGRA can be used for testing. Indications for preferred test found in Chapter 4 of the CTBS
    - Do not retest if a positive TST or positive IGRA is already recorded.
    - If results of previous TST or IGRA are unclear, may repeat using the other test or in consultation with a TB specialist.
    - Do not retest a client with if they have documented completed treatment for TB disease or TB infection. If the client experiences a new high-risk exposure, follow-up in context of contact investigation with a TB specialist for advice regarding re-treatment.
    - Only screen those who are at high risk of acquiring TB infection who are at high risk for developing TB disease and in those who would be eligible for treatment.

2. Review the population of existing known clients with TB infection in the community annually to determine who in that population is high risk for developing TB disease.
    - Those at high-risk should have TB assessments and screening for TB with symptom inquiry, CXR and sputum collection to ensure they have not developed TB disease.
    - High-risk clients who have had annual screening and are not found to have TB disease should be offered preventative TB therapy for TB infection if eligible.
    - High-risk clients who have refused treatment in the past, should be reassessed and reoffered treatment if there has been a significant change in their health status or social situation that further increase the risk of progression from TB infection to TB disease.
    - Any TB assessment, reassessment, initiation, or request for initiation of preventative therapy for TB infection must be reported to OCPHO via the NWT TB Form as per NWT reporting requirements.

3. The NWT TB Form provides a comprehensive TB assessment that should be used for TB screening

    The results of the comprehensive TB assessment, along with the reason for screening will determine which of the following tests to complete:
    - TST/IGRA
    - CXR
    - Sputum specimens x 3 collection for AFB

    Once all information is obtained for the client, a determination can be made on how to proceed with preventative therapy, surveillance or both is required.

2.6 PUBLIC & HEALTH PROFESSIONAL EDUCATION

For more information about Tuberculosis:

- The NWT Department of Health & Social Services: Indigenous Cultural Awareness and Sensitivity Training
- The Government of Canada:
    - Canada/Tuberculosis
    - Tuberculosis in Canada - 2010-2020 Summary Report
- Canadian Journal of Respiratory, Critical Care and Sleep Medicine: Canadian Tuberculosis Standards – 8th Edition
- World Health Organization: WHO/Tuberculosis

2.7 EPIDEMIOLOGY

Refer to Section 1 Epidemiology

2.8. REFERENCES

1. Alberta Health Public Health Notifiable Disease Management Guidelines Tuberculosis: https://www.alberta.ca/notifiable-disease-guidelines.aspx
2. Canadian Thoracic Society indorsing Canadian Tuberculosis Standards 8th Edition: https://cts-sct.ca/wp-content/uploads/2022/03/Media-Release-24March2022_Final-JS.pdf
3. Canadian Tuberculosis Standards, 8th Edition, 2022: https://www.tandfonline.com/toc/ucts20/6/sup1
4. Dr. R. Long (TB Specialist), personal communication, November 2022
5. NWT *Public Health Act*: https://www.hss.gov.nt.ca/en/about/legislation-and-policies
6. The time is Now – Chief Public Health Officer spotlight on eliminating TB in Canada (2018): https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/eliminating-tuberculosis.html
7. Tuberculosis in Canada – 2010-2020 Summary Report: https://open.canada.ca/data/en/dataset/17ee0902-055e-415e-b7aa-d9bee1734d35
8. Tuberculosis in Canada – 2008-2018 Data: https://open.canada.ca/data/en/dataset/4dbb9bff-022d-4aab-a11d-0a2e1b0afaad
9. Tuberculosis in Canada, 2020: https://www.canada.ca/en/public-health/services/publications/science-research-data/tuberculosis-canada-2020-infographic.html
10. Notifiable Disease Online: https://diseases.canada.ca/notifiable/charts-list
11. World Health Organization: https://www.who.int/health-topics/tuberculosis#tab=tab_1
12. World Health Organization Global TB Program https://www.who.int/teams/global-tuberculosis-programme/overview

Management of Non-adherence to TB Treatment

TB Disease DOT

Individuals who are unable or unwilling to take TB medications for TB disease may pose a public health risk by continuing to transmit TB to others or by becoming re-infectious due to treatment non-adherence. Those who start but do not finish treatment for TB disease may develop drug-resistant *MTB* strains. Although it is very rarely necessary to do so, clients with infectious TB disease can be compelled to adhere to treatment and to comply with isolation precautions under the *NWT Public Health Act*.

Treatment for TB disease and infection is long and sometimes requires the client to make social and lifestyle changes in order to best adhere to treatment and cure their disease. Both the client and the practitioner or public health team must develop a supportive partnership to establish trust in order to identify barriers to care and intervene when adherence to treatment becomes difficult. Before assistance from the OCPHO is sought to legislate care, all efforts made to support client adherence to treatment must be thoroughly and clearly documented and principles of reasonableness and due process must be met. These principles include:

- Educating the client about TB including why isolation, treatment and cure are necessary so that the client is involved and informed at all points in the TB care continuum.
- If the client is experiencing barriers to care and treatment adherence is jeopardized, the practitioner must make every attempt to identify these barriers, implement supports to minimize them and work closely with the client to complete treatment. Implementing supports for the client may include the use of enablers or incentives when appropriate to encourage and support adherence/compliance. Examples of enablers or incentives may include meal or grocery vouchers, transportation support with taxi or bus vouchers, referral to income support or social services and meeting the person "where they are at" to improve the client's ability to stay on treatment (i.e., DOPT at school or a workplace if the client indicates that is required).
- Any enablers or incentives are funded by the authority and funding should not be a barrier to the client seeking such supports.

If, despite best efforts to support treatment a client remains non-adherent a staged intervention must be implemented. Follow these steps:

1. If a client with TB misses a dose of medication every effort should be made to locate the client immediately and ensure the principles listed above are followed and documented in the EMR or in accordance with HSSA documentation policies and procedures.
2. If the client misses two consecutive doses of medication and/or continues to miss a dose sporadically after clear communication and documentation of the listed principles, notify the OCPHO immediately.
3. The CPHO or designate will determine if the client is unwilling or unable to take the medication in consultation with local public health or health centre staff.

4. Through negotiation with the client, the CPHO or designate will attempt to re-establish medication regimen.
5. The client will be given a verbal warning outlining that continued missed doses can lead to an apprehension order. The CPHO may also issue a written warning.
6. If a third dose of any regime is missed, an "apprehension order" may be issued mandating admission to a designated facility. The client will be informed of the public health hazard they pose if the TB medicine is not restarted.
7. An apprehension order cannot be written without clear, concise documentation from the practitioner on the efforts made to work with the client to administer DOT (e.g., documented calls and visits to client's home, enablers or incentives given, and other documentation to support the client's adherence).
8. The individual will be apprehended by local RCMP and taken to a facility under guard of a Peace Officer for 72 hours.
9. After 72 hours, should the CPHO still determine the client is a public health threat, a court order may be requested to detain the individual up to a maximum of 4 months.

TB Infection DOPT

Clients taking medication for TB infection are not infectious and so cannot be compelled under the *NWT Public Health Act* to adhere/comply with treatment as they do not pose a harm to others. Although clients on treatment for TB infection may choose to discontinue treatment at any time, every effort should be made to support adherence with the same principles used above for those with TB disease.

When a client elects to discontinue treatment and does not complete the full regimen, they should be seen in follow-up. Those at high-risk for development of TB disease, those with conversion of a TST within the past 2 years, or those identified as contacts of a case should be seen every 6 months for 2 years. Further ongoing surveillance of all clients who did not complete treatment is determined by risk.

Treatment Interruption

When a client interrupts their regimen by missing anti-TB medication doses, an assessment of the medication regimen and duration of treatment must be re-evaluated and possibly changed. This should be done in consultation with a TB specialist.

There are essential factors to consider for managing a client with interruption of their treatment including:

- If the client is smear or culture positive after interruption of treatment
- If interruption occurred during the intensive or continuation phase
- The duration of the interruption
- The client's medical condition (i.e., immunocompromised)
- The client's response to treatment before interruption of treatment

- If drug-resistant disease is present or suspected

It is important to calculate the adherence to treatment as a percentage at the end of each month to help determine if dosing remains at a therapeutic level. Adherence to treatment should be calculated as a percentage at every month end. To calculate: # of DOT/DOPT doses divided by the # doses due x 100. Example: 29 doses DOT divided by 31 doses due in January (i.e., 2 doses missed) x 100 = 94% adherence.

The determination of whether this percentage is therapeutic for the medication/regimen is determined by the TB specialist and therapy may be adjusted or changed accordingly.

The CTBS provide a general guideline to managing treatment interruption but consultation with a TB specialist should always take place.

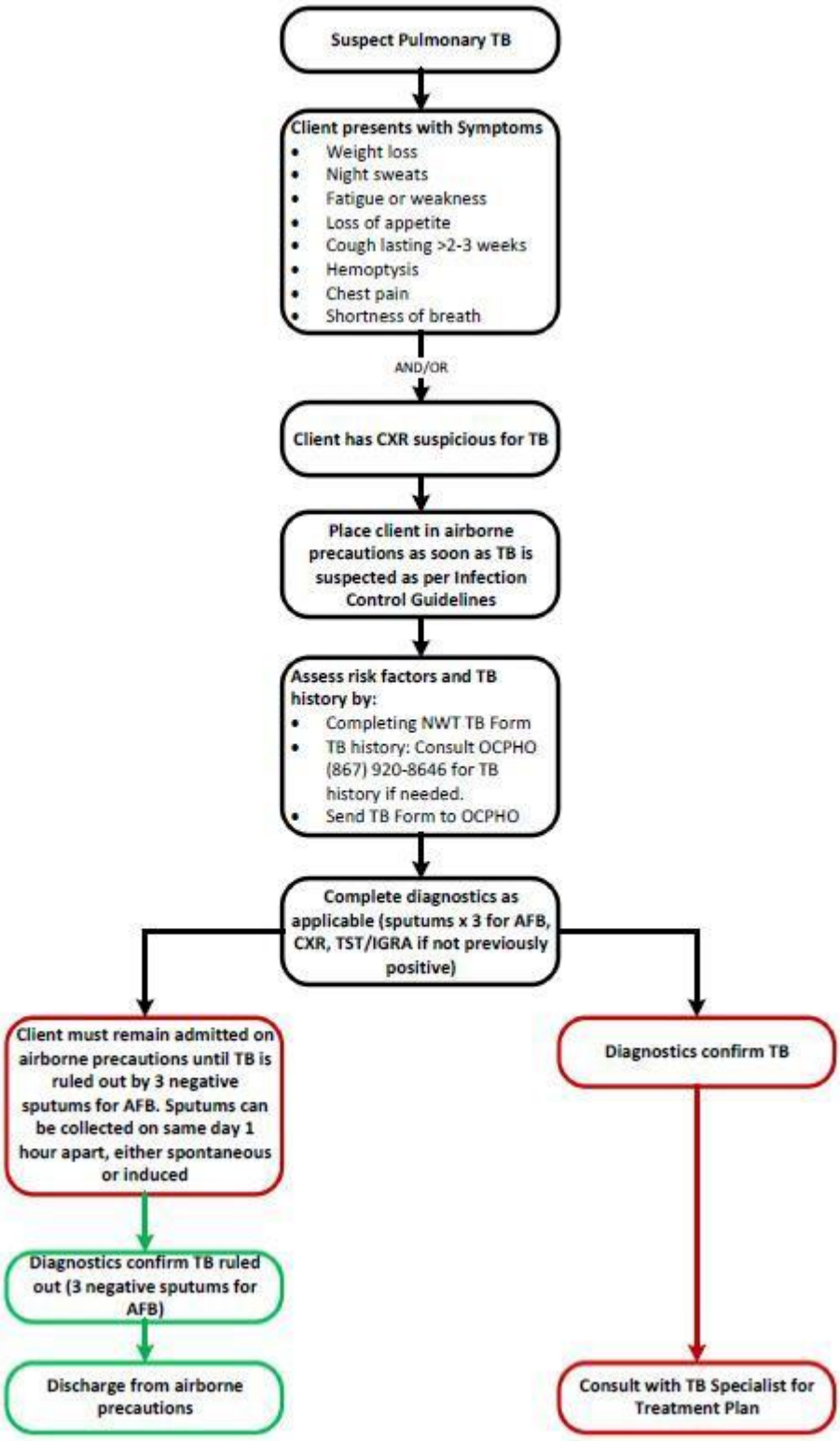
Management of Treatment Interruptions in First Line Therapy

Treatment phase	**Total length of interruption**	**Approach**
Intensive phase	<14 days	Continue therapy to complete intensive phase within three months
	≥14 days	Restart therapy
Continuation phase	<2 months	Continue therapy to complete treatment
	≥2 months and ≥80% of medications taken	Continue therapy to complete treatment
	≥2 months and <80% of medications taken	Restart therapy from start of intensive phase

Resource:
https://www.tandfonline.com/doi/figure/10.1080/24745332.2022.2036504?scroll=top&needAccess=true&role=tab

Appendix B

Management of Suspect TB

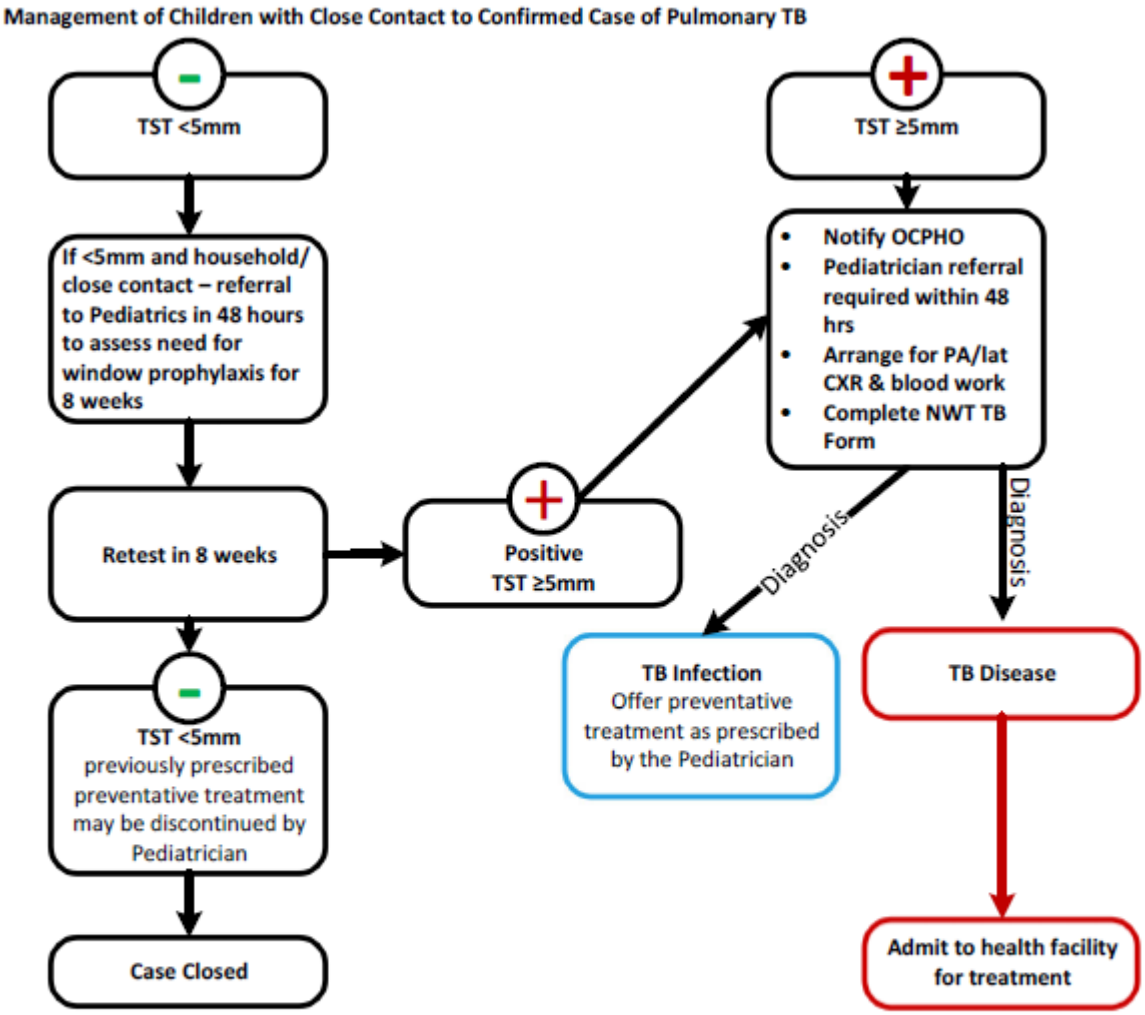


Risk Factors

Risk Factor	Annual risk of TB disease for the first 2-3 years after testing positive (%)
Very High Risk	
People living with HIV	1.7 to 2.7
Child or adolescent (<18 y) TB contact	2.9 to 14.6
Adult (≥18 y) TB contact	0.8 to 3.7
Silicosis	
High Risk	
Stage 4 or 5 chronic kidney disease with or without dialysis	0.3 to 1.2
Transplant recipients (solid organ or hematopoietic)	0.1 to 0.7
Fibronodular disease	0.2 to 0.6
Receiving immunosuppressing drugs (e.g., tumor necrosis factor a inhibitors or steroids)	0.5
Moderate Risk	
Granuloma on chest x-ray	0.1
Diabetes mellites	0.1 to 0.2
Heavy alcohol use (at least3 drinks/day)	0.1 to 0.2
Heavy tobacco cigarette smoker (at least 1 pack/day	0.1
Low Risk	
General (adult) population with no known risk factor	0.03
Persons with a positive two-step TST booster and no known risk factor	0.02

Resource: https://www.tandfonline.com/doi/figure/10.1080/24745332.2022.2036503?scroll=top&needAccess=true&role=tab Table 2. Chapter 4: Diagnosis of TB infection

Appendix D

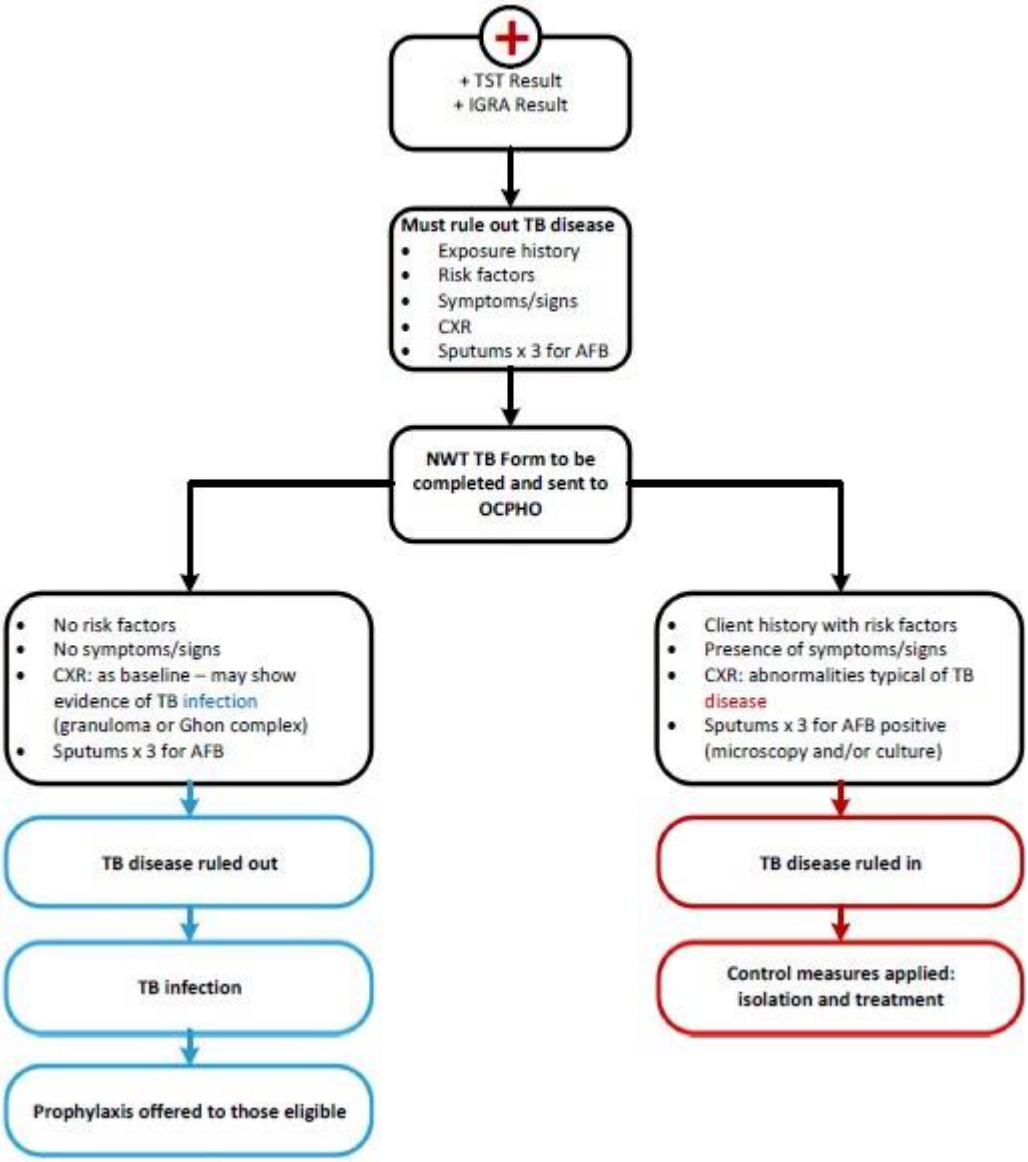


TB disease in young children signals a recent infection and indicates the probability of an undiagnosed case among the child's close contacts. If source case is unknown an investigation must take place to identify the source case.

Resource: https://www.tandfonline.com/doi/full/10.1080/24745332.2022.2043055?scroll=top&needAccess=true&role=tab

Appendix E

Assessment of an Individual with a Positive TST Result or Positive IGRA Result



Resource: https://www.tandfonline.com/doi/full/10.1080/24745332.2022.2036503