Guideline for Preventing the Transmission of *Mycobacterium tuberculosis* across the Continuum of Care

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List of Acronyms

AFB	Acid-fast bacteria (bacilli)
ACH	Air changes per hour
AIIR	Airborne infection isolation room
BCG	Bacillus Calmette–Guérin
CMOH	Chief Medical Officer of Health
CDCN	Communicable Disease Control Nurse
DHCS	Department of Health and Community Services
DOPT	Directly observed preventative therapy
DOT	Directly observed therapy
EHN	Employee Health Nurse
HCW	Healthcare worker
HEPA	High-efficiency particulate air
IGRA	Interferon gamma release assay
ICP	Infection control professional/practitioner
IPAC	Infection prevention and control
LTBI	Latent tuberculosis infection
MDR-TB	Multidrug-resistant tuberculosis
RMOH	Regional Medical Officer of Health
NAAT	Nucleic acid amplification tests
OHN	Occupational Health Nurse
PCR	Polymerase chain reaction
PPD	Purified protein derivative

TB	Tuberculosis
TST	Tuberculin skin test
XDR-TB	Extensively drug resistant tuberculosis

Introduction

The Population Health Branch of the Department of Health and Community Services strives to achieve optimal health for the people of Newfoundland and Labrador (NL) and provides this guideline in an effort to reduce the incidence and burden of tuberculosis through collaboratively delivered tuberculosis (TB) services. The goal of TB prevention and control is to reduce morbidity and mortality caused by TB in our population. This is accomplished by preventing transmission of *Mycobacterium tuberculosis* from persons with contagious forms of the disease to uninfected persons and by preventing progression from latent TB infection to TB disease. To achieve this goal our objectives include: timely diagnosis and treatment of active cases, contact tracing and management of those found to have active TB disease or latent TB infection (LTBI) and screening and treatment of LTBI in high-risk populations.

Guideline Working Group

The NL provincial TB working group was composed of experts in the field of infection prevention and control, communicable disease control, occupation/employee health, and the microbiology laboratory.

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Specila thank you to Dr Cheryl foo and Dr. Francoise Guigne

Section 1: Roles and Responsibilities in Tuberculosis Control

The responsibility for the control of tuberculosis lies with the Chief Medical Officer of Health in collaboration with the Communicable Disease Control Division of the Department of Health & Community Services (DHCS) and it is operationalized through the Regional Medical Officer of Health (RMOH) in the Regional Health Authorities. The purpose of this guideline is to provide a consistent provincial approach for health professionals as they provide care for persons with LTBI and TB disease.

The roles of the different partners in TB prevention and control are:

Provincial TB Control

- Establish provincial guidelines to standardize TB Control Programs
- Provide financial resources for the TB drug program
- Administer the surveillance program for TB cases
- Monitor and analyze the epidemiology of TB in the province and provide reports to the Public Health Agency of Canada
- Facilitate education and training for healthcare professionals
- Coordinate and support interprovincial TB control efforts
- Facilitate follow up of cases of inactive tuberculosis in immigrants and refugees

Regional Health Authorities

- Ensure that regional policies for TB prevention and control are available that address the public health, occupational health and infection prevention and control issues
- Ensure that all confirmed cases/suspect cases are fully investigated and treated
- Investigate TB contacts and provide recommendations for treatment, if indicated
- Perform screening tests for latent tuberculosis infection
- Provide the anti-tuberculosis drugs, as required, as part of a publicly funded program
- Ensure completion of the prescribed chemotherapy for cases through the provision of directly-observed therapy or other appropriate interventions
- Report all confirmed cases to the Chief Medical Officer of Health (CMOH) or designate
- Manage the surveillance program for TB cases
- Collect and maintain data in a secure data system
- Ensure timely reports are provided to the provincial TB program
- Coordinate the TB education for patients, families and healthcare personnel

Communicable Disease Control Nurses

- Liaise with the RMOH to establish a public health care plan for the client with LTBI and/or TB disease
- Coordinate the care plan with Community Health Nurses (CHNs) (in this document CHN also includes Public Health Nurses (PHNs)
- Organize the investigation of cases and contacts
- Coordinate the directly observed therapy (DOT) program
- Collect, consolidate and disseminate surveillance data on TB cases to the RHA and to the province
- Provide advice for the follow up of clients being assessed for LTBI

Community Health Nurses

- Collaborate with the Communicable Disease Control Nurses (CDCNs) to develop the client care plan and to implement the plan
- Investigate cases and contacts
- Educate patients, contacts, and families
- Provide directly observed treatment to clients
- Identify patient behaviors that might lead to poor adherence
- Develop strategies to encourage completion of the therapy
- Identify patient behaviors that might lead to poor adherence
- Develop strategies to encourage completion of the therapy
- Perform screening tests for LTBI

Occupational Health Nurses

- Perform a preplacement TB assessment on all new employees
- Follow up any employees with positive TB screening results
- Provide post-exposure contact tracing for employees
- Educate staff on TB at the time of hiring and following post-exposure
- Assess fit-for-work status of employees diagnosed with latent tuberculosis infection and TB disease

Infection Control Practitioners

- Ensure all suspect/confirmed cases of TB are placed on Airborne Precautions
- Notify CDCN/RMOH of any hospitalized suspect/confirmed cases of TB
- Inform the Occupational Health Division of any healthcare worker TB exposure
- Determine the risk category for TB in healthcare settings

- Educate employees to recognize signage and to understand the importance of administrative, environmental and personal protection controls in preventing the transmission of TB

Public Health Laboratory

- Test and confirm all cases of active TB disease in the province
- Report positive results to the attending physician and the appropriate RMOH/designate
- Provide expert consultative advice and education on diagnostic and other laboratory tests for TB and the interpretation of test results
- Provide the data on TB drug resistance

Physicians

- Assess and diagnose suspect cases of TB
- Report to the local RMOH/designate all cases of active and suspect cases of active TB immediately (same day)
- Provide clinical care and treatment for cases and contacts
- Review the drug regimens and culture and sensitivity results (if available) for each case to ensure their appropriateness and adequacy
- Collaborate with the RMOH/delegate to ensure the client's care plan is being followed and that treatment is successful
- Identify ineffective drug therapy regimens and drug toxicities and report to RMOH/designate

First Nations, Inuit and Métis

The prevention and control of TB for First Nations and Inuit is a shared responsibility that varies by region according to each region's level of collaboration with Health Canada's First Nations and Inuit Health regional offices, provincial governments and First Nations or Inuit organizations/communities.

- For Aboriginal communities within the geographic boundaries of this province, the Provincial DHCS is responsible for TB prevention and control.
- In Nunatsiavut,[1] the Department of Health and Social Development, operationalize the TB services in the Inuit communities under its jurisdiction. Health Canada's First Nation and Inuit Health regional office, through a contribution agreement, provide some funding for TB services.
    - Nunatsiavut Public Health
        - Collaborates with LGH regarding TB cases, contacts and clients with LTBI
        - Provides the necessary follow-up and investigation of source cases and contacts
        - Coordinates the DOT for TB cases and LTBI cases

[1] The Nunatsiavut Government is an Inuit regional government. Although Nunatsiavut remains part of Newfoundland and Labrador, the government has authority over many central governance areas including health, education, culture and language, justice, and community matters.

- Identifies patient behaviors that might lead to poor adherence
- Works with clients to develop strategies to encourage completion of therapy
- Provides TB education for CHNs during orientation and on a regular basis
- Offers education for HCWs, clients, families and the community on TB related issues
- Delivers TB health promotion programs to the community
- Provides education resources on TB
- Develops TB policies and procedures to guide the practice of HCWs
- Supports attendance at national meetings and education events addressing TB

Section 2: Surveillance and Reporting

Surveillance

The objective of TB surveillance is to provide timely, ongoing and systematic collection, collation, analysis, interpretation and dissemination of information in order to monitor disease trends (e.g., incidence of disease, geographic and risk group distribution). The data is used to estimate future disease impacts and to plan, implement and evaluate interventions and preventive programs. Additionally, it informs the development of health policy, resource allocation and assists in setting standards of care and practice guidelines.

Definitions

The province uses the *Case Definitions for Communicable Diseases under National Surveillance* (2009) developed by the Public Health Agency of Canada (PHAC).

New and retreatment cases

New Case

No documented evidence or adequate history of previously active tuberculosis

Re-treatment Case[2]

- Documented evidence or adequate history of previously active TB that was declared cured or treatment completed by current standards AND
- At least 6 months have passed since the last day of previous treatment [3]AND
- Diagnosed with a subsequent episode of TB that meets the active TB case definition OR
- Documented evidence or adequate history of previously active TB that cannot be declared cured or treatment completed by current standards AND
- Inactive[4] for 6 months or longer after the last day of previous treatment[2] AND
- Diagnosed with a subsequent episode of TB that meets the active TB case definition

[2] Prior to 2008 in Canada, re-treatment cases were known as relapsed cases.

[3] If less than 6 months have passed since the last day of previous treatment and the case was not previously reported in Canada, report as a re-treatment case. If less than 6 months have passed since the last day of previous treatment and the case was previously reported in Canada, do not report as a re-treatment case. Submit an additional "Treatment Outcome of New Active or Re-treatment Tuberculosis Case" form at the end of treatment.

[4] Inactivity for a respiratory TB case is defined as three negative tuberculosis smears and cultures with three-month duration of stability in serial chest radiographs or a six-month duration of stability in serial chest radiographs. Inactivity for a non-respiratory tuberculosis case is to be documented bacteriologically, radiologically and/or clinically as appropriate to the site of disease.

Case Classification

Confirmed case

A confirmed case can be either of the following:

Laboratory confirmed case

Cases with *Mycobacterium (M.) tuberculosis* complex demonstrated on culture, specifically *M. tuberculosis, M. africanum, M. canetti, M. caprae, M. microti, M. pinnipedii or M. bovis* (excluding M bovis 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 nonrespiratory tuberculosis (meningeal, bone, kidney, peripheral lymph nodes, etc.);
- Pathologic or post-mortem evidence of active tuberculosis;
- Favorable response to therapeutic trial of antituberculosis drugs.

National and Provincial Reporting

Tuberculosis is on the national and provincial Notifiable Disease List and requires immediate (same day) reporting to the province and annual reporting to the Public Health Agency of Canada (PHAC). All confirmed cases of disease must be reported.

For temporary residents (visitors, students and people granted work permits) and foreign nationals who are in Canada illegally, cases are reported if treatment was started in Canada. The province/territory where the client usually resides is responsible for reporting the case.

Reporting of TB cases

Timely and accurate reporting of suspected and confirmed TB cases is essential for public health planning and assessment at all levels.

- Physicians and other health practitioners must notify the RMOH, CDCN or designate, at the time of diagnosis, of any clinical or suspect cases of TB.
- The Public Health Laboratory must immediately notify the attending physician and the RMOH of all positive smear and culture reports for TB.
- The RMOH or designate must notify the CMOH or designate of any suspect or confirmed cases of TB.
- The CDCN must enter the TB case information into the provincial communicable disease surveillance system.
- The CDCN must complete the PHAC reporting form (Appendix 1) and fax to the provincial TB coordinator:
    - Active Tuberculosis Case Report Form–New and Re-treatment Cases; and the

  - Treatment Outcome of a New Active or Re-treatment Tuberculosis Case.

- The provincial TB coordinator must report all case information to PHAC at the time dictated by PHAC.

Analysis

The Provincial Epidemiologist is responsible for the general analysis of the TB data. Reports will be posted on the DHCS website; ad hoc reports can be completed, upon request.

Section 3: Diagnosis and Treatment of Latent Tuberculosis Infection

Diagnosis of Latent Tuberculosis Infection

Latent TB infection (LTBI) occurs when infection with *Mycobacterium tuberculosis* remains dormant; approximately 90% of those infected with TB will never develop active disease. It is estimated that about 10% of persons with LTBI, who do not have other risk factors, will eventually develop active disease. Of the 10%, 5% will develop active disease during the first two years of infection and 5% will develop active disease after five years. There are a large number of conditions that increase the risk of activation from LTBI to active TB; the strongest risk factors are acquired immunodeficiency syndrome (AIDS) and human immunodeficiency virus (HIV) infection. Other risk factors are provided in Appendix 2. People with LTBI are not infectious and do not show signs or symptoms of TB. LTBI can be treated with antibiotics to reduce the risk of progression to active TB disease.

Key Messages

- The goal of testing for LTBI is to identify individuals who are at increased risk for the development of active TB and who would benefit from treatment.
- Only those who would benefit from treatment should be tested, a decision to test presupposes a decision to treat if the test is positive.
- There are two accepted tests for identification of LTBI: the tuberculin skin test (TST) and the interferon gamma release assay (IGRA).
- In general, IGRAs are more specific than the TST in populations vaccinated with Bacillus Calmette–Guérin (BCG), especially if BCG is given after infancy or multiple times.
- Neither the TST nor IGRA can differentiate LTBI from TB disease; these tests have no value in the diagnosis of active TB disease.
- Neither TST nor IGRA have accuracy for the prediction of active TB although use of IGRAs might reduce the number of people considered for preventive treatment. The individual's risk factors for reactivation must be considered.

Identification of LTBI

Target testing is a TB control strategy that is used to identify, evaluate, and treat persons who are at high risk for LTBI or at high risk for developing TB disease once infected with *M. tuberculosis.* The benefit of a screening program for LTBI will be greatest in those with a higher probability of infection, and/or significant risk factors for reactivation, coupled with a low risk of toxicity and a high probability of treatment completion. The groups presently being screened for LTBI in NL are included in table 1.

Table 1: Target groups for LTBI screening in NL

Groups at risk	
• Close contacts of an active case of pulmonary TB	• As soon as possible after diagnosis of the index case (Section 5)
• Immigrants from countries with high TB incidence	• Immigrant referred by Citizenship and Immigration Canada • Refugees (Section 9)
• Medical conditions	• Persons being evaluated for treatment with immunosuppressive drugs* • Patients being evaluated for transplants
• Travelers to countries with high TB incidence	• ≥1 month of travel with very high risk contact
	• ≥3 months of travel to TB incidence country 400/100,000 population
	• ≥6 months of travel to TB incidence country 200-399/100,000
	• ≥12 months of travel to TB incidence country 100-199/100,000
• Healthcare workers	• On hiring and post exposure (Section 7)
• Residents of long-term care facilities	• Symptoms check and chest x-ray on admission
• HIV positive clients/AIDS	• At the time of diagnosis
*For patients being considered for immunosuppressive drugs, it is recommended that a TST and IGRA be done and if either are positive, they should be treated. A chest x ray should be done to rule out active tuberculosis disease.	

LTBI Screening Tests

The screening tests, IGRA and the TST, both evaluate cell mediated immunity. The TST consists of intradermal injection of a small amount of purified protein derivative (PPD) from *M. tuberculosis* bacteria into the inner surface of the arm. IGRA is a blood test that measures cell-mediated immune T cell release of interferon-gamma following stimulation by antigens specific to *M. tuberculosis*.

Tuberculin Skin Testing

The only recommended method for the TST is the Mantoux technique. In persons with a cell-mediated immunity to these tuberculin antigens, a delayed hypersensitivity reaction will occur. The TST should be read 48 to 72 hours after the injection. This reaction will cause localized swelling and will be manifested as induration of the skin at the injection site. In persons who are newly exposed and become infected with TB, this cell-mediated reaction to tuberculin will develop 3-8 weeks later.

TST Procedure

The TST is performed by a health care professional who is qualified, competent, and who has been authorized to perform this procedure. Additional information on the TST process includes:

- Fact sheet on TB and TST (Appendix 3 & 4)
- A TST assessment record (Appendix 5)
- The TST – Mantoux technique (Appendix 6)

- The interpretation of TST results (Appendix 7a & 7b)
- The online TST/IGRA interpreter (Appendix 8)
- BCG request form (Appendix 9)
- BCG world atlas (Appendix 10)

Training is essential for healthcare professionals to gain proficiency in the administration and interpretation of the TST. The technique is explained in the TST training module (RICN, 2009) available in the Regional Health Authorities.

Contraindications for TST

- Previous documented positive TST reaction
- Severe blistering TST reaction in the past
- Extensive burns/eczema over TST testing sites
- Documented active TB or documented history of adequate treatment for TB
- Current major viral infections (e.g., measles, mumps, varicella)
- Measles or other live immunizations within the past four weeks, as this has been shown to increase the likelihood of false-negative reactions

The following are not contraindications to TST

- The common cold
- Pregnancy or breastfeeding
- Those immunized on the same day or within the last 4 weeks with inactivated vaccines
- Those immunized on the same day with a live vaccine
- Those who provide a self-reported history of a positive TST (other than blistering) that is not documented
- Low doses of systemic steroids (≤15 mg Prednisone or equivalent daily)
- BCG vaccination or previously positive Tine or Cuti tests
    - The history of TST in Newfoundland and Labrador provides additional information on the Tine and Cuti (Appendix 11).

Interpretation of TST results

When interpreting a positive TST, it should be considered according to three dimensions:

1. Size of induration
2. Positive predictive value
3. Risk of development of active TB disease

Size of induration

This dimension is the easiest to understand; the guide for the results and the cut-points for various risk groups is provided in Appendix 7a. The online TST/IGRA interpreter can help estimate the risk of active TB for an individual with a TST reaction of ≥ 5 mm based on his/her clinical profile (Appendix 8).

Positive predictive value

The positive predictive value is low and the utility of the TST is limited in populations at low risk of TB infection, those with previous exposure to nontuberculous mycobacteria (NTM) or those with a previous BCG vaccination, each of which can reduce the specificity of the TST:

- NTM can cause reactivity, usually producing small tuberculin reactions;
- BCG vaccination should be considered the likely cause of a positive TST if BCG vaccine was given after 12 months of age and the person is either Canadian-born non-Aboriginal or an immigrant/visitor from a low TB incidence country.
- The BCG World Atlas provides BCG vaccination practices for 180 countries (Appendix 10).

Booster phenomenon and two-step TST

Some people infected with *M. tuberculosis* may have a negative reaction to the TST if years have passed since they became infected. They may have a positive reaction to a subsequent TST because the initial test stimulated their ability to react to the test. This is commonly referred to as the *"booster phenomenon*" and may incorrectly be interpreted as a skin test conversion (going from negative to positive). For this reason a two-step TST is recommended at the time of initial testing for individuals who may be tested periodically (e.g., healthcare workers).

- A two-step protocol needs to be performed only once; any subsequent TST can be one-step, regardless of how long it has been since the last TST.
- The second test should be performed 1-4 weeks later; a documented TST anytime in the previous 12 months can be considered the first step of the two-step TST or a TST performed within a year of the first test can be considered the second step of the two-step TST.
- Both tests should be read and recorded at 48 – 72 hours after injection.
- A two-step TST is not recommended in the setting of a contact investigation

Management of a positive TST result

The individual should be assessed for signs and symptoms suggestive of possible active TB:

- Chronic cough of at least 2-3 weeks duration; and
- Fever and night sweats.
- Hemoptysis, anorexia, weight loss, chest pain and other symptoms are generally manifestations of more advanced disease.

Determine if there are risk factors for development of TB (Appendix 2).

- Arrange chest x-ray.

- Discuss with physician/Medical Officer of Health.

Interferon Gamma Release Assay (IGRA)

A test that measures the cell-mediated reaction to tuberculin antigens, called an IGRA, has been developed for the detection of TB infection over the past decade. Two IGRAs currently registered for use in Canada are the QuantiFERON-TB Gold In-Tube (QFT-GIT) assay and the T-Spot.TB assay. IGRA testing should be done either on the same day as vaccination with live-virus vaccine or 4 weeks after the administration of the live-virus vaccine. Further information on IGRAs is available in Appendices 12 and 13.

Advantages of IGRAs include the following:

- Requires a single patient visit to conduct the test
- Does not cause booster phenomenon
- Laboratory test not affected by HCW perception or bias
- Unaffected by BCG and most environmental mycobacteri**a**

Limitations of IGRAs include the following:

- Special blood collection tubes must be used
- Samples are processed on certain days in the Public Health Laboratory
- Blood sample must be processed within 8-30 hours after collection
- IGRA sensitivity is diminished by HIV infection
- IGRA sensitivity is dimished in the very young especially in children less than 2 years old

Recommendations for LTBI Screening Tests

Available evidence suggests that both the TST and IGRA are acceptable for LTBI diagnosis but both have limitations. In NL, the primary test used is the TST. An IGRA is more specific than the TST in populations vaccinated with BCG and therefore can be useful for evaluating LTBI in BCG vaccinated individuals.

Situations in which neither TST nor IGRAs should be used for testing

- Neither the TST nor the IGRA should be used for testing people who have a low risk of infection and a low risk that there will be progression to active TB disease if they are infected.
- Neither should be used for active TB diagnosis in adults.
- Neither TST nor IGRA should be used for routine or mass screening for LTBI of all immigrants (adults and children).

Situation in which IGRAs are preferred for testing but a TST is acceptable

- People from groups that have poor rates of return for TST reading.

Situations in which TST is recommended for testing but an IGRA is not acceptable

- The TST is recommended whenever it is planned to repeat the test later to assess risk of new infection such as repeat testing in a contact investigation or serial testing of HCWs or other populations with potential for ongoing exposure.

Situations in which both tests can be used (sequentially, in any order) to enhance sensitivity

- When the risk of infection, progression to disease and poor outcome are high such as in those with primary or acquired immunodeficiency including human immunodeficiency (HIV) infection or patients receiving tumour-necrosis factor-alpha antagonists or blockers.

Chest Radiography

- Chest radiographs help differentiate between LTBI and pulmonary TB disease in individuals with positive tests for TB infection. A chest x-ray should be ordered to exclude pulmonary TB disease in any person who has a positive TST reaction or IGRA

Treatment of Latent Tuberculosis Infection

After a person is infected with *Mycobacterium tuberculosis*, the risk of developing active TB disease is influenced by the time since the infection occurred, age and other medical conditions or therapies that affect the immune system of the person infected. Risk is highest in the first 1-2 years after infection and in children < 5 years of age.

For individuals considered to be at high risk for developing active TB disease, treatment for LTBI can provide important individual and public health benefits. Every effort should be made to begin appropriate treatment and to ensure completion of the entire course of treatment.

Key Messages

- Before treatment of LTBI is started, active disease must be excluded carefully by means of history, physical examination and chest x-ray.
- The decision to treat LTBI should be individualized, with consideration of the risks of therapy from adverse events, such as hepatotoxicity, balanced against the risk of development of active disease.
- Because of greater risk of hepatotoxicity in the post-partum period, treatment of LTBI should be deferred in pregnant women until 3 months postpartum unless they are at very high risk of disease (HIV-infected), close contacts of an active TB case, or have a documented TST conversion. Treatment can be safely given to women who are breastfeeding.
- There are a number of medical illnesses and therapies that can increase the risk of reactivation of active TB from LTBI. The strongest risk factor is HIV infection. Other risk factors are listed in Appendix 2.

Recommendations for Treatment

There are two categories of indications for LTBI treatment: recent infection and increased risk of reactivation.

- The RMOH usually provides recommendations for the treatment of LTBI.
- The attending physician or nurse practitioner prescribes the medication and completes ongoing clinical care for those receiving treatment for LTBI.
- The medications are provided free of charge to clients as part of the provincially funded program.
- For clients on self-administered treatment, the prescription for medication should not exceed a 30 day supply.

Treatment regimens

There are several treatment regimens available for the treatment of LTBI. Providers should choose the appropriate regimens based on the following factors:

- Drug susceptibility results of the presumed source case (if known)
- Co-existing medical conditions
- Potential for drug-drug interactions.

Standard regimen: The standard for treatment of LTBI is self-administered isoniazid (INH) taken daily for nine months, as this shows the best evidence of efficacy (Table 2). The doses for these medications are provided in the Canadian Tuberculosis Standards (7th e.d.).

Table 2: Standard regimen for LTBI treatment

Drugs	Duration	Schedule	Mode of Administration
INH	9 months	Daily	SAP
Acceptable alternative regimens are available in the Canadian TB Standards.[5]			

Legend: INH=isoniazid; SAP=self-administered prophylaxis

Follow-up Monitoring for LTBI

Treatment with INH is associated with two problems: liver toxicity and long duration. These issues can result in poor acceptance of the therapy by patients and providers and poor completion rates by patients. Poor completion rates can be enhanced by the use of directly observed preventive therapy (DOPT). This is the process whereby a healthcare worker or pill dispenser watches the patient swallow each dose of medication. There are two main objectives of follow-up during LTBI therapy:

1. Monitoring and enhancing compliance;
2. Early detection and management of adverse events.

A recommended schedule for the follow-up of patients receiveing the standard treatment for LTBI is provided in Table 3a and 3b.

Table 3a: Follow-up monitoring schedule for patients receiving INH for LTBI treatment

Actions	Start[1]	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m
Physician medical evaluation	y	y	y	If needed	Y	If needed	y	If needed	y	If needed
CHN visit/call to patient	y	y	y	y	y	y	y	y	y	y
CHN compliance assessment	y	y	y	y	y	y	y	y	y	y
Chest x-ray	y									
Legend: 1=at the start of treatment; m=month; y=yes										

Recommendations for the monitoring of liver function during LTBI treatment is based on age and risk factors (Table 3b). The risk factors include pregnancy or first three months postpartum, history of previous drug-induced hepatitis, current cirrhosis or chronic active hepatitis of any cause, hepatitis C, hepatitis B with abnormal transaminases, daily alcohol consumption or concomitant treatment with other hepatotoxic drugs (e.g., methotrexate).

[5] Menzies D, Alvarez G, & Khan K. (2013). Treatment of Latent Tuberculosis Infection. Chapter 6.

Table 3b: Recommendations for monitoring liver function (bilirubin and transaminases)

Age < 35 years	Age 35-50 years	Age > 50 or with risk factors[6]
If clinical suspicion of liver disease; monitor monthly if needed.	At the initiation of treatment, at one month and at the end of treatment; monitor monthly if indicated.	Monitor monthly.
Note: If serum transaminases levels increase beyond five times the upper limit of normal or three times in the presence of symptoms the LTBI regimen should be stopped.		

The follow-up during LTBI therapy include: clinical monitoring, early detection of adverse events, and public health management. Practice varies but contact with the client is recommended **every 30 days**, at least by telephone, if not in person.

Clinical Monitoring

Clients on LTBI treatment should visit their physician/nurse practitioner who is managing their treatment as per the recommended protocol in Table 3a and 3b.

- The visit should include an assessment for signs of hepatitis, adherence to the medication regimen and symptoms of possible adverse drug reactions.
- The physician/nurse practitioner will order and monitor the bloodwork (e.g., bilirubin and transaminases)for the patient throughout the duration of the treatment.
- Clients receiving INH therapy should be provided with a clear written plan of action (Appendix 14) by the prescribing healthcare provider to include:
    - Recommendations to contact a healthcare provider **immediately** if they have anorexia, nausea, vomiting, abdominal discomfort, unexplained fatigure, dark-colored urine, yellowing of the skin or jaundice;
    - Contact telephone numbers for the healthcare provider; and
    - Advice to stop taking the medication if symptoms occur until the healthcare provider can assess and evaluate the symptoms.

Early Detection of Adverse Events

Recognition and management of adverse drug reactions is essential when placing clients on LTBI. Severe and sometimes fatal hepatitis associated with INH therapy may occur and may develop even after months of therapy. An overview of the adverse events is included in Table 4.

[6] Canadian Tuberculosis Standard. page 143.

Table 4: Adverse Events for LTBI Treatment

Drug	Adverse Effects	Comments
Isoniazid (INH)	Clients must be told to report immediately any signs of hepatitis, such as persistent fatigue or weakness lasting 3 or more days, malaise, unexplained anorexia, nausea or vomiting, dark urine or yellowing of the skin. Other symptoms which can occur are: • Fever • Rash • Abdominal tenderness • Easy bruising or bleeding • Arthralgia (joint pain) • Persistent paresthesia of hands and feet	Routine monitoring of serum liver enzymes is not recommended for all clients on INH. It is recommended for clients with the following preexisting conditions: • Liver disease • Concomitant hepatoxic drugs • History of alcohol abuse • 35 years or older • Pregnant or within 3 months postpartum
Pyridoxine (Vitamin B 6)	Vitamin B 6 is relatively nontoxic in usual doses.	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.

Public Health Management

The physician will refer the patient to the Communicable Disease Control Program for follow-up. The CDCN in collaboration with the RMOH and the CHN will initiate the following services:

- Provide patient education:
  - Explain the disease process and rationale for medication in the absence of symptoms or radiographic abnormalities (Appendix 3);
  - Review the importance of completing treatment for LTBI;
  - Discuss possible side effects of LTBI medications (Table 4);
  - Provide the fact sheet on INH (Appendix 14);

  - Discuss follow-up and management of common side effects and the need to report to healthcare provider .
- Ensure that the LTBI medication is provided to clients free of charge.
- Assess the need for DOPT.
  - If required, establish a schedule for DOPT based on a client assessment.
- Enhance compliance by contacting the client every 30 days (by telephone or in person)and completing the LTBI treatment monitoring record (Appendix 15).
- Consult with client's physician/nurse practitioner if concerns are noted and notify the RMOH/designate .
- Document the completion of treatment.

Note: Medications for treatment and prophylaxis are publicly-funded. The province, through Eastern Health Pharmacy (EHP), orders medications as required. Regional pharmacies then order their requirements through EHP. EH distributes through the regional health care centers.

Section 4: Diagnosis and Treatment of Tuberculosis Disease

Diagnosis of Active Tuberculosis

Tuberculosis is a disease caused by the bacteria *Mycobacterium (M) tuberculosis. M. tuberculosis* is carried in airborne particles, called droplet nuclei, of 1– 5 microns in diameter. Infectious droplet nuclei are generated when persons who have pulmonary or laryngeal TB disease cough, sneeze, shout, or sing. Depending on the environment, these tiny particles can remain suspended in the air for several hours. Infection occurs when a person inhales the tubercle bacilli. Usually special immune cells called macrophages ingest and surround the tubercle bacilli keeping the bacilli contained and under control. This is called latent tuberculosis infection (LTBI), previously discussed in section 3. In some people, the tubercle bacilli overcome the immune system and multiply resulting in progression from LTBI to TB disease.[7] The first priority of a TB program is the identification and successful treatment of persons with TB disease.

Key Messages

- The use of TST or IGRA for the diagnosis of active TB in adults is not recommended.
- Testing for active TB is indicated in persons with signs and symptoms of TB or those considered to be at high risk of TB disease.
- Chest x-ray, although not specific for the diagnosis of pulmonary TB, is an integral part of the TB diagnosis algorithm.
- Every effort should be made to obtain a microbiological diagnosis.
    - At least three sputum specimens should be collected and tested with microscopy as well as culture.
    - The three sputa can be collected on the same day, a minimum of one hour apart with at least one specimen obtained in the early morning.
    - At least one respiratory sample should be tested with a Health Canada approved or validated in-house nucleic acid amplification test (NAAT).
    - Phenotypic drug susceptibility testing (DST) should be routinely performed for all first positive culture isolates obtained from each new TB case.

Identification of TB Disease

TB disease can occur in respiratory and non-respiratory sites. Although the majority of cases of TB are respiratory; TB can occur in almost any anatomical site or as a disseminated disease referred to as non-respiratory TB. Non-respiratory TB is discussed in detail in Chapter 7 of the Canadian TB Standards (7th Ed).[8] In Canada, respiratory TB includes pulmonary TB (the lungs and conducting airways), primary TB, tuberculosis pleurisy (non primary) and TB of the intrathoracic lymph nodes, mediastinum, nasopharynx, nose (septum) and sinus (any nasal).

[7] CDC. Transmission and pathogenesis of tuberculosis.
[8] Fisher D, & Elwood K. Nonrespiratory tuberculosis.

Not all persons with TB disease have symptoms. However, most persons with TB disease have one or more symptoms that lead them to seek medical care. All persons with symptoms of TB disease, or either a positive tuberculin skin test (TST) or an interferon-gamma release assay (IGRA) indicative of *M. tuberculosis* infection should be evaluated to exclude TB disease.

Medical Evaluation

A complete medical evaluation for TB disease includes the following components:

- Medical history
- Physical examination
- Chest x-ray
- Microbiologic examination of clinical specimens

Medical History

The medical history includes the following:

- History of present illness;
- TB history: record of TB exposure, prior LTBI, BCG, TST and chest x-rays results;
- Demographics including country of origin, ethnicity, occupation, incarceration history;
- Underlying medical conditions, especially HIV infection and diabetes, that increase the risk for progression to TB disease in those LTBI;
- TB symptoms inquiry (Table 5).

Table 5: Symptoms of TB disease

Symptoms of TB Disease

• Chronic cough –the classical symptom of pulmonary TB is a chronic cough of a least 2-3 weeks duration
• Fever
• Night sweats
• Manifestation of more advanced disease
  ○ Coughing up blood (hemoptysis)
  ○ Loss of appetite (anorexia)
  ○ Weight loss
  ○ Chest pain

Physical Exam

A physical examination is an essential part of the evaluation of any patient. It cannot be used to confirm or rule out TB disease, but it can provide valuable information about the patient's overall condition, inform the method of diagnosis, and reveal other factors that may affect TB disease treatment, if diagnosed.[9] The most common physical finding in pulmonary TB is a totally normal examination.

Chest X-ray

Chest x-ray (posterior and anterior views) is the usual first step in evaluation on an individual with pulmonary symptoms.

HIV Testing

- All patients with newly diagnosed TB should undergo HIV serologic testing.
- TB programs should take advantage of contact tracing activities to offer provider-initiated HIV testing to at-risk individuals.

Microbiologic Examination of Clinical Specimens

Examinations of clinical specimens (e.g., sputum, urine, or cerebrospinal fluid) are of critical diagnostic importance. Culture for *M. tuberculosis* is considered the gold standard in diagnosis and growing bacteria are required to perform drug-susceptibility testing and genotyping. The microbiological examination includes the following:

- Specimen collection
- Categories of specimens
- TB laboratory tests

Specimen collection

- All specimens should be collected in sterile, leak-proof, laboratory approved containers.
- A detailed requisition form should accompany the specimen and include:
    - the patient's demographic data;
    - the physician's name;
    - the date and time of collection;
    - specimen type and site;
    - reason why specimen is sent.
- The specimen should be sent to the laboratory promptly.
    - If samples cannot be processed within **one** hour; samples (except blood culture and cerebrospinal fluid specimens) should be refrigerated at 4°C (not frozen) and protected from light.

[9] CDC. Diagnosis of tuberculosis infection.

- Clinical samples should be handled, processed and transported according to the Transportation of Dangerous Goods Act Canada and the International Air Transport Associations' Dangerous Goods Regulations (for transport by air).
- Specimens should be examined and cultured in a laboratory that has expertise in testing for *M. tuberculosis.*
    - Laboratory technologists should read a minimum of 15 smears/week for proficiency.

Categories of Specimens

Sputum

For diagnostic purposes, all persons suspected of having TB diseases at any site should have sputum specimens collected for an AFB smear and culture, even those without respiratory symptoms. There are four specimen collection methods for sputum collection:

- Coughing
- Induced sputum
- Bronchoscopy
- Gastric aspiration

Coughing is the most commonly used method of sputum collection. Patients should be instructed regarding the importance of the sputum and the appropriate technique of producing a good sputum sample (Appendix 16).

- Sputum is the material brought up from the lungs; mucus from the nose or throat and saliva are not good specimens.

Induced sputum is useful for patients unable to cough up sputum and has been performed successfully even in very young children. Because induced sputum is very watery and resembles saliva, it should be labeled "induced" (Appendix 17).

Bronchoscopy may be needed for specimen collection if previous results have been non diagnostic and doubt exists as to the diagnosis. The test entails risk and discomfort for the patient, is expensive and can contribute to nosocomial spread of TB if not performed in an appropriate environment. If done, a post-bronchoscopy sputum should be sent for AFB testing.

Gastric aspiration is sometimes used to obtain a specimen from patients (usually children) who cannot cough up adequate sputum. Specimens obtained by gastric aspiration must be neutralized at the site of collection or transported to the lab immediately for neutralization (Appendix 18).

Other Specimens

TB can occur in almost any anatomical site; thus a variety of clinical specimens other than sputum maybe submitted for examination when extrapulmonary TB is suspected.

- Contact the laboratory prior to specimen collection to determine if any special directions are required.
- Rapid transportation to the laboratory according to the laboratory's instructions is critical.
- Table 6 gives an overview of the ideal specimens submissions.
- The tests available at the NL Public Health Laboratory are provided in Table 7.
- Standard turnaround times for laboratory specimens are provided in Table 8.

Table 6: Ideal TB specimens for submission to the NL Public Health Laboratory

Specimen type	Ideal Specimen submissions	Unacceptable specimens
Sputum (spontaneous or induced)	• 5-10 mL in sterile, wax-free, disposable container • Do not pool specimens • Where feasible, three sputum specimens (either spontaneous or induced) can be collected on the same day, a minimum of one hour apart (one early morning)	• Saliva • 24 hour pooled specimens A minimum of 3 mLs of sputum required. Specimens with <3 mLs are rejected.
Abscess contents, other aspirated fluid	• As much as possible in a sterile plastic container	• Dry swab • Swabs in an anerobic transport medium
Blood (for culture)	• 7 mL heparin (green top) blood collection tube	• Blood collected in EDTA, which greatly inhibits mycobacterial growth even in trace amounts • Coagulated blood • Serum or plasma
Body fluids (pleural, pericardial, peritoneal, etc.)	• As much as possible (10-15 mL) minimum in sterile container	
Bronchoalveolar lavage or bronchial washing	• ≥ 5 mL in sterile container	
CSF	• ≥ 2 mL in sterile container	< 0.5 mL
Gastric lavage fluid	• 5-10 mL in gastric lavage container • Collect early in the morning after the patient awakens in order to obtain sputum swallowed during sleep • 100 mL sodium bicarbonate **must** be added to tubes within four hours	• Specimens in which the acidity has not been neutralized with the sodium bicarbonate
Tissue biopsy sample	• 1 g of tissue, if possible, in sterile container without fixative or preservative • Sterile normal saline (2-3 mL) should be added to container to prevent the sample from drying out	• Specimen submitted in formalin • Inappropriate because of inability to culture and degradation of DNA for molecular tests
Urine	• Catheter or midstream urine as much as possible (minimum 40 mL) of first morning specimen • For suprapubic tap, as much specimen as possible with needle removed and Leur Lock cap in place • Aspirate can be sent in sterile container	• 24-hor pooled specimens • Urine from catheter bag • Specimens of < 40 mL unless larger volume is not obtainable • Urine specimens should only be tested if renal or urinary tract TB is suspected and should not be used a routine screen

Table 7: Overview of laboratory TB tests available at the NL Public Health Laboratory.

Test	Comments
Smear microscopy AFB smear classification and results	• The quickest and easiest procedure • Results should be available in 24 hours • Smear exam permits only the presumptive diagnosis of TB disease because AFB in a smear may be acid-fast organisms other than TB • Negative smears do not exclude TB disease as patients may have a negative AFB smear and a subsequent positive culture • Smear results reported as negative to 4+ ○ 4 + is strongly positive and the patient is probably very infectious
Mycobacterial culture	• Culture remains the gold standard for laboratory confirmation of TB disease • A single positive culture is considered definitive for active disease • A single positive culture with a long detection time and/or few colonies when clinical suspicion is low should raise the possibility of a false-positive results
Nucleic Acid Amplification Tests (NAAT) *only performed on smear positive cases	• Used to amplify DNA and RNA segments to rapidly identify organisms • At least one respiratory sample should be tested with a Health Canada approved or validated in-house NAAT in all new, smear positive cases • PCR is the most commonly used method • Sensitivity is high in AFB smear positive samples • Sensitivity is lower in AFB smear negative and extrapulmonary specimens
Drug Sensitivity Testing *Coordinated by the PHL All specimens sent to National Microbiology Lab for testing	• Drug sensitivity should be routinely performed for all first positive culture isolated obtained from each new TB case • Test for resistance to the first-line anti-TB drugs: isoniazid, rifampin, ethambutol and pyrazinamide • Multidrug-resistant TB (MDR TB) is indicated if the organisms are resistant to at least isoniazid and rifampin, the two most potent first-line anti-TB drugs
Genotyping *Coordinated by the PHL All specimens sent to National Microbiology Lab for testing	• Used to analyze the genetic material of M. tuberculosis • Help distinguish different strains of M. tuberculosis • Identical genotypes often link suspected transmission between cases

Table 8: Summary of standard turnaround times for TB tests once received at the NL Public Health Laboratory.

Procedure	Turnaround time to completion/report
Specimen collection and arrival at the laboratory	• 24 hours
Acid-fast bacteria (AFB) smear microscopy	• 24 hours from specimen receipt
Nucleic acid amplification testing (NAAT) for MTBC detection	• 24 hours from smear result or 24 hours from receipt of specimen
Bacteriological diagnosis - culture	• Up to 6 weeks for broth cultures and 8 weeks for solid media cultures from specimen receipt
Identification of mycobacterial species	• Usually 21 days from specimen receipt but can take longer
Primary phenotypic susceptibility testing	• 7-15 days from a positive culture in NML
Reporting of all test results (electronically)	• 24 hours from test completion within meditec
Reporting of all test results (mailed hard copy)	• 48 hours from test completion

Treatment of TB Disease

The main objectives of treatment of active TB are:

- Rapid killing of TB bacilli to produce rapid improvement in the clinical condition of the patient and thereby prevent complications (reduce morbidity), prevent death (reduce mortality) and prevent transmission (reduce contagiousness);
- Prevent the emergence or worsening of drug resistance;
- Prevent the relapse of disease after completion of therapy and achieve long-lasting cure.

Key Messages

- In Canada, all patients with active TB should be treated with a regimen of isoniazid (INH), rifampin (RMP), pyrazinamide (PZA), and ethambutol (EMB) initially.
    - If the isolate causing disease is fully susceptible to all first-line drugs, the EMB can be stopped, and PZA should be given for the first two months.
    - After that it is recommended that only INH and RMP be given for the remainder of therapy – usually another 4 months.
- Providers who are initiating TB therapy should provide comprehensive, patient-centered care and be able to monitor that 100% of prescribed doses are taken.

Recommendations for Treatment

The treatment of TB requires collaboration between the patient's physician and the Communicable Disease Control Program in the Regional Health Authority. The primary care physician has responsibility for clinical care and ensuring the patient has been prescribed an effective treatment regimen, evaluating adverse effects and referring patients with complications to the appropriate specialist. The Communicable Disease Control Program is responsible for monitoring each TB case to ensure that each patient is tolerating the treatment regimens.

Treatment Regimens

This guideline will give an overview of the standard regimen prescribed for TB disease. Other regimens are available in the TB Standards.[10] The primary care physician, in collaboration with a TB expert if required, prescribes the medication for each patient with TB disease. The treatment is usually divided into two phases, the initial and the continuation phase (Table 9).

Table 9: TB treatment phases

Phase	Purpose	Treatment
Initial phase	• Kills most of the tubercle bacilli during the first 8 weeks of treatment, but	• Should last 2 months • Drugs should be given daily • Includes four drugs; INH, RIF,

[10] PHAC. (2013). Canadian Tuberculosis Standards (7th ed.).

Phase	Purpose	Treatment
	some bacilli can survive longer • Prevent the emergence of drug resistance • Determines the ultimate outcome of the regimen	PZA, and EMB • If the isolate is fully susceptible to all first-line drugs, the EMB can be stopped and PZA should be given for 2 months
Continuation phase	• Kills remaining tubercle bacilli • If treatment is not continued long enough the surviving bacilli may cause TB disease in the patient at a later time	• Usually two drugs are given • The length of this phase is variable, depending on indications of risk of relapse, on the drugs given in the initial phase and on the pre-treatment drug susceptibility testing
Prolonging the Continuation Phase		
	• Duration depends on risk factors for relapse including: • More extensive disease and/or cavities on chest x-ray in the first 2 months of therapy • Culture positive after 2 months of therapy • Cavity on chest x-ray at the end of treatment	• In patients with any of the risk factors for relapse, the continuation phase should be prolonged from 4 to 7 months

TB Drugs

Based on strong evidence, the standard drug therapy for adults with drug-sensitive TB or expected drug-sensitive TB is INH, RMP, PZA and EMB for the first two months followed by INH and RMP for 4 more months. These are known as first-line drugs. First-line drugs are the most effective, can be taken orally and are better tolerated than second-line drugs. Second-line drugs, all injectables, had been used to treat TB in the past but were abandoned due to the availability of better treatments.

Pyridoxine (vitamin B6) supplementation during INH therapy is necessary in some patients to prevent the development of peripheral neuropathy. Those at risk of symptoms related to pyridoxine deficiency include: patients with diabetes, renal failure, malnutrition, substance abuse or seizure disorders or for women who are pregnant or breastfeeding.

The treatment regimens for adults for fully susceptible TB are provided in Table 10. The recommended drug doses for TB drugs are available in the TB Standards.[11]

[11] PHAC. Canadian Tuberculosis Standards, p. 101.

Table 10: Treatment regimens recommended by the Canadian Thoracic Society for adults with fully susceptible TB disease

	Initial phase (first 2 months)	Continuation phase
Standard		
Regimen 1	INH RMP PZA EMB* daily (or 5 days/week)	INH RMP for 4 months daily (or 3 times/week)†
Regimen 2	INH RMP EMB* daily (or 5 days/week)	INH RMP for 7 months daily (or 3 times/weekly)
Elderly (>65) or other risk factor for hepatotoxicity		
	INH RMP EMB* daily (or 5 days/week)	INH RMP for 7 months daily (or thrice weekly)
Pregnant		
	INH RMP PZA EMB* or INH RMP EMB* daily (or 5 days/week),	INH RMP for 7 months *if PZA not used and for 4 months if PZA used in first 2 months* daily (or thrice weekly)

*EMB can be stopped as soon as the drug sensitive test (DST) results are available, if sensitive. PZA is continued for the two months.

†Three times weekly preferred over twice weekly for programmatic reasons. If patients miss a single dose while receiving thrice weekly therapy, they effectively receive twice weekly therapy, which is still adequate. If they miss a dose of twice weekly therapy,they effectively receive once weekly therapy, which is inadequate.

Intermittent Therapy

In the initial intensive phase, daily therapy is recommended. This can be given five days per week, if therapy is given by DOT. In the continuation phase, if DOT is used, the thrice weekly therapy is preferred; once weekly regimens are inadequate and should not be used.

Directly Observed Therapy (DOT)

DOT is the method by which a trained healthcare worker or another trained designated person watches a patient swallow each dose of medication and documents it. It is one component of a comprehensive, patient-centered treatment plan. It is recommended that all jurisdictions across Canada have the capacity to provide DOT. The need for DOT should be considered for each patient. It provides the additional opportunity to closely monitor for side-effects of the medications.

TB Disease Treatment Regimens for Specific Situations

TB disease treatment regimens for specific situations (Table 11) require special management and should be administered in consultation with a TB and other experts (e.g., hepatologist, nephrologist, or obstetrician).

Table 11: TB treatment considerations in specific situations

Situation	Consideration
Hepatitic disease	• RMP, INH or PZA can cause drug-induced hepatotoxicity and dramatically worsen the patient's condition
Renal insufficiency and dialysis	• Complicates the management of TB disease because some anti-TB drugs are cleared by the kidneys
Pregnancy	• Untreated TB represents a greater risk to the pregnant woman and the fetus than the toxic effects of the drugs • INH, RMP and EMB are considered safe in pregnancy, so all three should be used as initial treatment
Breastfeeding	• Breastfeeding should not be discouraged for women being treated with TB drugs • The small concentrations of these drugs in breast milk do not produce toxicity in the nursing newborn. However, pyridozine supplementation is recommended for mother and infant.
Drug-resistant TB[12]	• Drug resistance in a patient with newly diagnosed TB disease may be suspected on the basis of previous treatment, contact with a known drug-resistant case or time spent in a region in which drug resistance is common • These patients must be referred to an expert in the management of drug-resistant TB disease
HIV-infected persons[13]	• Management of HIV and TB is complex • It is strongly recommended that experts in the treatment of HIV-related TB be consulted

[12] PHAC. Canadian Tuberculosis Standards, Chapter 8
[13] PHAC. Canadian Tuberculosis Standards, Chapter 10

Follow-up Monitoring for TB Disease

Follow-up during active TB treatment should be at least monthly (every 30 days), to assess adherence and response to therapy and to detect adverse events. Response to treatment should be gauged clinically, radiographically and microbiologically. A comprehensive, patient-centered treatment plan should be developed by the attending physician in collaboration with the TB Control Program within the Regional Health Authority for each patient diagnosed with TB disease.

Clinical Care

The physician will oversee the clinical care of the patient and will ensure the following components are in place:

- TB drug treatment regimen;
- Evaluation of treatment response (microbiologic and radiographic monitoring);
- Evaluation and management of adverse drug reactions (including the ordering and monitoring of the bloodwork); and
- Close supervision and monitoring to ensure adherence to the TB treatment regimen.

Early Detection of Adverse Events

All healthcare professionals responsible for the treatment of TB should be familiar with possible adverse events related to the drugs (Table 12). Any possible adverse event should be carefully evaluated in order to identify other potential causes or to identify the responsible drug.

Table 12: Common adverse events of first line drugs

Caused by	Common Adverse Events	Signs and Symptoms
Any drug	Allergic	• Skin rash
INH PZA RMP	Hepatic toxicity (can range from asymptomatic, mild elevation of serum transaminases to liver failure)	• Abdominal pain • Dark urine • Fatigue • Fever for 3 or more days • Flu-like illness • Lack of appetite • Nausea/Vomitiing • Yellowish skin or eyes • Abnormal liver function test results
INH	Nervous system damage	• Dizziness; tingling or numbness around the mouth
	Peripheral neuropathy	• Tingling sensation in hands and feet
PZA	Stomach upset	• Stomach upset • Vomiting • Lack of appetite
	Gout	• Joint aches • Abnormal uric acid level

Caused by	Common Adverse Events	Signs and Symptoms
RMP	Bleeding problems	• Easy bruising • Slow blood clotting
	Discoloration of body fluids	• Orange urine, sweat or tears • Permanently stained soft contact lenses
	Drug interactions	• Interferes with certain medications such as birth control pills, birth control implants, and methadone treatment
	Sensitivity to the sun	• Frequent sunburn
EMB	Eye damage	• Blurred or impaired vision • Change in color vision

Public Health TB Disease Follow-up

The attending physician must refer all TB cases to the RMOH for the initiation of the required public health action and follow-up. The CDCN, in collaboration with the RMOH, physician and CHNs, will develop a follow-up plan for each patient (Table 13). The follow-up plan should include:

- Case interview and identification of contacts (Section 5);
- Patient Education;
    - Information to the case/family regarding TB, infection prevention and control (Appendix 3)
    - Medication information to include:
        - The medications, dosage, frequency and timing of administration
        - Possible adverse reactions to the medications
        - Potential interactions of TB medications with other drugs and food (consult a pharmacist/dietician if required)
        - Advice on when to seek necessary medical attention
            - Provide contact information for physician/PHN
            - Review consequences of not taking the medication correctly
        - How the drugs are dispensed (the physician writes the prescription and the drugs are provided free of charge from the DHCS)
            - A 30 day supply is provided at a time
        - Monitor weight monthly as drug doses may need to be adjusted if the weight changes
- Ensuring that the culture and sensitivity report are available for review by the attending physician and the RMOH.
- Providing DOT, as this provides a time to provide support for the patient and to monitor for side effects of the medications.
    - DOT should be considered for each patient since poor adherence to prescribed therapy is the most common cause of treatment failure.

- Monitoring for medication adverse reactions (Table 12) and monitoring of the overall health status of the patient.
- Documenting clinical findings (Appendix 19a, 19b & 20 for sample records).

Note: Medications for treatment and prophylaxis are publicly-funded. The province, through Eastern Health Pharmacy (EHP), orders medications as required. Regional pharmacies then order their requirements through EHP. EH distributes through the regional health care centers.

Table 13: Summary of care for patients receiving TB treatment

Required Assessment	Base-line	Ongoing	Rationale
Symptom inquiry	✓	As per DOT regimen. Monthly by family doctor/nurse practitioner	To assess adherence and response to therapy and to detect adverse events.
Social monitoring	✓	At each visit	Concerns with compliance, alcohol consumption, housing, nutrition etc., may be identified.
Weight	✓	Monthly	Weight loss may indicate worsening of TB disease or weight gain may indicate a need to increase the dose of drugs.
Physical exam	✓	PRN	As indicated by symptom inquiry.
Sputum for AFB	✓	If AFB positive; weekly smear until smear negative	To assess response to therapy and contagiousness.
		If AFB smear negative: one culture should be done at the end of the second month of therapy and repeated at the end of therapy.	To assess risk of relapse.
Chest x-ray	✓	After 2nd and 6th month of therapy	To assess response, potential complications and risk of relapse.
Bilirubin, transaminases(ALT, AST)	✓	If < 35 years – monthly if clinical suspicion of liver disease Age > 50 years or other risk factors* -monthly	Risk of liver toxicity increases after age 35. Children rarely experience liver toxicity. Affected by INH, RMP, PZA.
Creatinine/ Uric Acid	✓	Monthly while on PZA	PZA can cause nephrotoxicity
Bilirubin	✓	Every 3 months (month 1, 4 & 7)	Rifampin can cause blood dyscrasias.
CBC/ Platelets	✓		
Color Vision/ Visual Acuity	EMB Only	Monthly nursing assessment of visual acuity and red-green color discrimination is recorded. Referral to an ophthalmologist for periodic assessment	Ethambutol can cause visual disturbances.
Hearing Test	Strepto-mycin only	Monthly- May need referral to audiologist.	Streptomycin can cause ototoxicity and mild nephrotoxicity.
BUN/Creatinine			
*Risk factors include: pregnancy or first 3 months postpartum, history of previous drug-induced hepatitis, current cirrhosis or chronic active hepatitis of any cause, hepatitis C, hepatitis B with abnormal transaminases, daily alcohol consumption or concomitant treatment with other hepatotoxic drugs (e.g., methotrexate). HIV infection is not an independent risk for drug-induced hepatitis.			

Section 5: Contact Follow-up

The identification and follow-up of close contacts of active TB cases is the second priority of a TB program. Contact investigation is the responsibility of the RMOH who works in collaboration with the Communicable Disease Control Division in the relevant RHA to ensure the contacts are identified and followed appropriately. The objectives[14] of contact investigation are as follows:

- Identification and treatment of secondary cases of TB disease;
- Detection of LTBI in contacts in order to offer preventative treatment; and
- Source case identification and treatment if the index case is under five years old.

Key Messages

- Contact tracing should be carried out for both sputum smear-negative and smear-positive respiratory TB cases.
- Interviews with the case to identify contacts should include questions about locations/activities of potential exposure as well as specific names of contacts.
- The follow-up of the contacts should be prioritized according to the infectiousness of the source case, the extent of exposure and the immunologic vulnerability of those exposed.
- The initial follow-up for smear-positive/cavitary/laryngeal TB cases include both high and medium priority contacts; for smear negative, non-cavitary pulmonary TB, the initial follow-up would focus on high priority contacts.
- For high-priority contacts, the initial investigation should include a symptoms assessment and TST; this should be repeated at eight weeks following date of last exposure to the case.
- A single evaluation, at least eight weeks following the date of last exposure (symptoms assessment with TST), is recommended in most non-household contact settings.
- Contact tracing recommendations for children are available in Section 6: Pediatrics.
- TST is no longer recommended as a primary assessment tool in the contact follow-up of elderly residents in long term care.

Initiating a Contact Investigation

It is important to prioritize the work of contact investigation. Precedence should be placed on contacts that are most at risk of being infected and/or most at risk of developing active TB disease if infected . They include children under five years of age, HIV positive and immunocompromised persons. (Appendix 2). The extent and order of contact investigation is based on a risk assessment on the infectiousness of the index case, the likely period of infectiousness and the degree of exposure to the index case.

[14] Public Health Agency of Canada. (2013). Chapter 12: Rea, E., & Rivest P. Contact Follow-up and Outbreak Management in Tuberculosis Control. P. 293.

Infectiousness of index case

This is the single greatest factor determining the extent of contact investigation.

- Laryngeal TB, smear-positive pulmonary cases and cases with cavitary disease on chest x-ray are considered most infectious. Sputum status is the most reliable indicator of infectiousness.

Likely period of infectiousness

Determining the infectious period focuses the investigation on those contacts most likely to be at risk for infection and sets the timeframe for testing contacts. Based on expert opinion, the following criteria are provided to help determine the infectious period:

- Patients 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 and
- Asymptomatic cases with a negative smear and no cavities seen on chest x-ray should be considered infectious four weeks before the date that TB was suspected.
- The infeciousness ends when the case is on Airborne Precautions or is no longer infectious.

Degree of exposure to the source case

- The likelihood of infection depends on the intensity, frequency and duration of exposure to the infectious case.

Definitions for Contact Follow-up

Index case is 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 in some situations can be the index case.

Contact

- A person identified as having been exposed to an active case of TB disease.
- The closeness and duration of exposure usually corresponds with the risk of becoming infected.

Category of Contacts

Category	*Definition*
Household contacts	• Those who regularly sleep in the same household as the infectious case on an ongoing basis (e.g., three or more times per week) • May include members of an extended family, room-mates, boarders, cell mates, or couch surfers
Close non-household contacts	• 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 • May include caregivers, regular sexual partners, close friends,

Category	Definition
	extended family, elementary or primary classmates, choir members ○ Regular contacts in specialized health care settings such as dialysis units or rehabilitation programs • The critical issue is the amount of time spent in a shared airspace
Casual contacts	• Those who spend time regularly but less frequently with the infectious case • May include high school classmates who share fewer classes with the case, less exposed colleagues at work, extended family members who are seen occasionally
Community contacts	• Those living in the same community or attending the same school or workplace but in a different classroom or area of the workplace

Priority of Contact Screening

Contacts should be prioritized for screening based on their risk of TB infection. The contacts can be classified as high, medium or low priority to facilitate contact tracing. High priority contacts should be assessed for both smear-negative and smear-positive cases. The initial assessment of high priority contacts should begin within **seven** working days of their being identified as contacts and be completed within one month.

Priority	Definition
High priority contacts	• Those with the most exposure and those with the highest risk of progression to active TB if infected ○ Household contacts ○ Contacts who are close non-household or casual contacts AND are at high risk of progression of LTBI to TB disease (Appendix 2) notably: ▪ Children under 5 years of age ▪ HIV positive ▪ Immunocompromised ○ Contacts exposed (i.e., without a respirator) during bronchoscopy, sputum induction, autopsy or other aerosolizing medical procedure
Medium-priority contacts	• Close non-household contacts who are not at high risk of rapid progression from LTBI to active TB • Most non-household contacts fall into the medium-priority group
Low priority contacts	• Casual contacts are low priority • This group would only be investigated if there was evidence of transmission

Interviewing the Index Case

Comprehensive information regarding an index patient is the foundation of a contact investigation. The first public health communication with a new infectious patient should ideally begin within one calendar day of the case being notified. Interviewing to determine the contacts should be initiated within **three** working days of the case being notified. Prior to the interview, information should be collected on the

medical history of the case. Information to be collected in the pre-interview phase is outlined in Appendix 21.

General principles for interviewing

In addition to setting the direction for the contact investigation, the first interview provides opportunities for the patient to acquire additional information regarding TB and for the public health worker to learn how to provide treatment and specific care for the patient. Interviewing skills are crucial and require training. General rules for the interview are:

- Establish rapport - the interviewer should discuss confidentiality and privacy issues
- Confirm information - substantiate facts from the pre-interview phase and obtain missing information
- Identify transmission setting - determine where the patient spent nights, met with friends, worked, ate, visited, where heath care was sought and any travel history
- Obtain a list of contacts - for each transmission setting the interviewer should ask the names of the contacts and the approximate type, frequency and duration of each exposure (Appendix 22)
- Provide closure - express appreciation and provide an overview of the process in contact investigation
    - An appointment for the next interview should be set; ideally the next interview should be in the patient's residence.

Investigation and Management of Contacts

All close contacts should be interviewed systematically regarding the circumstance and TB exposure and duration of exposure, presence of symptoms, previous history of TB, and TST history.

- All contacts should receive information about TB (Appendix 3)
- Public health authorities and the treating physician should collaborate to ensure that contacts with no previous history of TB or documented positive TST receive a symptoms assessment and TST.
    - High-priority contacts should ideally have both an initial and a second TST (at least 8 weeks from the last day of exposure) to identify conversion (Appendix 24).
    - Low-priority contact - In most non household settings it is most practical to aim for a single round of screening after 8 weeks from the break in contact (Appendix 24).
    - A two-step TST is not recommended in the setting of a contact investigation.
- In the context of contact investigation, TST results should be interpreted as described in Appendix 23.
- A medical evaluation to rule out active TB should be performed for all contacts who have symptoms compatible with TB.
- Regardless of the initial TST results, contacts who are HIV seropositive and those who are severely immunocompromised should have the following:
    - Chest x-ray and sputum collection

  - Window treatment prophylaxis is recommended in the interval between a negative initial TST result and definitive TST at least 8 weeks after the last day of exposure.

- Evaluation and follow-up of contacts;
  - Once active TB has been ruled out, treatment of LTBI should be offered to contacts considered newly infected, as recommended by the RMOH in collaboration with the attending physician. If the patient refuses LTBI prophylaxis, the RMOH should be notified.
- The RMOH in collaboration with the CDC Division will determine the need to extend the contact investigation.
- A sample procedure for the follow-up of TB cases is provided in Appendix 25.

Section 6: Pediatrics

Pediatric tuberculosis is defined by the World Health Organization (WHO) as TB in persons less than 15 years of age. The diagnosis of TB is often based on a clinical case definition, which usually relies on a positive TST or IGRA, either an abnormal chest x-ray and/or physical examination and the discovery of a link to a known or suspected case of infectious TB.

Key Messages

- Active TB in children is a sentinel event usually indicating recent transmission that should prompt a search for the source case.
- TB diagnosis in children, especially those under 5 years of age, can be difficult because they often have nonspecific signs and symptoms and a paucity of mycobacteria.
- In children under the age of five there is a high risk of progression from infection to severe forms of TB.

Management of TB Disease

Clinical Presentation of TB Disease

Children are typically identified as contacts of patients with infectious TB and often have abnormal chest x-rays when evaluated. This is especially true for children under 5 years of age. Many children are asymptomatic at presentation and some children may have nonspecific presentations such as fever, lymphadenopathy, abdominal distention or lethargy. Older children and adolescents are more likely to experience adult-type disease and often present with fever, night sweats and weight loss.

TB Diagnosis

Isolation of *Mycobacteria tuberculosis* from a clinical specimen confirms TB disease. However, because children may be too young to produce sputum or may have paucibacillary disease, recovery of the organism from them may be difficult and confirmation is not always possible. Gastric aspiration has been used for children who cannot produce sputum (Appendix 18). Chest x-ray, frontal and lateral views, are critical and should be reviewed by a radiologist with expertise in viewing pediatric films.

Treatment of TB Disease

A team approach is recommended for treating children with TB which should include a Pediatric Infectious Disease Specialist. The treatments are described in detail in the Canadian Tuberculosis Standards.[15] The drugs used to treat TB in children are the same as those used in adults. Because it is difficult to isolate *M. tuberculosis* from a child with pulmonary TB it may be necessary to rely on the results of the culture and susceptibility tests of specimens from the source case to guide the choice of drugs for the child.

A treatment plan for the child with TB should include the following elements:

- Consult a Pediatric Infectious Disease Specialist;

[15] Kitai, I., & Demers, AM. Pediatric Tuberculosis. In the Canadian Tuberculosis Standards (7th Ed.). p. 219-245.

- Perform baseline alanine aminotransference, aspartate transaminase, bilirubin and HIV serology;
- Monitor acuity and color vision monthly in a clinic setting; when possible a baseline ophthalmological assessment should be obtained in younger children before starting EMB and be repeated regularly during treatment with the drug;
- Administer daily treatment regimens especially during the intensive phase;
- Provide DOT for the full duration of therapy for all children;
- Educate the parent/guardian regarding the disease and transmission, give an overview of the medications being administered and their side effects, advise to seek medical help immediately if side effects occur and provide contact information for the nurse/doctor;
- Ensure a clinical evaluation occurs at least monthly;
- Monitor weight monthly;
- Obtain follow-up sputums, if possible;
- Perform a chest x-ray at 2 months into treatment to rule out extension of disease; and
- Ensure that children are provided follow-up for at least one year after treatment completion .

Management of Contacts

The most efficient way to prevent pediatric TB is to evaluate and treat those children exposed to an infectious adult source case.

- All exposed children must have a symptom inquiry, physical exam and chest X-ray. For all children less than 5 years of age and all children who are not BCG-vaccinated who are contacts of infectious source cases TST is the screening method of choice because repeat testing for TST conversion will be required and repeat IGRAs are not [16]recommended.
- Children less than 5 years of age with a negative TST and no evidence of active TB by examination or chest x-ray must complete “window” preventive therapy until investigations are completed. The “window” preventative treatment should not be started until TB disease has been ruled out and a normal chest x-ray has been confirmed.
    - The therapy may be discontinued if, after a period of 8 weeks, the repeat TST is negative and the child remains asymptomatic and is immunocompetent.
    - If the initial or repeat TST is positive and there is no clinical or radiographic evidence of disease, then a full course of treatment for LTBI is recommended.
- IGRA is preferred for children between 5-10 years old who are BCG-vaccinated, those who received BCG after 1 year of age, those who received multiple doses of BCG vaccine or for children who are unlikely to return for the TST to be read.
- For children older than 10 years old, TST is preferred if they received BCG vaccination within the first year of life

[16] Pai, M.; Kunimoto, D.; Jamieson, F. & Menzies, D. Diagnosis of Latent Tuberculosis Infection. In Canadian Tuberculosis Standards (7th Ed) p 3.

    - Only 1% of BCG-vaccinated children older than 10 years old had a TST ≥10mm if they received BCG vaccination within the first year of life[17].

- Consult a Pediatric Infectious Disease Specialist for advice regarding treatment.
- There is concern about the reliability of the TST in very young infants, therefore if the contact is under 6 months of age the recommendations of a Pediatric Infectious Disease Specialist should be sought.

Screening for LTBI in High Risk Pediatric Populations

Children arriving to Newfoundland and Labrador from TB endemic countries or children at high risk of activation from LTBI to active TB should be screened for latent infection, including those children living with acquired immunodeficiency syndrome (AIDS) and human immunodeficiency virus (HIV) infection or who are receiving tumour-necrosis factor-alpha antagonists or blockers.

- All children should have symptom inquiry. Detailed vaccination history should be taken including age of BCG vaccination, country in which vaccination was administered and whether booster vaccines were administered. If the patient or legal guardian is uncertain and country of birth is known then BCG World Atlas may be used to identify vaccination patterns specific to country.
- For children less than 2 years old, TST is the screening method of choice because the sensitivity of IGRA in children less than 2 years old has not been established.[18] [19]
- For children between the ages of 2 and 10 years old, either a TST or IGRA can be the screening method.
    - An IGRA is preferred if:
        - The child is BCG vaccinated
        - The child is unlikely to return for the TST to be read[20]
- For children older than 10 years old, TST is preferred.
    - Only 1% of BCG-vaccinated children older than 10 years old had a TST ≥10mm if they received BCG vaccination within the first year of life[21].

[17] Seddon,JA, Paton J, Nademi Z, et al. " The impact of BCG vaccination on tuberculin skin test responses in children is age dependent: evidence to be considered when screening children for tuberculosis infection" Thorax 2016 2016: 71 : 935.
[18] Elliot, Chris et al "Tuberculin skin test versus interferon-gamma release assay in refugee children: a retrospective cohort study" Journal of Paediatrics and Child Health (2018) doi: 10.1111/jpc.13865
[19] Starke, Jeffrey "Interferon-y Release Assays for Diagnosis of Tuberculosis Infection and Disease in Children" Pediatrics 134(6) 2014.
[20] Committee on Infectious Diseases; American Academy of Pediatrics; Eds. David W. Kimberlin, MD, FAAP; Michael T. Brady, MD, FAAP; Mary Anne Jackson, MD, FAAP; Sarah S. Long, MD, FAAP "Section 3 Summaries of Infectious Diseases, Tuberculosis>Testing for M. Tuberculosis infection > TST versus IGRA" Red Book 2018: 829-853: p 834.
[21] Seddon,JA, Paton J, Nademi Z, et al. " The impact of BCG vaccination on tuberculin skin test responses in children is age dependent: evidence to be considered when screening children for tuberculosis infection" Thorax 2016 2016: 71 : 935.

  - If it is known that the child was vaccinated after 1 year of age or received multiple boosters of BCG vaccine than an IGRA can be considered by the physician or nurse practicioner following up on the TST results for this patient.

- Collaboration with a pediatric Infectious Disease Specialist should be sought for all positive TST or IGRA results.
- All children with positive TST or IGRA should have chest x ray to rule out active TB infection and also a physical examAny child with a risk factor for TB who is found to be a direct contact of someone with active TB should be assessed for signs of active TB infection. Once active TB infection has been ruled out, they should be tested for latent TB as described under "Management of Contacts" . Consultation with a pediatric Infectious Disease Specialist is recommended.

Perinatal Issues

Management of the newborn infant should proceed according to the following principles:

- Untreated TB presents a far greater hazard to a pregnant woman and her fetus than does the treatment of the disease.
- Administration of first line TB drugs is not an indication for termination of pregnancy.
- If second line drugs are used, advice from a TB expert should be sought.
- HIV-negative women receiving first line agents, including INH and rifampin, may continue to breastfeed.

The evaluation of an infant for congenital TB should include:

- Clinical examination;
- TST;
- Chest radiography;
- Appropriate cultures, including lumbar puncture and abdominal ultrasound.
- The recommended management for a newborn infant exposed to maternal TB is included in Table 14.[22]

[22] Canadian Tuberculosis Standards. Pediatrics Tuberculosis. (p.236).

Table 14: Recommended management of the newborn infant exposed to TB

Situation 1	Evaluation of mother	Evaluation of infant
Mother or household contact with clinical or radiographic evidence of infectious TB at or close to the time of delivery	• Evaluate for TB disease • HIV testing. • Examine placenta for histology smears and cultures.	• Evaluate for congenital TB (see text).
Separation of mother/infant	**Treatment of infant**	**Breastfeeding**
• Separate mother (or household contact) and child until mother (or household contact) and infant are receiving appropriate care, tolerating medication and mother (or household contact) is noninfectious and clinically improving. • If the mother (or household contact) has possible MDR-TB or has poor adherence to treatment and DOT is not possible, the infant should be separated from the mother (or household contact).	• If congenital TB is diagnosed, start appropriate treatment (see text). • If congenital TB is excluded, INH at a dose of 10-15 mg/kg (see text for duration of INH) is advised.	Women with TB disease who have been treated appropriately for at least 2 weeks and who are not considered infectious can breastfeed.
Situation 2	**Evaluation of mother**	**Evaluation of infant**
Mother treated for TB during pregnancy	• Mother should have follow-up smear examinations to confirm she is no longer infectious. • HIV testing. • Examine placenta for history, smears and cultures.	• Evaluate for congenital TB (see text).
Separation of mother/infant	**Treatment of infant**	**Breastfeeding**
• Provided treatment has been adequate to produce clinical improvement and the mother is no longer infectious, separation is not recommended. • If in doubt, proceed as in Situation 1.	• If congenital TB is diagnosed, start appropriate treatment (see text). • If congenital TB is excluded and mother is confirmed to be not infectious and no other household contacts have TB disease, INH is not necessary. • If in any doubt, proceed as in Situation 1.	Women with TB disease who have been treated appropriately for at least 2 weeks and who are not considered infectious can breastfeed.
Situation 3	**Evaluation of mother**	**Evaluation of infant**
Mother with abnormal chest x-ray but no evidence of active disease	• If the chest x-ray abnormality is considered to be secondary to old, healed TB and the mother has not been previously treated, she should be evaluated, including testing of induced sputum. • HIV testing. • The mother should be treated for LTBI if not previously treated.	• The infant should be evaluated clinically and radiographically at birth. • Consider evaluation for congenital TB (see text). • Consider a repeat TST at 3 and 6 months of age.
Separation of mother/infant	**Treatment of infant**	**Breastfeeding**
• If the mother is no longer infectious, separation is not recommended. • If in doubt, proceed as in Situation 1.	• If there is uncertainty about the status of the mother, the child should be provided with preventive treatment (see Situation 1).	The mother can breastfeed.
Situation 4	**Evaluation of mother**	**Evaluation of infant**
Mother with LTBI and no abnormality on chest x-ray		• No special investigation for the newborn is recommended.
Separation of mother/infant	**Treatment of infant**	**Breastfeeding**
• Separation of mother and infant is not recommended.	• No treatment is recommended.	The mother can breastfeed.

Section 7: Prevention and Control of Tuberculosis Transmission in Health Care and Other Settings

All health care organizations should designate a program (e.g., Infection Prevention and Control) or a person (e.g., Infection Control Practitioner) who will be responsible for the prevention and control of TB within their healthcare settings. Infection prevention and control (IPAC) measures must include administrative (policies and procedures), engineering (airborne infection isolation rooms) and personal protective equipment (e.g., respirators).

Key Messages

- Healthcare organizations and individual healthcare workers (HCWs) have a shared responsibility in the prevention and control of TB.
- The risk of transmission varies with the type of setting, HCW occupational group, patient care activity, patient/resident/client population and the effectiveness of the TB infection prevention and control measures.
- The key to preventing transmission of TB within a facility is early diagnosis, isolation and treatment of an infectious case.
- Airborne Precautions must be maintained until the patient is deemed non-infectious.

Organization and HCW Responsibilities

Healthcare organizations and HCWs have a shared responsibility in the prevention and control of TB.

Organization Responsibilities

The organization should:

- Ensure that the organization has a TB management program;
- Provide resources to support the TB program (i.e., laboratory testing, airborne infection isolation rooms, and personnel); and
- Require that HCWs be educated about TB IPAC measures on hiring and periodically thereafter.

HCW Responsibilities

HCWs who are expected to provide direct care for patients with TB should:

- Adhere to the Occupational Health TB screening initiatives;
- Participate in the organization's respiratory protection program;
- Perform a point-of-care risk assessment prior to each patient interaction;
- Follow Routine Practices and Airborne Precautions; and
- Ensure that patients with TB are provided with information about TB.

TB Risk Assessment

There are two components to the TB risk assessment:

- Facility risk assessment
- Patient risk assessment

Facility risk assessment

Each year the IPAC Program should perform a TB facility risk assessment for the healthcare settings in the RHA. This assessment will provide a framework to predict whether the HCWs are at increased risk of TB exposure so that the necessary occupational health actions can be implemented. A tool to help guide the risk assessment is provided in Appendix 26. The risk assessment should be reported to the IPAC Committee and Occupational Health staff.

Patient risk assessment

The key to preventing transmission of TB within a facility is early diagnosis, prompt isolation and treatment of an infectious case.

a. Early diagnosis

- A high index of suspicion must be maintained in the following individuals:
    - Those with a cough lasting > 3 weeks with associated symptoms such as bloody sputum, night sweats, weight loss, anorexia, fever persisting longer than one week and a chest x-ray suggestive of active TB;
    - Those from geographic areas with high prevalence of TB;
    - Those with previous TB infection/cavitary disease; and
    - Those at risk for the development of TB (Appendix 2).

b. Prompt isolation

- It is preferable to immediately isolate clients who later prove not to have active TB than to not implement appropriate isolation precautions for clients who are later proven to have contagious TB.
    - All clients with suspected or confirmed infectious TB must be immediately placed on Airborne Precautions.
    - If the sputum for acid fast bacillus (AFB) is not obtained and reported within 48 hours, consult the ICP.

c. Treatment

- Immediate treatment usually results in clinical evidence of improvement and early resolution in the infectiousness of the case.

Airborne Precautions

Infection Prevention and Control (IPAC) must be notified of all patients with suspected or confirmed TB who are in the facility.

- The patient should be placed in a designated airborne infection isolation room (AIIR) , placed on Airborne Precautions and the sign placed on the door (Appendix 27).
    - Patients, family and visitors should be educated about TB. A fact sheet should accompany verbal information (Appendix 3).

Airborne Precautions Elements

Airborne Precautions are used in addition to Routine Practices for patients known or suspected of having an infection that can be spread by the airborne route. Airborne Precautions should be implemented empirically (i.e., before confirmation) for patients with conditions/clinical presentation of TB.

In addition to **Routine Practices** these elements of Airborne Precautions are recommended:

1. Hand Hygiene

Hand hygiene should be performed in accordance with the four moments.[23]

2. Personal Protective Equipment

- Healthcare settings requiring the use of respirators should have a respiratory protection program in place.
- HCWs must adhere to the policies and procedures related to the organization's respiratory protection program.
- A respirator should be worn by a HCW providing care for patients with suspected or confirmed respiratory tuberculosis or when performing procedures that could aerosolize viable tubercle bacilli (e.g., wound irrigations).

Recommendations:

Respirators

- All HCWs requiring respirators should be trained in their use.
- A fit-tested and seal-checked approved respirator should be used to enter the room or home of a patient on Airborne Precautions (Appendix 28).
- Hand hygiene should be performed prior to putting on a respirator.
- Self-contamination should be avoided by not touching the respirator on its external surface

Appropriate Respirator Use

- *HCWs should be fit-tested prior to respirator use.*
- *A seal check should be performed every time a respirator is used (Appendix 29).*
- *Hand hygiene should be performed after removing and discarding a respirator.*
- *A respirator should not be placed on a patient.*

[23] Public Health Agency of Canada. Hand Hygiene Practices in Healthcare Settings.

during use and disposal.

- Respirators should be carefully removed by the straps.
- A respirator should not dangle around the neck when not in use and should be changed if it becomes wet or soiled or if breathing becomes difficult.
- The respirator should be discarded immediately after its use into a no-touch waste receptacle, followed by hand hygiene.
- In a cohort setting, a single respirator may be used for successive patients.

Masks

- Patients with airborne infections should be directed to put on a mask (not a respirator) , if tolerated, if outside the AIIR.
- The patient should be allowed to remove the mask once in an AIIR.

Source Containment

A system should be developed to identify patients with known or suspected infections that warrant Airborne Precautions.

- A sign should be placed in a visible space to identify that Airborne Precautions (Appendix 27) are required.

Source containment includes the following components: patient placement and accomodation, patient flow, visitor management, aerosol-generating medical procedures, duration of precautions and handling of deceased bodies. Other source containment components for Airborne Precautions include management of personnel and management of patients with airborne infections.

Recommendations:

Patient placement and accommodation

- Patients known or suspected to have an airborne infection should be immediately placed in an AIIR with the door closed and with the exhaust vented to the outside or filtered through a high-efficiency particulate filter if recirculated.
- The AIIR should have an in-room toilet, sink and bathing facility for the patient and a designated hand hygiene sink for the HCWs.
- **When an AIIR is not available:**
    - The patient should be placed in a single room with the door closed;
        - The room should preferably be without recirculation of air from the room and as far away from the rooms of other patients as possible;
        - The number of people entering the room should be limited (e.g., no non-essential visitors).
    - The Medical Officer of Health should be consulted if there is uncertainty with the requirement to transfer the patient to a facility with an AIIR.

- Patients with tuberculosis should not share rooms as strains and levels of infectivity may be different.
- Monitoring of the AIIR:
    - The negative pressure should be checked prior to placing the patient in an AIIR and on a daily basis when the AIIR is in use;
    - Visual indicators (smoke tubes or flutter strips) or portable manometers may be used to check the differential pressure;
    - The results of monitoring should be documented; and
    - Visual or audible alarms should not be inactivated.

Patient flow

- Patients should be restricted to their room unless leaving the room for essential medical procedures.
    - The patient should be accompanied by a HCW whenever outside the room.
- The patient should wear a mask, if tolerated, and follow respiratory hygiene during transport.
    - If the patient cannot wear a mask, transport should be planned to limit the exposure of other individuals.

Visitor management

- Visitors should be kept to a minimum; special consideration for additional visitors should be discussed with the care team.
- Visitors should be instructed to check at the nursing station before entering the AIIR.
- For tuberculosis:
    - Close contact visitors (those who had close contact with the case prior to admission) should be screened for the presence of cough;
    - Close contact visitors who have a cough should be sent for a tuberculosis assessment as soon as possible and until assessed, they should only visit if it is essential and should wear a mask while in the facility.

Aerosol-generating medical procedures (AGMPs)

The following strategies should be applied to reduce the level of aerosol generation when performing AGMPs for patients on Airborne Precautions:

- AGMPs should be limited to those that are medically necessary;
- If possible, AGMPs should be anticipated and planned;
- Appropriate patient sedation should be used;
- The number of personnel in the room should be limited to those required;
- AGMPs must be performed in an AIIR, whenever feasible;

- A single room (with the door closed and away from high-risk patients) should be used in settings where AIIRs are not available;
- Respirators should be worn by all personnel in the room.
- For intubated and ventilated patients:
    - A bacterial filter should be placed on the endotracheal tube to prevent contamination of the ventilator and the ambient air; and
    - Endotracheal suction should be performed using a closed suction apparatus.

Discontinuation of Airborne Precautions

Suspect TB cases

- Airborne Precautions may be discontinued if three successive sputum samples are smear negative unless TB is still strongly suspected or if another diagnosis has been made.
- The ICP should be consulted prior to discontinuing Airborne Precautions in a healthcare facility.

Confirmed TB cases

Patients with smear-negative, culture-positive drug-susceptible respiratory TB :

These patients should be maintained on Airborne Precautions until there is clinical evidence of improvement and a minimum of two weeks of effective therapy has been completed.

Patients with smear-positive, culture-positive drug-susceptible respiratory TB:

These patients should be maintained on Airborne Precautions until:

- there is clinical evidence of improvement and
- evidence of adherence to at least two weeks of effective multidrug therapy based on the known antibiotic sensitivity of the patient's organism, and
- three consecutive negative AFB sputum smears have been obtained.

Sufficient time (e.g., one hour for rooms with six air exchanges per hour) should be allowed for the air to be free of aerosolized droplet nuclei before the room can be used again.

Patients may be discharged to home isolation for the period requiring Airborne Precautions provided there is clinical improvement, drug-resistant TB is not suspected and there is no contraindication for home isolation (see Table 15).

Handling of deceased bodies

- Airborne Precautions should be used for handling deceased bodies, preparing bodies for autopsy or for transfer to mortuary services. Airborne Precautions should be continued for the handling of the deceased until appropriate time has elapsed to remove airborne contaminants in the room.

Environmental Controls

Cleaning of equipment

- Non-critical patient-care equipment (e.g., thermometers, blood pressure cuff, pulse oximeter) should be dedicated to the use of one patient and cleaned and disinfected before reuse with another patient. Single use devices should be used and discarded after use.

Environmental cleaning should be performed as per Routine Practices. Environmental services staff must adhere to Airborne Precautions when cleaning an AIIR.

Management of laundry dishes and waste require no special precautions.

Education

- Patients, their visitors, families and their decision makers should be educated about the precautions being used, the duration of precautions, as well as the prevention of transmission of disease to others with a particular focus on hand and respiratory hygiene.
- Visitors who participate in patient care should be instructed about the appropriate PPE:
    - Visitors should be able to adhere to the Airborne Precautions recommendations (e.g., able to tolerate a respirator).
    - In the adult setting, the PPE required would be the same as for the HCW unless it is determined that they have had prolonged exposure.
    - Visitors should be shown how to perform a seal check if wearing a respirator; fit testing is not required.

Prevention of TB Transmission in other Healthcare Settings

Long-term Care

- Screen all residents for symptoms of TB on admission to LTC facilities.
- Screen residents with a posterior-anterior and lateral chest x-ray prior to admission.

Home Care Setting

- HCWs caring for patientss with respiratory TB disease at home should wear a respirator.
- If a decision is made to discharge a patient with TB to the home setting before the person is considered noninfectious the conditions for home isolation must be in place (Table 15).

Table 15: Conditions for home isolation

Condition	Has this condition been met?
Directly observed therapy has been arranged	
The person does not share a common airspace with non-household members (e.g., rooming house) and the household air is not being recirculated to other housing units (e.g., apartment complex)	
All household members have been previously exposed to the person. If any household members are TST negative, they should understand the risk	
No children under 5 years or persons with immunocompromising conditions are present in the home (an exception would be if they are receiving prophylaxis or treatment for active TB disease or latent TB infection)	
No visitors (except HCWs) should be allowed in the home	
The person should be advised not to use public transportation	
The person is counseled on and is willing to comply with limitation in movement outside the home (e.g., does not go to work or school)	
The person can ambulate outdoors if not in close contact with susceptible persons	

Note: Home isolation can be discontinued by the attending physician in collaboration with the Medical Officer of Health.

Section 8: Occupational Health

The Occupational Health Nurse (OHN) or Employee Health Nurse (EHN) is responsible for the assessment of healthcare workers' (HCWs) TB status. HCWs are individuals who provide health care or support services such as nurses, physicians, dentists, nurse practitioners, paramedics and sometimes emergency first responders, allied health professionals, unregulated healthcare providers, clinical instructors and students in health care disciplines, volunteers and housekeeping staff. Healthcare workers have varying degrees of responsibility related to the health care they provide, depending on their level of education and their specific job/responsibilities. Immunization requirements will be determined by their specific job and responsibilities (PHAC, 2012).

Key Messages

- All HCWs should have a baseline TB assessment done at the time of hiring. Healthcare students who have established a baseline 2-step TST prior to the admission to their program do not need to have repeated TSTs done as they do clinical placements in other RHAs unless Occupational Health determines a risk (e.g, post exposure or high risk facility).
- HCWs, working for a private company, who have a baseline TST documented do not need to have the TST repeated every time they change employers unless their prehiring assessment determines that they have had a risk for TB.
- Recommendations for periodic and serial (repeated) TST for HCWs vary with the setting.
- Interferon gamma release assays (IGRAs) are not recommended for serial testing.
- The RMOH will provide direction for TB contact tracing within healthcare facilities.
- HCWs that have an occupational exposure to TB will be followed-up by the OHN/EHN in collaboration with the RMOH/CDCN in the RHA.

Screening

All HCWs must be assessed for LTBI at the time of hiring and a baseline TST evaluation should be documented.

- The assessment form in Appendix 5 should guide this evaluation.
- Information on LTBI testing and the TST procedure can be found in Section 3 of this document.
- TST baseline should be established using Appendix 7a and 7b.
- HCWs who do not have a documented two-step TST should have one performed unless contraindicated.
- TST results should be interpreted using Appendix 7a & 7b.

Additonal screening of HCWs may be indicated depending on the risk related to an area and type of work. The frequency of HCW routine screening is determined by the facility risk assessment (Appendix 26). If a facility is identified as at risk for TB transmission the TB assessment should include:

- Annual TST for HCWs (with negative baseline TSTs) involved in intermediate-risk activities in healthcare settings not considered low risk and those involved in high-risk activities in all healthcare settings.
- After two or more years of annual screening, if the annual risk of infection (based on the conversion rate) is shown to be less that 0.5%, consideration could be given to reducing the frequency of screening to every other year or to restrict annual screening to fewer workers who are at high risk.

HCW TB Follow-up

Management of HCWs with infectious or suspected TB

- HCWs being investigated for TB must have approval from Occupational Health before returning to work.
- HCWs with infectious TB must notify Occupational Health.
    - The HCW shall be excluded from work until three negative AFB smears have been obtained, evidence of adherence to two weeks of therapy, clinical evidence of improvement and on the advice of the RMOH.
- HCWs with nonrespiratory TB may work if concurrent respiratory TB has been ruled out with sputum assessment.
- HCWs with LTBI can work unless symptoms develop. The follow-up is decribed in Section 3.

Management of HCWs exposed to TB at work

The RMOH is responsible for coordinating TB contact tracing (Section 5).

Identification of Contacts

- If the patient with infectious TB was immediately placed and managed on Airborne Precautions, no contact follow up is required.
- Any HCW who has had unprotected contact with a patient with active TB should be considered at risk of infection and should be considered for post exposure management.
- The ICP will notify the OHN/EHN that there is an infectious TB case in the facility.
- The OHN/EHN will collaborate with the Manager/Patient Care Coordinator to identify any HCWs exposed prior to the use of Airborne Precautions (AP). This would include determining if any HCWs involved in the transport to the facility were exposed.
- The OHN/EHN will provide the RMOH and/or CDCN with the list of contacts in the facility.
- The OHN/EHN will provide the RMOH and CDCN with the report on the follow-up of HCWs.

Assessment of Contacts

- A single TST, eight weeks after the last last exposure to the case, is recommended for most TST negative HCWs exposed to people with respiratory TB disease without adequate protection. If the HCW is considered a high priority contact additional testing may be required.

- For previously TST positive HCWs exposed to people with respiratory TB disease without adequate protection provide education on signs and symptoms of active TB disease and follow-up as per Appendix 23.
- A medical evaluation to rule out active TB should be performed for all contacts who have sypmtoms compatible with TB and/or a positive TST result, whether before exposure or on testing. Refer to the RMOH for direction.
- If a HCW refused prophylactic treatment for LTBI; it should be documented on the chart and referred to the RMOH for advice.

Note: Employees known to be TST positive should be instructed to report immediately to Occupational Health/Employee Health any symptoms suggesting TB, such as cough of more than 3 weeks duration with or without fever, night sweats or weight loss.

Section 9: Immigration and TB

A substantial number of new immigrants to Canada are from regions of the world with rates of TB several times higher than in Canada. Citizenship and Immigration Canada (CIC) has two strategies in place for the protection of public health in respect to TB. These are:

- Immigration medical exam (IME); and
- Post arrival medical surveillance program for inactive pulmonary tuberculosis.

Key Messages

- Most foreign-born groups undergo a mandatory immigration medical examination prior to arrival in Canada, which includes chest x-ray to detect active TB.
- CIC requires that individuals with previously treated TB and those with abnormal chest x-ray , but without active disease, be followed in the post arrival medical surveillance program.

Immigration Medical Exam

Under section 38(1) of the Immigration and Refugee Protection Act, CIC has the mandate to determine applicants' inadmissibility with respect to three health grounds: danger to the public, danger to public safety and excessive demand on health and social services. The program does not screen for LTBI. The purpose of medical surveillance for pulmonary tuberculosis is to detect and treat active TB in immigrants to ensure that they are not infectious on arrival.

The following applicants are required to undergo an immigration medical examination:

Entrants to Canada	Criteria
Foreign nationals applying for permanent residency (immigrants and refugees selected abroad)	Mandatory for all.
Foreign nationals claiming refugee status in Canada	Mandatory for all.
Foreign nationals applying for temporary residency (including students, workers and visitors)	Those who will stay in Canada for more than 6 months and who have spent 6 or more consecutive months in a country/territory with high TB incidence, as designated by the Public Health Agency of Canada, during the 1 year immediately preceding the date of seeking entry (application) to Canada.
Foreign nationals applying for temporary residency and seeking to work in certain occupations	Mandatory for all who are seeking to work in an occupation in which the protection of public health is essential regardless of length of stay and country of origin AND for agricultural workers from a country/ territory with high TB incidence, as designated by the Public Health Agency of Canada. The occupational list is available at http://www.cic.gc.ca/english/information/medical/medexams-temp.asp#occupational
Seriously ill foreign nationals	May be requested to undergo an immigration medical examination if an Immigration Canada or Canada Border Services Agency officer has reasonable grounds to believe that the person is medically inadmissible to Canada, regardless of anticipated length of stay in Canada and country of origin.

Note: Countries with high prevalence rate of TB: http://www.phac-aspc.gc.ca/tbpc-latb/itir-eng.php

The Immigration Medical Exam (IME) is performed by a designated physician in the country of origin before arrival in Canada. It has the following components: a
medical history, physical examination, urinalysis for applicants ≥ five years of age, chest x-ray for applicants ≥ 11 years of age, syphilis and HIV serology for applicants ≥ 15 years of age. If active TB is discovered, the applicant is denied entry to Canada until successful treatment has been completed. Applicants identified as having inactive pulmonary TB are permitted to enter Canada but are placed under medical surveillance. Inactive pulmonary TB is defined as:

- 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 three months apart with stable appearance and three negative sputum smears and cultures or
    - two chest x-rays taken at an interval of six months apart with stable appearance.

Post Arrival Medical Surveillance Program

The CIC's post arrival medical surveillance program is designed to refer applicants identified by the IME as having inactive pulmonary TB to Public Health within 30 days of their arrival. This program includes the reporting process and the medical assessment.

Reporting process

When an applicant is identified as requiring medical surveillance, the following steps are undertaken:

- Immigration officer issues a Medical Surveillance Undertaking Form – IMM0535 to the applicant (Appendix 29).
- Upon entry into Canada, the applicant must show the IMM0535 to the port of entry (POE) Officer who should confirm the information. The POE Officer sends a copy of the IMM0535 to the Public Health Liason Unit of CIC (within 24 hours).
- The CIC actions are:
    - To notify the provincial Chief Medical Officer of Health (CMOH) office of the individual's arrival and the contact information for the individual. The surveillance code should be indicated as:
        - 2.02 (Inactive pulmonary TB) must report within 30 days of arrival in Canada
        - 2.02U (Inactive pulmonary TB) urgent – must report within seven days of arrival in Canada
    - To advise the client to report to the Regional Health Authority, Public Health Division, within 30 days of arrival (or 7 days for urgent cases) for a medical assessment and to provide the client with an informational handout (Appendix 30).
- The provincial CMOH office notifies the RMOH/designate of the client's need for medical assessment (Appendix 31).
- The client reports to RHA or the CDCN contacts the client for medical assessment.
- The medical assessment is completed as required.

- The CDCN/designate returns the notification form to the CMOH office indicating that the client has complied with CIC recommendations.
- The CMOH office advises CIC that the client has kept their first appointment with a designated health professional.
- The CID updates the immigration file indicating that the individual has met his/her condition of entry.

Medical Assessment

The initial assessment of these clients is the responsibility of the RMOH/designate and consists of the following:

- Review of the history/evaluation for signs and symptoms of active TB;
    - Physical exam if indicated from the history
    - Other investigations as recommended by the RMOH (chest X ray, sputum C&S)
- Duration of follow-up will be recommended by the RMOH;
    - Clients should be given the contact information for the RHA
    - Clients discharged from follow-up must be advised to seek medical attention promptly if they experience symptoms suggestive of TB or to contact the CHN/CDCN.

Section 10: Tuberculosis Prevention in First Nations, Inuit and Metis Peoples

In Canada, the burden of TB is over represented in the Canadian-born Aboriginal People. While the incidence rate for Canadian-born non-Aboriginal people has remained relatively stable from 2001 to 2012 at about 1.0 per 100,000 population; the incidence rate for the Canadian-born Aboriginal People increased from 22.0 to 29.2 per 100,000 population.[24] Canadian-born Aboriginal People comprise three distinct populations: First Nations, Inuit and Métis people. The incidence rate of TB varies greatly amongst these three populations. In 2012, the the incidence rate in the First Nations population, at 23.7 per 100,000 population, was almost five times the overall Canadian rate. In 2012, the highest incidence rate was observed for the Inuit population, at 262.2 per 100,000 population. With the exception of 2003, from 2002 to2012, the annual incidence rates for the Inuit were the highest of any origin group in Canada.[25] In NL, a similar trend has been reported.

Key Messages

- In Canada, the incidence rate of TB is higher among Aboriginal People than the foreign-born and Canadian-born non-Aboriginals, but the greatest burden as measured by the number of cases, occurs in the foreign-born.
- Determinants of TB infection and disease in the Aborignal People of Canada differ with respect to comorbidities, genetic factors, transmission factors and the social determinants of health when compared to the rest of Canada.
- Social determinants of health, including lack of food security, housing, health care access, education and income are seen with higher frequency in Aboriginal groups in Canada.
- Programmatic issues in TB prevention in Aboriginal groups in Canada that can be strengthened include strong TB partnerships with communities, increased community awareness, improving adherence to TB medications and underscoring the importance of effective contact investigation.
- To achieve a substantial reduction in rates of TB among Canadian-born Aboriginal Peoples it seems likely that intensified and coordinated efforts using novel approaches will be necessary.

Determinants of TB Infection and Disease in Aboriginal Populations

Comorbidites

The following comorbidies are recognized risk factors for the development of active TB disease in relation to the Canadian Aborignal population.

- HIV infection is the strongest known risk factor for the development of disease in those with remotely or recently acquired TB infection.

[24] Public Health Agency of Canada. *Tuberculosis in Canada 2012*.
Ottawa (Canada): Minister of Public Works and Government Services Canada; 2015.
[25] Ibid.

- Diabetes mellitus – the age-adjusted prevalence of diabetes (predominantly type 2) in First Nations populations is 3.3 times higher among males and 5.3 times higer among females than in the Canadian population as a whole.
- Chronic renal disease is 2.5 to 4.0 times higher than the national rate in Aboriginal People.
- Undernutrition occurs in subpopulations of Aboriginal poopulations.
- Tobacco use – the Canadian Aboriginal population has a higher prevalence rate of recreational tobacco use than the rest of the Canadian population.
- Alcohol and drug abuse occur in both the Aborginal and non-Aboriginal populations and has been associated with increased TB transmission.

Genetetic Factors

- Linkages between susceptibility to symptomatic TB disease and a chromosome abnormaility was demonstrated in a large Aboriginal family undergoing an epidemic of tuberculosis.

Environmental Factors

Some of the key social determinants of health related to TB included 1) food insecurity and malnutrition, 2) poor housing and environmental conditions and 3) financial, geographic and cultural barriers to health care access.

Transmission Factors

There are two ways to eliminate TB: to interrupt transmission and to prevent active TB disease in those with LTBI.

Populations at Greatest Risk for TB

Health Canada's Strategy (2012) Against Tuberculosis for First Nations on-Reserve identified a number of examples of subpopulations that are at risk of TB infection and disease. These four are highlighted but others can be found in the Strategy.[26]

High Incidence Communities and Outbreaks

Communities or populations experiencing a high incidence of TB over a prolonged period of time and communities experiencing repeated outbreaks require special consideration. The challenge is not only to quickly identify and treat active cases but to identify and follow up with all contacts to break the chain of transmission. In these communities there is a need for a targeted sustained commitment for program strategies and activities to reduce the incidence and burden of the disease. It is important to include strategies aimed at those most at risk for severe outcomes, such as young children and severely immunocompromised people.

[26] Health Canada's Stratgegy against Tuberculosis for First Nations On-Reserve.

Remote and Isolated Communities

The challenges for these communities include the ability to access and use laboratory resources, to access care in a timely and consistent fashion and to access, attract and retain staff dedicated to TB prevention and control activities.

Adults and Older Generations with Untreated LTBI

Untreated individuals with LTBI represent a possibly significant pool of future cases of active TB, even in a community that has not had active TB cases for many years. Although it may be inappropriate to provide preventative treatment for these cases, it is important to remain vigilant and to maintain a heightened awareness/knowledge of TB.

Mental Health and Addictions

In First Nation populations in Canada, mental well-being and addictions represent an increasing concern. Psychological distress and disorders, especialy substance abuse, interfere with the compliance and completion of treatment for TB.

Inuit-Specific TB Prevention

To address the disparity in the incidence rate of TB between the Inuit and other Canadian-born populations the Inuit Tapiriit Kanatami (ITK)[27] released the Inuit-Specific Tuberculosis Strategy. The goal of the Stragety is to increase awareness of the need for more effective approaches to TB prevention, control, and care for Inuit. It also lays the framework for the development of an Inuit-Specific TB Action Plan to present a collaborative path forward in the development of effective and sustainable solutions to reduce TB in Inuit Nunangat. This Strategy identified the Social Determinants of Health as one of the key influences on TB transmission. To address this critical area the following recommendations were identified:

- Reductions in household crowding and improvements in household ventilation;
- Improvements to food security and nutrition;
- Exploring new opportunities and novel approaches to mental health and addiction issues;
- Identifying and minimizing barriers to health care services for Inuit; and
- Increasing awareness among Inuit and health care providers about the importance of early detection and treatment of medical risk factors associated with the development of TB disease. For example, +the benefits of smoking cessation could have substantial impact on improving Inuit health and reducing the number of Inuit who develop TB disease.

Regional TB Initiatives

One of the most successful initiatives undertaken between Labrador-Grenfell Health and the Nunatsiavut Department of Health and Social Development to address the local TB issues was the initiation of the TB Clinics for clients with TB disease or LTBI. These clinics are overseen by the LGH

[27] ITK is the national Inuit organization in Canada representing the four Inuit regions– Nunatsivut (Labrador), Nunavik (northern Quebec), Nunavut, and the Inuvialuit settlement Region in the Northwest Terrirories collectively called Inuit Nunangat.

primary TB physician and coordinated by the LGH CDCN in collaboration with the public health staff in Nunatsiavut . Chest x-ray services are enhanced by having access to a radiologist via the picture archiving and communication system (PACS). Clinic day case conferences ensures that all clients with problems are discussed by the multidisciplinary team.

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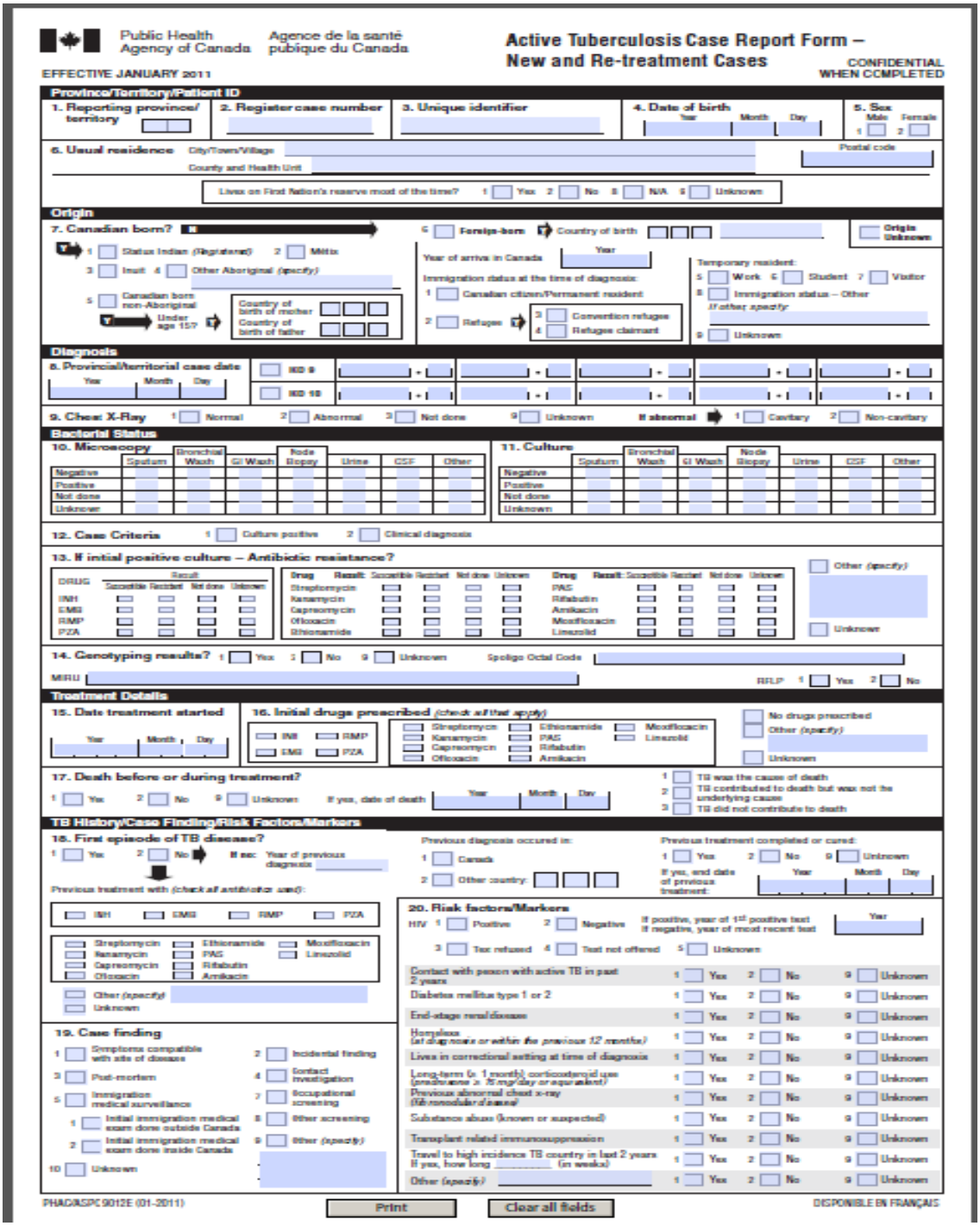
Appendices

Appendix 1: Surveillance Forms



Public Health Agency of Canada / Agence de la santé publique du Canada

Active Tuberculosis Case Report Form – New and Re-treatment Cases

EFFECTIVE JANUARY 2011

CONFIDENTIAL WHEN COMPLETED

Province/Territory/Patient ID

1. Reporting province/territory
2. Register case number
3. Unique identifier
4. Date of birth (Year / Month / Day)
5. Sex (Male / Female)
6. Usual residence (City/Town/Village; County and Health Unit; Postal code)
Lives on First Nation's reserve most of the time? 1 Yes 2 No 8 N/A 9 Unknown

Origin

7. Canadian born? 1 Status Indian (Registered) 2 Métis 3 Inuit 4 Other Aboriginal (specify) 5 Canadian born non-Aboriginal
Under age 15? Country of birth of mother / Country of birth of father
6 Foreign-born Country of birth
Origin Unknown
Year of arrival in Canada
Immigration status at the time of diagnosis: 1 Canadian citizen/Permanent resident 2 Refugee 3 Convention refugee 4 Refugee claimant
Temporary resident: 5 Work 6 Student 7 Visitor 8 Immigration status – Other (If other, specify) 9 Unknown

Diagnosis

8. Provincial/territorial case date (Year / Month / Day)
ICD 9
ICD 10
9. Chest X-Ray 1 Normal 2 Abnormal 3 Not done 9 Unknown If abnormal 1 Cavitary 2 Non-cavitary

Bacterial Status

10. Microscopy

	Sputum	Bronchial Wash	GI Wash	Node Biopsy	Urine	CSF	Other
Negative							
Positive							
Not done							
Unknown							

11. Culture

	Sputum	Bronchial Wash	GI Wash	Node Biopsy	Urine	CSF	Other
Negative							
Positive							
Not done							
Unknown							

12. Case Criteria 1 Culture positive 2 Clinical diagnosis

13. If initial positive culture – Antibiotic resistance?

DRUG	Result: Susceptible	Resistant	Not done	Unknown
INH				
EMB				
RMP				
PZA				

Drug	Result: Susceptible	Resistant	Not done	Unknown
Streptomycin				
Kanamycin				
Capreomycin				
Ofloxacin				
Ethionamide				
PAS				
Rifabutin				
Amikacin				
Moxifloxacin				
Linezolid				

Other (specify) Unknown

14. Genotyping results? 1 Yes 2 No 9 Unknown Spoligo Octal Code
MIRU RFLP 1 Yes 2 No

Treatment Details

15. Date treatment started (Year / Month / Day)
16. Initial drugs prescribed (check all that apply)
INH RMP EMB PZA
Streptomycin Ethionamide Moxifloxacin Kanamycin PAS Linezolid Capreomycin Rifabutin Ofloxacin Amikacin
No drugs prescribed Other (specify) Unknown
17. Death before or during treatment? 1 Yes 2 No 9 Unknown If yes, date of death (Year / Month / Day)
1 TB was the cause of death 2 TB contributed to death but was not the underlying cause 3 TB did not contribute to death

TB History/Case Finding/Risk Factors/Markers

18. First episode of TB disease? 1 Yes 2 No If no: Year of previous diagnosis
Previous treatment with (check all antibiotics used):
INH EMB RMP PZA
Streptomycin Ethionamide Moxifloxacin Kanamycin PAS Linezolid Capreomycin Rifabutin Ofloxacin Amikacin
Other (specify) Unknown
Previous diagnosis occured in: 1 Canada 2 Other country
Previous treatment completed or cured: 1 Yes 2 No 9 Unknown If yes, end date of previous treatment: (Year / Month / Day)

19. Case finding
1 Symptoms compatible with site of disease 2 Incidental finding 3 Post-mortem 4 Contact investigation 5 Immigration medical surveillance 7 Occupational screening
1 Initial immigration medical exam done outside Canada 8 Other screening
2 Initial immigration medical exam done inside Canada 9 Other (specify)
10 Unknown

20. Risk factors/Markers
HIV 1 Positive 2 Negative 3 Test refused 4 Test not offered 5 Unknown
If positive, year of 1st positive test / If negative, year of most recent test (Year)

Contact with person with active TB in past 2 years	1 Yes	2 No	9 Unknown
Diabetes mellitus type 1 or 2	1 Yes	2 No	9 Unknown
End-stage renal disease	1 Yes	2 No	9 Unknown
Homeless (at diagnosis or within the previous 12 months)	1 Yes	2 No	9 Unknown
Lives in correctional setting at time of diagnosis	1 Yes	2 No	9 Unknown
Long-term (≥ 1 month) corticosteroid use (prednisone ≥ 15 mg/day or equivalent)	1 Yes	2 No	9 Unknown
Previous abnormal chest x-ray (fibronodular disease)	1 Yes	2 No	9 Unknown
Substance abuse (known or suspected)	1 Yes	2 No	9 Unknown
Transplant related immunosuppression	1 Yes	2 No	9 Unknown
Travel to high incidence TB country in last 2 years If yes, how long _____ (in weeks)	1 Yes	2 No	9 Unknown
Other (specify)	1 Yes	2 No	9 Unknown

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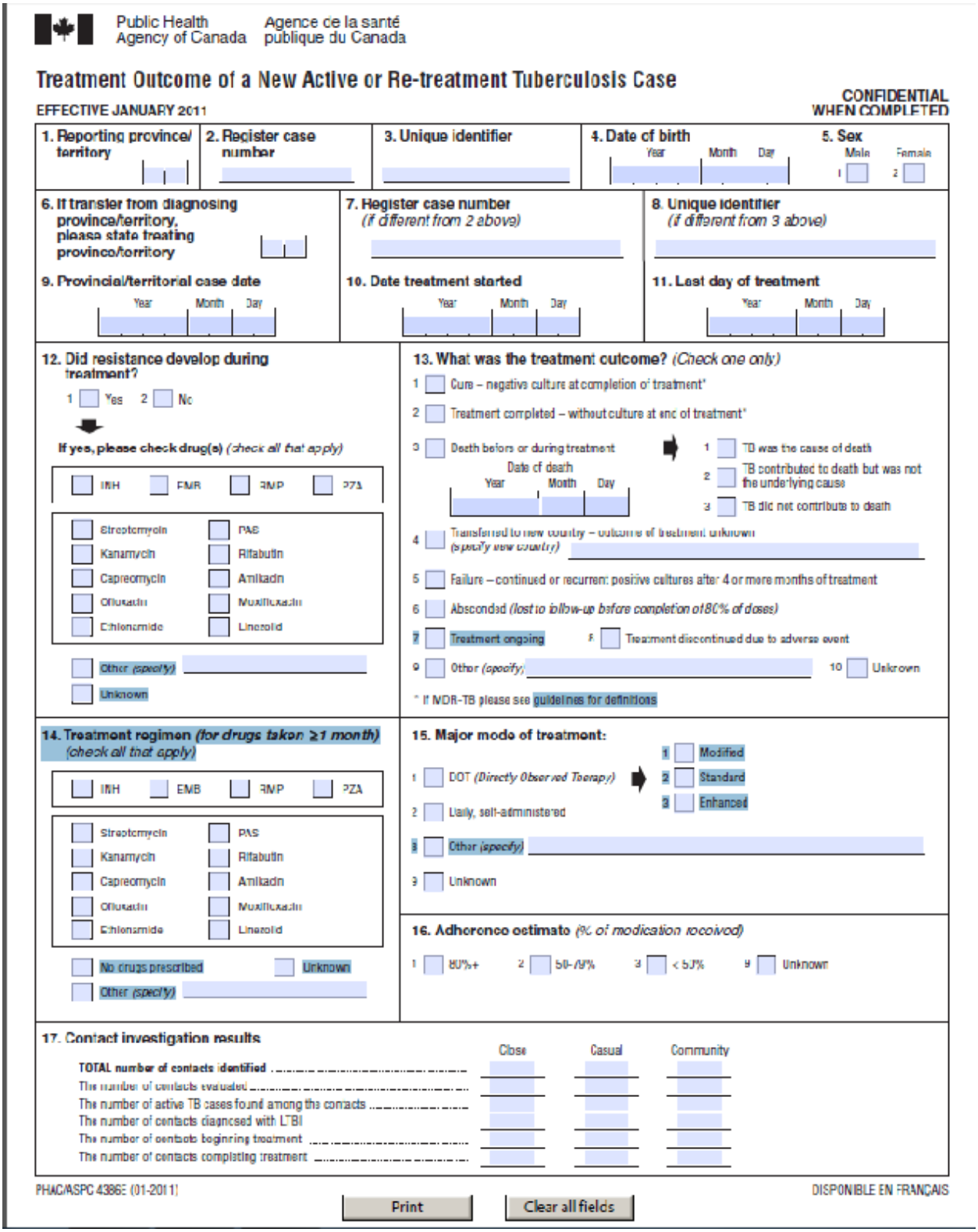

Public Health Agency of Canada / Agence de la santé publique du Canada

Treatment Outcome of a New Active or Re-treatment Tuberculosis Case

EFFECTIVE JANUARY 2011

CONFIDENTIAL WHEN COMPLETED

1. Reporting province/territory
2. Register case number
3. Unique identifier
4. Date of birth (Year / Month / Day)
5. Sex (1 Male, 2 Female)
6. If transfer from diagnosing province/territory, please state treating province/territory
7. Register case number (if different from 2 above)
8. Unique identifier (if different from 3 above)
9. Provincial/territorial case date (Year / Month / Day)
10. Date treatment started (Year / Month / Day)
11. Last day of treatment (Year / Month / Day)
12. Did resistance develop during treatment? 1 Yes 2 No
If yes, please check drug(s) (check all that apply)
INH EMB RMP PZA
Streptomycin PAS
Kanamycin Rifabutin
Capreomycin Amikacin
Ofloxacin Moxifloxacin
Ethionamide Linezolid
Other (specify)
Unknown
13. What was the treatment outcome? (Check one only)
1 Cure – negative culture at completion of treatment*
2 Treatment completed – without culture at end of treatment*
3 Death before or during treatment
Date of death (Year / Month / Day)
1 TB was the cause of death
2 TB contributed to death but was not the underlying cause
3 TB did not contribute to death
4 Transferred to new country – outcome of treatment unknown (specify new country)
5 Failure – continued or recurrent positive cultures after 4 or more months of treatment
6 Absconded (lost to follow-up before completion of 80% of doses)
7 Treatment ongoing
8 Treatment discontinued due to adverse event
9 Other (specify)
10 Unknown
* If NDR-TB please see guidelines for definitions
14. Treatment regimen (for drugs taken ≥1 month) (check all that apply)
INH EMB RMP PZA
Streptomycin PAS
Kanamycin Rifabutin
Capreomycin Amikacin
Ofloxacin Moxifloxacin
Ethionamide Linezolid
No drugs prescribed
Unknown
Other (specify)
15. Major mode of treatment:
1 DOT (Directly Observed Therapy) → 1 Modified, 2 Standard, 3 Enhanced
2 Daily, self-administered
3 Other (specify)
9 Unknown
16. Adherence estimate (% of medication received)
1 80%+ 2 50-79% 3 < 50% 9 Unknown
17. Contact investigation results

	Close	Casual	Community
TOTAL number of contacts identified			
The number of contacts evaluated			
The number of active TB cases found among the contacts			
The number of contacts diagnosed with LTBI			
The number of contacts beginning treatment			
The number of contacts completing treatment			

PHAC/ASPC 4386E (01-2011)

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Appendix 2: Risk Factors for the Development of Active TB

Risk factors for development of active TB among people with a positive tuberculin skin test (presumed infected with *Mycobacterium tuberculosis*).[28]

Risk factor	Estimated risk for TB relative to people with no known risk factor
High risk	
Acquired immunodeficiency syndrome	110 - 170
Human immunodeficiency virus infection	50 - 110
Transplantation (related to immune-suppressant therapy)	20 - 74
Silicosis	30
Chronic renal failure requiring hemodialysis	7 - 50
Carcinoma of head and neck	11.6
Recent TB infection (≤2 years)	15.0
Abnormal chest x-ray – fibronodular disease	6 - 19
Moderate risk	
Tumour necrosis factor alpha inhibitors	1.5 - 5.8
Diabetes mellitus (all types)	2 - 3.6
Treatment with glucocorticoids (≥15mg/d prednisone)	4.9
Young age when infected (0-4 years)	2.2 - 5
Slightly increased risk	
Heavy alcohol consumption (≥3 drinks/day)	3 - 4
Underweight (<90% ideal body weight; for most people, this is a body mass index ≤20)	2 - 3
Cigarette smoker (1 pack/day)	1.8 - 3.5
Abnormal chest x-ray – granuloma	2
Low risk	
Person with positive TST, no known risk factor, normal chest x-ray ("low risk reactor")	1
Very low risk	
Person with positive two-step TST (booster), no other known risk factor and normal chest x-ray	0.5

[28] Source: Chapter 6, page 4, Canadian Tuberculosis Standards, 7th ed.

Appendix 3: Tuberculosis (TB) Fact Sheet

WHAT IS TB?

TB is caused by a bacterium called *Mycobacterium tuberculosis.* When a person with infectious TB sings, talks, sneezes or coughs, TB bacteria are released into the air. These very tiny particles can travel on air currents and can be inhaled by other people in the area.

WHAT IS LATENT TB INFECTION (LTBI)?

LTBI occurs when a person has been exposed to TB bacteria, but do not have symptoms of the disease. They do not feel sick and they are not able to spread TB to others. The only sign of TB is a positive skin test and/or blood test. People with latent TB infection can go on to develop TB disease, so it is important they are seen by a healthcare provider.

HOW DO YOU TEST FOR LTBI?

The Tuberculin Skin Test (TST) is the most common test for TB exposure. This is a skin test given and read by a qualified healthcare provider. This test is done following contact with a TB case, before beginning a job in a health-related field and before some medical treatments. There are times when a TST may react even though the person has not been exposed to TB. In that case, a blood test, called an Interferon Gamma Release Assay (IGRA), may also be requested. Follow-up on the TST will be done by your healthcare provider.

HOW IS LTBI TREATED?

If it is determined that you have LTBI, you may require treatment with an antibiotic. It is usually one antibiotic taken for nine months.

WHAT IS ACTIVE TB DISEASE?

Active TB disease develops when the body cannot contain the TB germs and symptoms of the disease develop. These symptoms include a productive cough, chest pain, night sweats, unexplained weight loss, loss of appetite, fatigue, fever and/or coughing up blood. Symptoms of TB in other areas of the body depend on the areas affected (e.g. swollen lymph nodes or joint pain). People with TB disease are infectious and can spread TB to others. They need to be treated. Untreated TB disease can cause death.

HOW DO YOU TEST FOR ACTIVE TB?

A physician/nurse practitioner will do further tests for TB, such as an examination of the sputum and a chest x-ray.

HOW IS ACTIVE TB TREATED?

Active disease is treated with a combination of drugs for the first two months usually followed by two drugs as determined by your physician.

CAN TB BE CURED?

Yes. TB can be cured but the treatment is for at least six months. It is extremely important that you follow the prescribed treatment plan and finish the medication exactly as instructed or you may get even sicker.

DO I HAVE TO PAY FOR THE MEDICATION?

No. The medications are provided, free of charge, by the Department of Health & Community Services.

WHERE CAN I GET MORE INFORMATION?

For more information on TB go to website http://www.phac-aspc.gc.ca/tbpc-latb/faq-eng.php and for the Newfoundland and Labrador TB guideline go to http://www.health.gov.nl.ca/health/publichealth/cdc/tuberculosis_management.pdf

Appendix 4: Tuberculin Skin Testing (TST) Facts

WHAT IS A TST?

The TST is a skin test to determine if someone has been infected with the bacteria that causes tuberculosis (TB). The TST is a screening test for *exposure* to TB; it does not diagnose active TB.

WHO SHOULD HAVE A TST?

A TST is used to screen people:

- who have been in contact with someone who has active TB disease;
- before beginning employment in healthcare;
- before beginning medical treatments that may cause the immune system to be suppressed.

HOW IS THE TST ADMINISTERED?

- A very small amount of fluid (0.1 ml) is injected directly under the skin of the forearm by a qualified healthcare provider
- The site is examined 48-72 hours after the test to see if there is a reaction
- Your healthcare provider will tell you the test results and if any further testing is needed

WHAT IF THE TST IS POSITIVE?

If the TST is positive, your physician will be notified and you will be assessed for signs and symptoms of active TB disease. This may include a blood test called an Interferon Gamma Release Assay (IGRA), a chest X-Ray and sputum samples (cough into a cup).

Sometimes the TST can be positive even if there hasn't been any exposure to TB. Vaccination with BCG, immune suppression and advanced age can cause 'false' skin reactions. This will be determined in cooperation with a healthcare provider.

WHAT IS BCG VACCINATION?

BCG stands for Bacillus Calmette-Guérin. Prior to 1979, many children in Newfoundland and Labrador were vaccinated with BCG to prevent them from getting infected with TB.

HOW DO I CARE FOR THE SITE AFTER THE TST?

- Do not cover the TST area with a bandage or tape
- Do not rub or scratch the area where the TST was performed
- If the area becomes itchy, place a cold cloth on it

WHAT ARE THE CONTRAINDICATIONS FOR TST?

- A documented positive TST in the past
- A previous allergic/severe reaction to a TST
- Presently sick with a fever or infection
- Previously treated for TB
- Vaccinated in the past 4-6 weeks with a live vaccine

Appendix 5: Tuberculin Skin Test Assessment Record

Name (include maiden name):		**Date of Birth:**
Address:		**Postal Code:**
MCP:	Phone #:	**Physician:**
Reason for TST: □ Employment □ Clinical Assessment □ Other		

History

LTBI □ Yes □ No Date:_____	TB Disease □ Yes □ No Date:	Contact with TB □ Yes □ No Date:
Previous BCG Vaccination □ Yes □ No Date:	Previous TST □ Yes □ No Date:_____Results:_____	Previous IGRA □ Yes □ No Date: _____ Results: _____

Contraindications to TST

Current major viral infection □ Yes □ No	Live vaccine received in past 4 weeks □ Yes □ No	Reaction to previous TST□ Yes □ No	Immunocompromised □ Yes □ No

Assessment of symptoms

A cough that lasts longer than 3 weeks □ Yes □ No	Fever □ Yes □ No	Night Sweats □ Yes □ No
Coughing up blood or sputum (phlegm) □ Yes □ No	Weight Loss □ Yes □ No	Loss of appetitie □ Yes □ No
Comments:		

Consent checklist for TST

Fact sheet on TST provided □ Yes □ No	Benefits and risks of test understood □ Yes □ No	Agree to return in 48-72 hours □ Yes □ No
Client signature:	**Date:**	

Investigations

	Lot #	**Dose/Route/Site**	**Date**	**Result**	**Signature**
TST1 □ Yes □ No					
TST2 □ Yes □ No					

IGRA □ Yes □ No	Chest x-ray □ Yes □ No	Sputum for AFB x 3		
Date:	Date:	Date 1:	Date 2:	Date 3:
Result:	Result:	Result:	Result:	Result:

Contact information for nurse:

RN:	Phone:	Date:
Address:		
Comments:		

Appendix 6: Tuberculin Skin Test-Mantoux Technique

The procedure for the TST includes the administration steps and the reading steps.

The administration steps include the following:

Preparation

Collect supplies

Supplies	
• Vial of tuberculin ® five tuberculin units (5-TU) of purified protein derived (PPD) o PPD must be stored away from light at 2 – 8 Centigrade o Label date opened and who opened it on the vial o Note the expiry date on vial o Use the solution within one month after opening	• Anaphylaxis kit (as per recommendation in NL Immunization Manual)
• One cc disposable tuberculin syringe	• Puncture resistant container
• Needle – ¼ to ½ inch 26 or 27 gauge	• Pen/record
• Alcohol swabs/gauze	

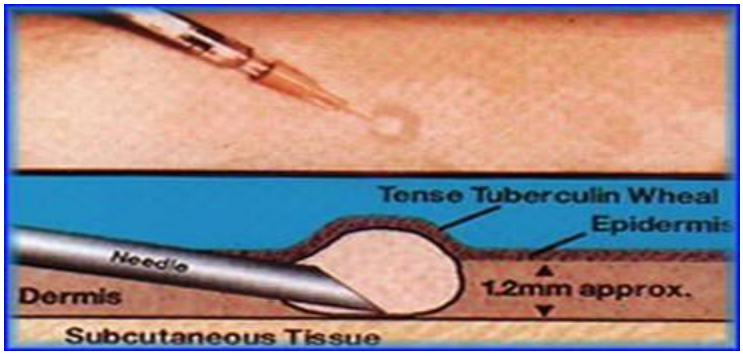
Educate Client

- Provide information about TB/ LTBI and the TST (Appendix 3 & 4)
- Assess for contraindications for TST
- Obtain informed verbal and written consent
- Ensure client can return in 48-72 hours to have the test read
- Pain, itchiness and discomfort at the site may occur
    - Do not scratch the site
    - A cold compress may relieve the symptoms
    - All normal activities (e.g., showering/bathing) can be resumed
- Monitor the person for 15 minutes after the injection

Method of injection

- Perform hand hygiene
- Use the inner aspect of the forearm (nondominant hand preferred) about 10 cm below the elbow, being careful to avoid areas with abrasions, swelling, visible veins or lesions that make TST difficult to read
- Cleanse the injection site with an alcohol swab and allow to dry to reduce irritation from the alcohol at the site
- Hold the skin of the forearm tautly and with the bevel of the needle up, insert the needle at a 5-15 degree angle
    - Without aspirating, administer a slow intradermal injection of 0.1 ml of 5 –TU of PPD just under the skin
    - The needle is inserted until the entire bevel is covered
- An elevation of the skin (a wheal) 6-10 mm in diameter should appear
    - The size is not completely reliable but if most of solution runs out it needs to be repeated. It necessary,repeat the test 5-10 cm from theoriginal site or use the other arm
    - A drop of blood may occur; use a gauze pad and do not rub site
    - Do not massage the site or cover the site with a bandage after injection
        - Doing either may change the results of the TST
- Dispose of needle in appropriate container

Correct placement of a TST



Final Steps

- Perform hand hygiene
- Record the information to include:
  - Date TST is applied; record in year/month/day (yyyy/mm/dd)
  - Dose administered and route
  - Manufacturer name and lot number of the injected antigen
  - Injection site
  - Expiry date of regent
  - Signature of health professional who administered the TST
- Remind the client to return in 48-72 hours; a reminder card is helpful
- Review the care instruction and monitor the client for 15 minutes post injection

Reading the TST

Assessment and interpretation of the results is not always straightforward**,** as interpretation of test results involves consideration of previous exposure and level of risk, previous testing and BCG vaccination. A TST must be read by a trained health professional 48 to 72 hours after administration. Self-reading is very inaccurate and not recommended. If the TST cannot be read within 72 hours, it should be repeated at a site far enough away from the previous test that the reactions do not overlap. No minimum wait is required to repeat the test.

- Collect supplies
  - Flexible millimeter (mm) ruler or caliper
  - Alcohol pad
  - Pen
  - Client record

Method for reading the TST

- Read the site of the TST in good light with the forearm supported on a firm surface and the elbow slightly flexed
- Look for the presence or absence of induration (hard, dense, raised formation)
  - Erythema or redness should be ignored when assessing induration
- Use a ballpoint pen, draw a line from the outer edge of the arm inward toward the induration, and stop when the pen comes against the border of the induration (Figure 1)
  - Repeat the process on the other side

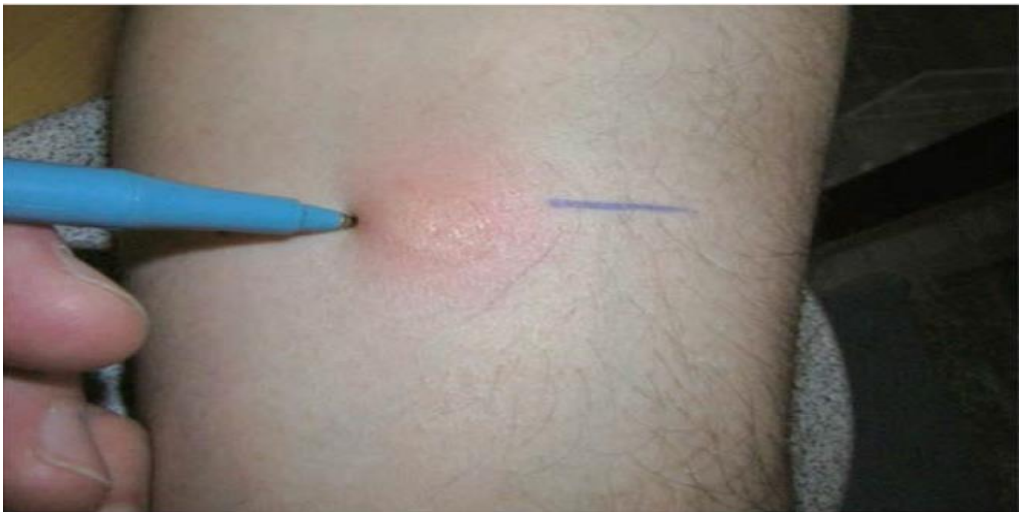


Figure 1: Ball-point method for reading transverse diameter of TST induration

- Using a caliper measure across the induration between the two lines
- Measure the diameter of induration at the widest part transversely (side-to-side) to the long axis of the forearm
- Do not round off the diameter of the induration to the nearest 5 mm as this can interfere with determining whether TST conversion has occurred in the event of a future TST
    - If the measurement falls between demarcations on the rules, the smaller of the two numbers should be recorded
- See Figure 2 for technique for measuring the induration

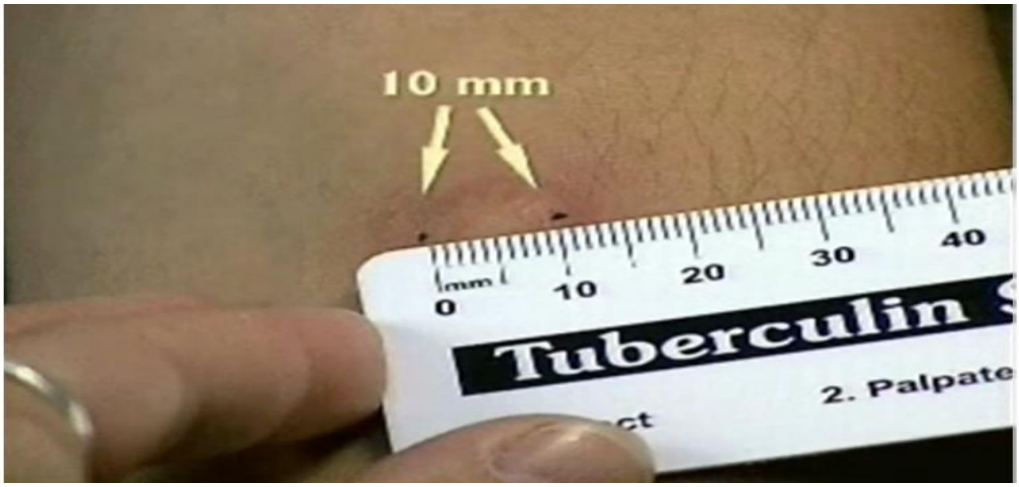


Figure 2: Measuring the induration of the TST

Documenting the results

- Document TST results in millimeters (mm) of induration, not of erythema or redness
    - When no induration is seen, write results as “0 mm”

  - Do not use words such as “positive,” negative,” “significant,” or “insignificant” in recording results
  - Blistering should be recorded
  - If the measurement fall between two demarcations on the ruler, the smaller of the two numbers should be noted

- Record the following information make available to client
  - Size of reaction in millimeters (mm)
  - Date and time the test was read
  - Signature of health professional reading the test
  - Adverse reactions if noted
  - Adverse reactions should be reported to Regional Health Authority public health office using the drug adverse events form
- Interpretation of TST results
    - Size of induration (Appendix 7a)
- Provide the client with a record

TST false-positive and false-negative reactions

Although the TST is a valuable tool, it is not perfect. Several factors can lead to false-positive or false negative skin test reactions as shown in Table 16.

Table 16: False-positive and false-negative reactions to the TST[29]

Type of Reaction	Possible Cause	People at Risk
False-positive	Nontuberculosis mycobacteria (NTM)	Those infected with NTM
	BCG vaccination	Those vaccinated with BCG
	Administration of incorrect antigen	Any person being tested
	Incorrect interpretation of TST result	Any person being tested
False-negative	Anergy (a lack of reaction by the body's defense mechanisms to foreign substances)	HIV-infected persons, others with weakened immune systems, severe TB disease, and some viral illnesses (e.g., measles, mumps, and chicken pox)
	Recent TB infection	Those infected with *M. tuberculosis* within the past 8 weeks
	Concurrent viral, bacterial or fungal infection	Those injected with a live-virus vaccination; those with a recent infection
	Chronic renal failure	
	Diseases affecting lymphoid organs	Those with Hodgkin's disease, lymphoma, chronic leukemia, sarcoidosis
	Immunosuppressive drugs	Those receiving steroids, TNF-alpha blockers or comparable drugs
	Very young or elderly persons	Newborns – immature immunity Elderly – waning immunity
	Stress	Those who have had surgery, burns, mental illness, graft-versus host reactions
	Incorrect storage or handling of antigen, administering the TST or results that are not measured or interpreted properly	Any person being tested

[29] CDC: Testing for tuberculosis infection and disease.

Appendix 7a: Interpretation of Tuberculin Skin Test Results

Interpretation of tuberculin skin test results and cut-points in various risk groups

TST result	Situation in which reaction is considered positive
0-4 mm	• In general this is considered negative, and no treatment is indicated

≥5 mm	• HIV infection
	• Contact with infectious TB case within the past 2 years
	• Close contact with known or suspected contagious person with tuberculosis
	• Presence of fibronodular disease on chest x-ray (healed TB, and not previously treated)
	• Children suspected to have tuberculosis disease:
	  • Findings on chest radiograph consistent with active or previous tuberculosis disease
	  • Clinical evidence of tuberculosis disease
	• Organ transplantation (related to immune suppressant therapy)
	• TNF alpha inhibitors
	• Other immunosuppressive drugs, e.g. corticosteroids (equivalent of ≥15 mg/day of prednisone for one month or more; risk of TB disease increases with higher dose and longer duration)
	• End-stage renal disease

≥ 10 mm	• All others, including the following specific situations:
	  Hematologic malignancies (leukemia, lymphoma) and certain carcinomas (e.g. head and neck)
	  • TST conversion (within 2 years)
	  • Diabetes, malnutrition (<90% ideal body weight), cigarette smoking, daily alcohol consumption (>3 drinks/day)
	  • Silicosis
	  • Persons with increased exposure to Tuberculosis, ie people born in TB endemic countries/high prevalence regions of the world
	  • Children at increased risk of disseminated TB disease -ie children less than 4 years old [30]

)	

[30] Kimberly, DW.; Brady, MT.; Jackson, MA. Definitions of Positive Tuberculin Skin Test (TST) Results in Infants, Children and Adolescents. Redbook (2018) Report of the Committee on Infectious Diseases, 31st Edition, Diseases, AAP, Committee on Infectious; Kimberly, David W.; Brady, Michael T.; Jackson, Mary Ann p 832.

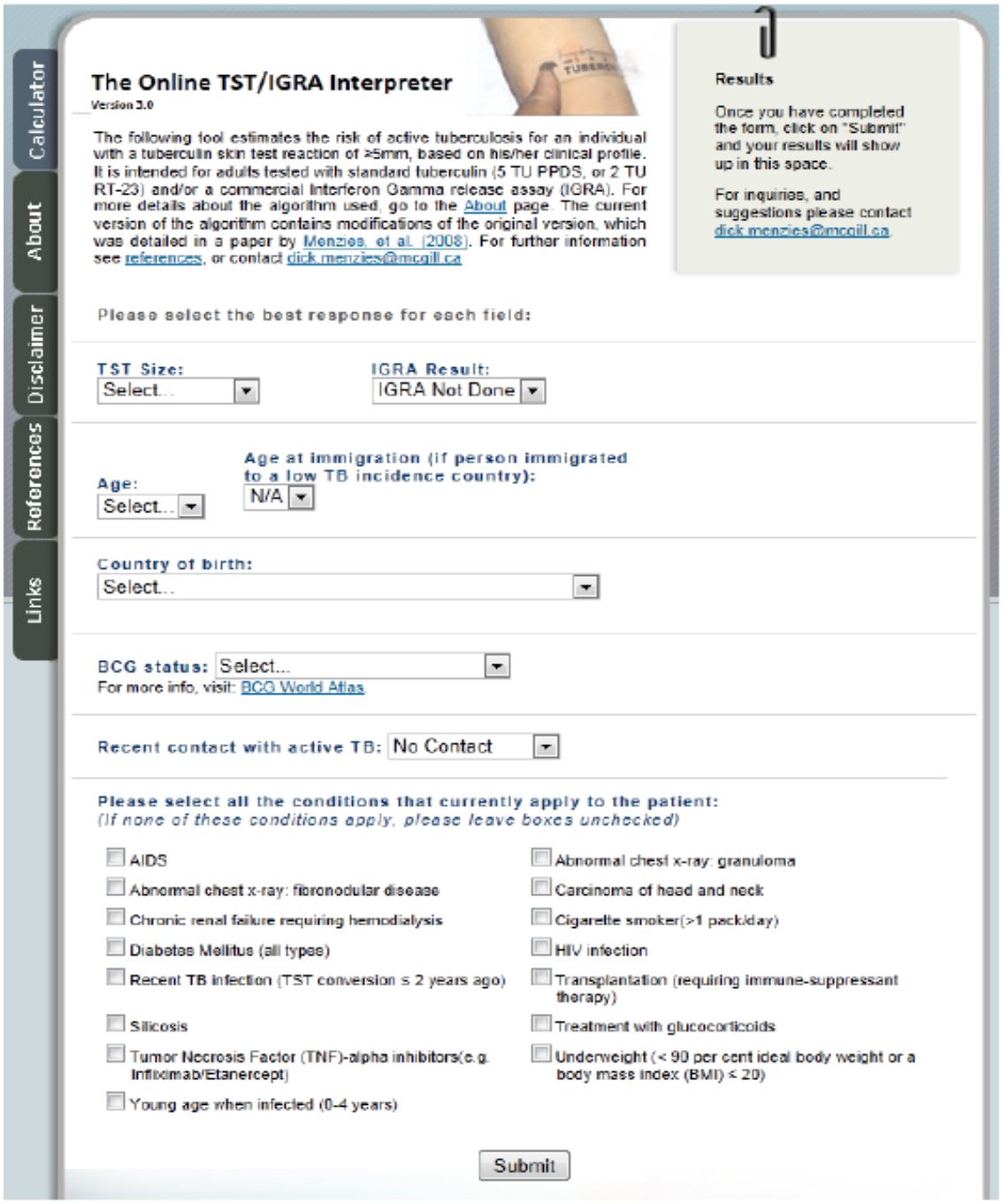
Appendix 7b: TST baseline screening

TST Status	Action
• Unknown or no previous TST	• Do two-step TST (second test 7-21 days after the first test) ***Note: If 1st step is negative and there are no identified risk factors, can be cleared to work while awaiting 2nd step***
• Documented prior negative TST, within the last year, with no previously documented two-step	• Do one TST and consider this the second step of the two-step method • If no risk factors, can be cleared to work
• Documented prior negative TST, greater than one year, with no previously documented two-step	• Do two-step TST **Note: If 1st step is negative and there are no identified risk factors, can be cleared to work while awaiting 2nd step**
• Previously documented two-step TST greater than one year ago and no TST testing within the last year	• Do one TST
• Previously documented two-step TST greater than one year ago and a negative TST within the last year	• TST not required at this time • Assess for recent exposure to TB or symptoms
• Documented prior positive or baseline positive TST	• See follow-up action below
• Previous treatment for TB /preventative treatment for LTBI	• See follow-up action below as if TST positive
• Prior positive TST, inadvertently tested (for example -documentation of previous TST not known)	• If ≥10 mm, do not repeat • If <10 mm, use result as test #1 of two-step TST; and complete the two-step process

Follow-up Action	
• If TST negative	• Document – No further action required
• If TST positive	• If positive, confirm BCG vaccination • It may be helpful to rule out a false-positive TST result by performing an IGRA if between 2 to 10 years old, received BCG vaccination greater than 1 year old, or received multiple doses of BCG vaccines • Review history for TB disease or infection and assess for signs and symptoms of TB • If no symptoms of TB present, no work restrictions required • Refer to attending MOH or medical provider for chest x-ray, medical exam if signs and symptoms present, and/or new conversion noted. Discuss with medical provider if there is an indication for LTBI treatment. • Document action

Appendix 8: Screenshot of the Online TST/IGRA Interpreter

Available on website http://www.tstin3d.com/en/calc.html



Appendix 9: BCG Request Form

Newfoundland Labrador

BCG Request Form - Fax to 709-729-4647

Name: _____**REASON FOR REQUEST***:* _____

Date of birth (Y/M/D):_____Address: _____

Surname while at school: _____ Parents/Guardians: _____

Former Home Address: _____ Last School Attended: _____

Requested by: _____ Fax #: _____ Date Requested: _____

This section to be completed by the Department of Health and Community Services

Tuberculin skin test		1st	2nd	3rd	4th	5th	6th	7th
Type:	Date tested							
	Test Result							

BCG Vaccination	1st	2nd	3rd	4th	5th	6th	7th
Date							

Comments:

_____

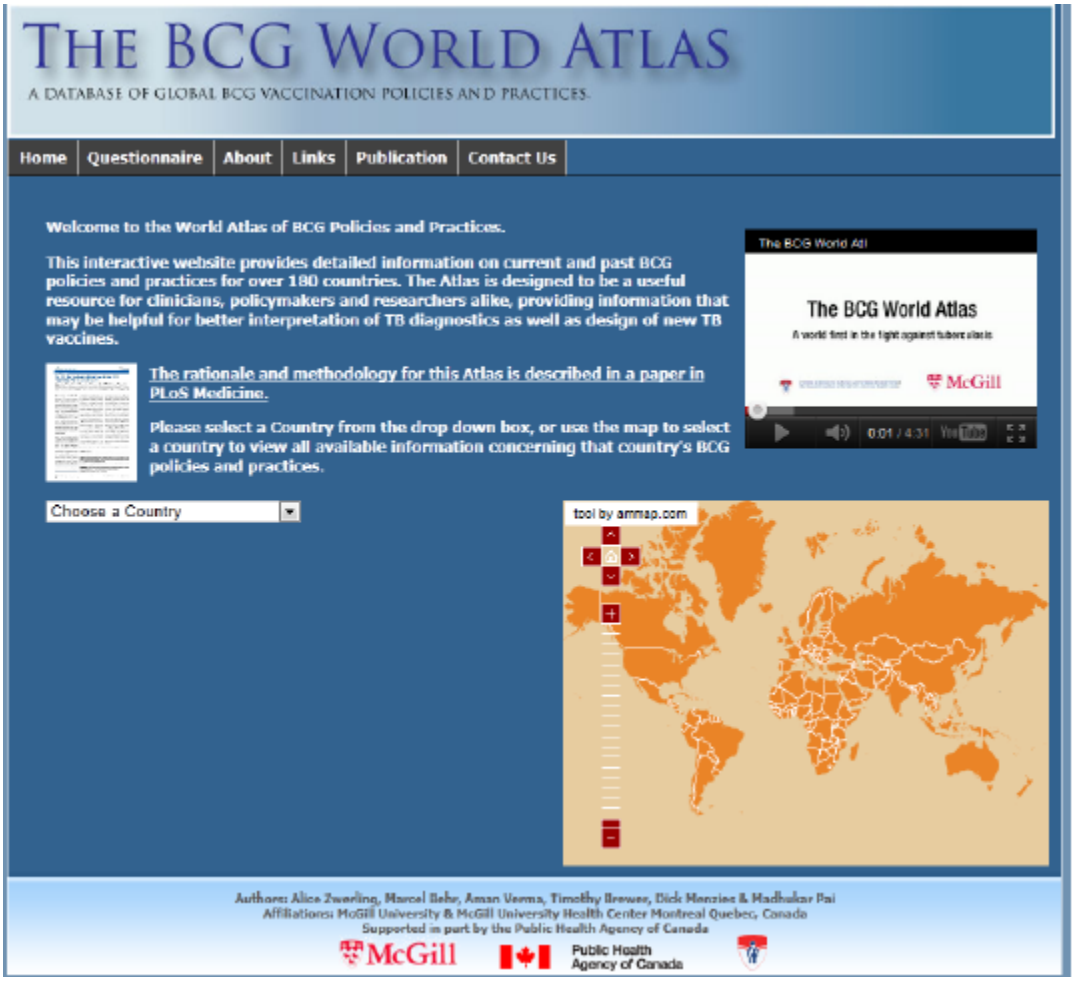
_____

Appendix 10: BCG World Atlas

The *BCG World Atlas* is available at website: http://www.bcgatlas.org/

This interactive website provides detailed information on current and past BCG policies and practices for over 180 countries. The Atlas is designed to be a useful resource for clinicians, policymakers and researchers alike, providing information that may be helpful for better interpretation of TB diagnostics as well as design of new TB vaccines.

Figure 1: Screenshot of the *BCG World Atlas*



Appendix 11: History of Tuberculin Skin Testing (TST) in Newfoundland and Labrador

Source: Helen Lawlor

INTRODUCTION AND RATIONALE

This history of tuberculin testing in Newfoundland and Labrador (NL) is intended to be useful in the interpretation of the tuberculin skin tests (TSTs) of former years. As the TST is a component in the detection and management of TB, a record search is a requirement any time an individual's tuberculin status has to be determined. This means that 'old records' must be reviewed in order to capture a person's TB history. As of 2015, it is almost 70 years ago since tuberculin testing was introduced in NL. Hopefully, this contribution to the TB manual will assist health professionals to fill in the gaps in deciphering 'who had what and when'. The chronology for the three TSTs that were utilized in the TB Control Program, a description of each TST procedure and Bacillus Calmette–Guérin (BCG) vaccination will also be included.

BACKGROUND

The BCG[31] was phased out on the island portion of the province in 1975 and in Labrador in 1979. Routine Tine testing in schools was discontinued on the island as of September 1980, and it ended in Labrador in 1997. Evidence of TSTs and BCG vaccinations from that time was documented on the School Health and Immunization Record of the day. In the case of BCG, the results of the Cuti TST and date of vaccination were documented on the designated BCG record and often on both records. Often in the Public Health Office were ledger books, called 'TB bibles'. These contained TB profiles, which were used during times of contact tracing and investigations. In the absence of any computerized data base, this was a superb resource and was meticulously kept – a credit to those nurses who maintained it.

TB PROGRAM DELIVERY

For many years TB Control was a major Public Health program in the province, and BCG was synonymous with TB control. When the program began in the late 1940s, it consisted of tuberculin skin testing with Cuti[32] BCG and BCG vaccination, and was included in the mandate of the Public Health Nurse. There were Public Health Nurses (PHNs) who were called BCG nurses; these nurses travelled to deliver the program in communities where there was no assigned PHN. Further, the nurses, along with an x-ray technician, travelled on the medical ship *The Christmas Seal* to communities accessible only by boat. The Grenfell medical ship *The Strathcona* brought nurses and x-ray equipment to coastal communities of Labrador. During the years 1950-1968 a bus, which had been converted to a mobile x-ray unit, transported the BCG nurses and x-ray technician to schools and communities which were accessible by road. At the same time, a railway car, staffed by nurses and x-ray technicians, was converted to an xray unit in order to reach communities that could only be reached by railway.

[31] BCG (named after two French scientists, Calmette and Guérin who developed it in 1920s) is an active immunizing agent. It is a culture preparation of Bacillus Calmette Guerin, Connaught sub strain. It contains a suspension of a live attenuated strain of *Mycobacterium bovis* and is used in the prevention of human tuberculosis. While it does not confer 100% protection, it is important in the prevention of meningitis, military tuberculosis and other forms of invasive infection and was widely used in the 1940s and 1950s.

[32] The Cuti BCG tuberculin skin test was an allergy test that was developed in 1947 by scientists, Dr. Frappier and Dr. R. Guy. It was believed to a more rapid and sensitive test than other tuberculin tests used at the time.

CHRONOLOGY OF TUBERCULIN TESTS

Three TSTs namely, Cuti BCG (Cuti), Tine and 5 tuberculin units of purified protein derivative (5 TU PPD) - Mantoux, were utilized over the years in tuberculin screening in NL. Vaccination with BCG was also a component of the TB Control program. The tables below provide the chronology for BCG vaccination and TSTs used in NL since 1948.

BCG		Persons born between
Year	Target groups	
1948-1949	• Given to Nursing Students in schools of nursing	Varied years
1951	• Introduced to infants/young children, Grades 4 and 8. (also Grade 11)	• 1935 to 1951
1975	• Program discontinued on island portion of province	• 1959 to 1975
1979	• Program discontinued in Labrador	

Note: Those born between 1960-1965 were among the last to be BCG vaccinated in the province. The scarifications (scratches) can still be seen on the lower back area of many of those who of many of those who were vaccinated even 70 years ago.

TINE		Persons born between
Year	Target groups	
1972-1980	• Kdg, Grade 5 and 10 • Kdg and others entering NL schools from outside the province • Grade 10 students who had not been previously vaccinated	• 1957 to 1975
1980-1981	• Kdg and others entering NL schools from outside the province • Grade 10 students who had not been previously BCG vaccinated	• 1965-1975
1982	• Randomly selected grades and schools, alternating yearly, depending on the prevalence of TB in the community	

Note: In Labrador TB screening continued until 1997.

For the most part, there has not been any routine TB skin testing in the schools since 1982. In situations where there has been contact tracing, the 5TU PPD Mantoux was used. When the BCG program was discontinued in Labrador, a screening program using the 5TU PPD Mantoux, was used to TST children at age 5 months, Kindergarten, Grades 5 and 10 on the north coast. This screening program continued until 1997 when a review identified no new cases as a result of this routine screening effort.

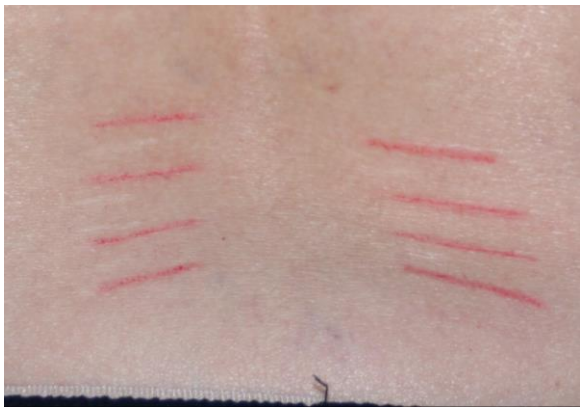
DESCRIPTION AND PROCEDURE FOR TUBERCULIN TESTS

The BCG program consisted of two components:
(1)Cuti BCG TB Skin Test and (2) BCG Vaccination

Cuti BCG TB Skin Test

Cuti was used to skin test individuals to determine their tuberculin status prior to vaccination with BCG. The test was performed on the forearm.The area was cleansed with acetone and allowed to dry. One drop of BCG liquid was then placed on the skin. Using one end of a double pointed needle (special sterile needle for scarifications), one scarification (scratch) was made above the vaccine. This scratch was the 'control scratch'. Then with the other end of the double pointed needle, a scratch was made through the vaccine, and the vaccine was worked into the area. (The scratch was enough to break the skin and not to draw blood). Then it was allowed to dry. The test was read in 48-72 hours. If the reading was 2.5 mm induration and over, it was a positive reading, and the person was not vaccinated. If the reading was negative, i.e. less than 2.5mm, the person was BCG vaccinated as described below.

BCG Vaccination

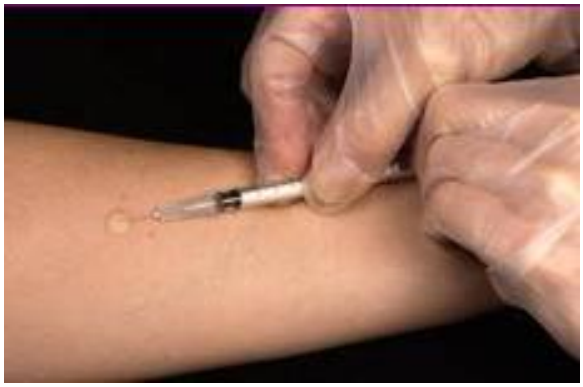


Many refer to BCG vaccination as "the scratches". Often, in the absence of a person's record, or if the person cannot remember having been BCG vaccinated, the scarifications (scratches) on the individual's back are usually still visible enough to confirm that the person was vaccinated with BCG. BCG vaccination was performed on the individual's lower lumbar region. The area was cleansed with acetone and allowed to dry. Eight (8) drops of BCG vaccine were placed in the designated area of the lower back on either side of the spine. Then using one end of the double pointed needle, eight scarifications(scratches), 1cm long and 1 inch apart, were made through each of the eight BCG drops. With the other end of the double pointed needle, the BCG liquid was spread evenly and worked through the scarifications. The area was then covered with a large band aid for 48 hours, at which time the 'scratches' would normally be healed (scabbed over). The individual would then be retested with Cuti at the appropriate interval/age/ grade. If the Cuti result was positive, i.e. if the induration measured 2 .5 mm or over, consultation would occur with the Regional Medical Officer of Health or the Provincial Director TB Control regarding booster effect of the BCG, symptom review and evaluation, need for chest x-ray or other appropriate action.

Tuberculin Tine Test

The Tine Test was a tiny, short metal spiked (hence tine) four pronged instrument. The Tuberculin antigen was located on these spikes, and was introduced just under the skin of the forearm. The area would be marked with a pen so that the test site would be easily identified when it was read in 48-72 hours. A Tine Test reading of 0-4 mm induration was considered negative. Induration that measured 5-9 mm was doubtful, and an induration reading of 10 mm or over was a positive reading. An area that was vesicular (blistered) was very strongly positive. Because it was not possible to control precisely the amount of TB antigens used in the Tine test, a positive Tine was always followed up with 5TU PPD (Mantoux). If a person's Mantoux was positive, he/she would then have a chest x-ray, would be investigated for symptoms and receive the appropriate follow up.

5TU PPD (Mantoux) Tuberculin Skin Test



The Mantoux is the current standard TST for contact tracing, pre-employment screening or anywhere TST is required. The procedure for the Mantoux is described in Section 3 of this guideline.

CONCLUSION

This effort was not intended to provide a complete history of TB in this province. The primary purpose of this effort was to provide the history of the various TSTs for health care providers who are not familiar with past practices. Hopefully, this attempt has provided sufficient detail to 'fill in the gaps' for those who are, and will continue to be, involved with TB programming in NL. It is acknowledged that while there are still many challenges associated with TB control, there were also challenges in the past – albeit different challenges. However, the vigilance for TB is never over. Even today, Sir William Osler's words are still pertinent: "Tuberculosis is a social disease, with medical overtones".

Acknowledgement May 2015

Helen Lawlor provided this overview of TB testing in NL. She has extensive experience in Public Health in the Province. She worked as a Staff Public Health Nurse in St. John's, Regional Nurse on the Northern Peninsula, PHN Supervisor for Clarenville-Bonavista- Burin, PHN Director Western Region. She was the last to hold the province's Provincial PHN Director's position. Thanks to Helen for this contribution.

Appendix 12: Interferon Gamma Release Assay (IGRA) – Healthcare Professional

WHAT IS AN IGRA TEST?

An IGRA is a blood test developed to help in the diagnosis of latent tuberculosis infection (LTBI). Two IGRAs are currently registered for use in Canada – the QuantiFERON®-TB Gold In-Tube (QFT) assay and the T-SPOT®.TB assay.

HOW DO IGRA TESTS WORK?

The IGRAs measure a person's immune reactivity to *Mycobacterium (M.) tuberculosis.* White blood cells from most persons that have been infected with TB will release interferon-gamma (IFN-g) when mixed with antigens derived from *M. Tuberculosis*.

WHEN SHOULD THE TEST BE USED?

The test may be used following a positive tuberculin skin testing (TST) to support the diagnosis of latent tuberculosis infection for patients about to undergo immunosuppressive therapy, during contact tracing, and other indications at the discretion of the Regional Medical Officer of Health.

CAN IGRA TESTS DISTINGUISH BETWEEN ACTIVE TB AND LTBI?

No, the tests cannot distinguish between active TB and LTBI.

WHAT ARE THE ADVANTAGES OF THE IGRA TEST?

- Prior BCG vaccination does not cause a false-positive IGRA test result
- It requires a single patient visit to conduct the test
- Does not boost responses measured by subsequent tests
- It increases detection sensitivity when you take a positive result from a second test as evidence of infection

WHAT DOES THE TEST INVOLVE?

This blood test requires special tubes for blood collection and the blood samples must be processed within 8-16 hours after collection while white blood cells are still viable. The physician requesting the test must confirm that the local laboratory has the necessary equipment to collect and transport the specimen to Public Health Laboratory.

WHO CAN ORDER AN IGRA TEST?

A physician who has collaborated with either the Regional Medical Officer of Health or the Public Health Laboratory can order the test.

DO LIVE VACCINES AFFECT IGRA?

IGRA testing should be done either on the same day as vaccination with live-virus vaccine or 4 weeks after the administration of the live-virus vaccine.

HOW ARE THE RESULTS INTERPRETED?

IGRA interpretations are based on the amount of IFN-g that is released or on the number of cells that release IFN-g. A positive test result suggests that *M tuberculosis* infection is likely; a negative result suggests that infection is unlikely. An indeterminate result indicates an uncertain likelihood of infection.

Appendix 13: Tuberculosis (TB) Blood Test – Questions and Answers for the Public

WHAT IS A TB BLOOD TEST?

Interferon Gamma Release Assay, or IGRA, is a blood test to find out if you have TB germs in your body. IGRA is done in addition to, or instead of, the tuberculin skin test (TST). Unlike the TST, the Bacillus Calmette–Guérin (BCG) vaccine does not affect the IGRA test.

WHY WOULD A TST BE POSITIVE?

Prior to 1979, most children in Newfoundland and Labrador were vaccinated with BCG to help protect them from getting infected with tuberculosis. Those who have had BCG vaccine may have a false positive TST result.

WHEN IS AN IGRA BLOOD TEST NEEDED?

An IGRA test is requested by your healthcare provider in the event of a reactive/positive TST.

HOW DO I GET THE BLOOD TEST?

The IGRA test is not performed in all areas of Newfoundland and Labrador. Call your local lab regarding IGRA test availability, times, and any specific instructions. Once collected, the blood is sent to St. John's for testing and results may not be available for 7-10 days. The doctor/nurse who ordered the test will get the results.

DO LIVE VACCINES AFFECT IGRA?

IGRA testing should be done either on the same day as vaccination with live-virus vaccine or 4 weeks after the administration of the live-virus vaccine.

WHAT WILL HAPPEN IF I HAVE A POSITIVE RESULT?

If you have a positive result it could indicate that you have a TB infection. When TB germs enter your body you could have an infection, called latent TB infection. If the infection is not contained by your body you could get TB disease. The difference between them is as follows:

Person with Latent TB infection	Person with TB disease
• Does not feel sick	• May feel sick and have symptoms such as cough for more than 3 weeks, fever and/or weight loss
• Cannot spread TB Bacteria to others	• May spread TB bacteria to others
• Chest x-ray is usually normal	• Chest x-ray may be abnormal
• Sputum smears are negative	• Sputum smears may be positive
• May require treatment for LTBI to prevent TB disease	• Needs treatment for TB disease
• Does not require isolation from others	• May require isolation during the infectious phase

Your results will be reviewed by your nurse or doctor. For more information on tuberculosis go to website http://www.phac-aspc.gc.ca/tbpc-latb/faq-eng.php

Appendix 14: Fact Sheet for Client on LTBI Treatments

INFORMATION ON ISONIAZID: PREVENTATIVE TREATMENT FOR TUBERCULOSIS

WHAT IS LATENT TB INFECTION (LTBI)?

The skin test for tuberculosis (TB) indicates that you have the TB germs in your body. You do not have active TB disease. You are not infectious. Therefore, you do not have to worry about passing the TB germs to someone else.

To kill the TB germ in your body and prevent it from causing active TB disease in the future, it is important to take the medication ISONIAZID (INH) as ordered by your doctor. ISONIAZID is an antibiotic which is very good at killing the TB germ.

HOW SHOULD I TAKE ISONIAZID?

Take ISONIAZID (INH) at the same time every day, on an empty stomach (1 hour before or 2 to three 3 hours after eating food).

It is important to take ISONIAZID every day, as prescribed by your doctor. If you miss a dose, take your pills as soon as you remember. But if it is almost time for the next day's dose, skip the missed dose. Do not take a double dose.

DOES ISONIAZID INTERACT WITH OTHER DRUGS?

- Avoid alcohol consumption.
- If you need to take an antacid for stomach-ache or heartburn, take the antacid at least 2 hours apart from ISONIAZID.
- Tell your doctor, nurse, and pharmacist if you are taking any other medicines, including any non-prescription remedies.

WHAT ARE THE POSSIBLE SIDE EFFECTS OF ISONIAZID?

Most people do not experience any side effects with ISONIAZID. If ISONIAZID bothers your stomach when you take it on an empty stomach, try to take ISONIAZID with a piece of bread or a few crackers. This may help make your stomach feel better.

STOP TAKING ISONIAZID AND CONTACT A DOCTOR OR NURSE IF YOU EXPERIENCE THE FOLLOWING:

- Skin itchiness or rash
- Unusual tiredness or weakness
- Fever
- Brown (tea-color) urine
- Yellowing of skin or eyes
- Loss of appetite
- Nausea (urge to vomit)
- Stomach upset or diarrhea
- Tell your doctor if you experience numbness or tingling in your hands or feet.
- Your doctor will order blood tests for you while you are taking these medicines. It is very important that you keep your appointments with your doctor and go for all your blood tests.

PYRIDOXINE (VITAMIN B 6) IS SOMETIMES ORDERED BY THE DOCTOR TO BE TAKEN WITH ISONIAZID

PYRIDOXINE is the name for Vitamin B_6. Taking PYRIDOXINE (Vitamin B_6) will help prevent numbness and tingling of the hands or feet sometimes caused by ISONIAZID.

HOW SHOULD I STORE ISONIAZID AND PYRIDOXINE (VITAMIN B6)?

- Keep the bottles tightly closed and away from the reach of children.
- Store in a cool, dry place.
- Protect from light.

If you have any questions, please call the Communicable Disease Control Nurse or your local Public Health Nurse.

Contact number for Public Health Nurse: _____

Contact number for Communicable Disease Control Nurse: _____

Appendix 15: Latent Tuberculosis Infection Treatment Monthly Monitoring Form

Name: _____ **Address:** _____

Age: ____ **MCP:** _____ **Phone #:** _____

Physician: _____ **Date treatment started:** _____ **(Y/M/D)**

Treatment: □ Isoniazid Dose: _____ □ Pyridoxine (Vit B 6) □Yes or □No □ Other _____

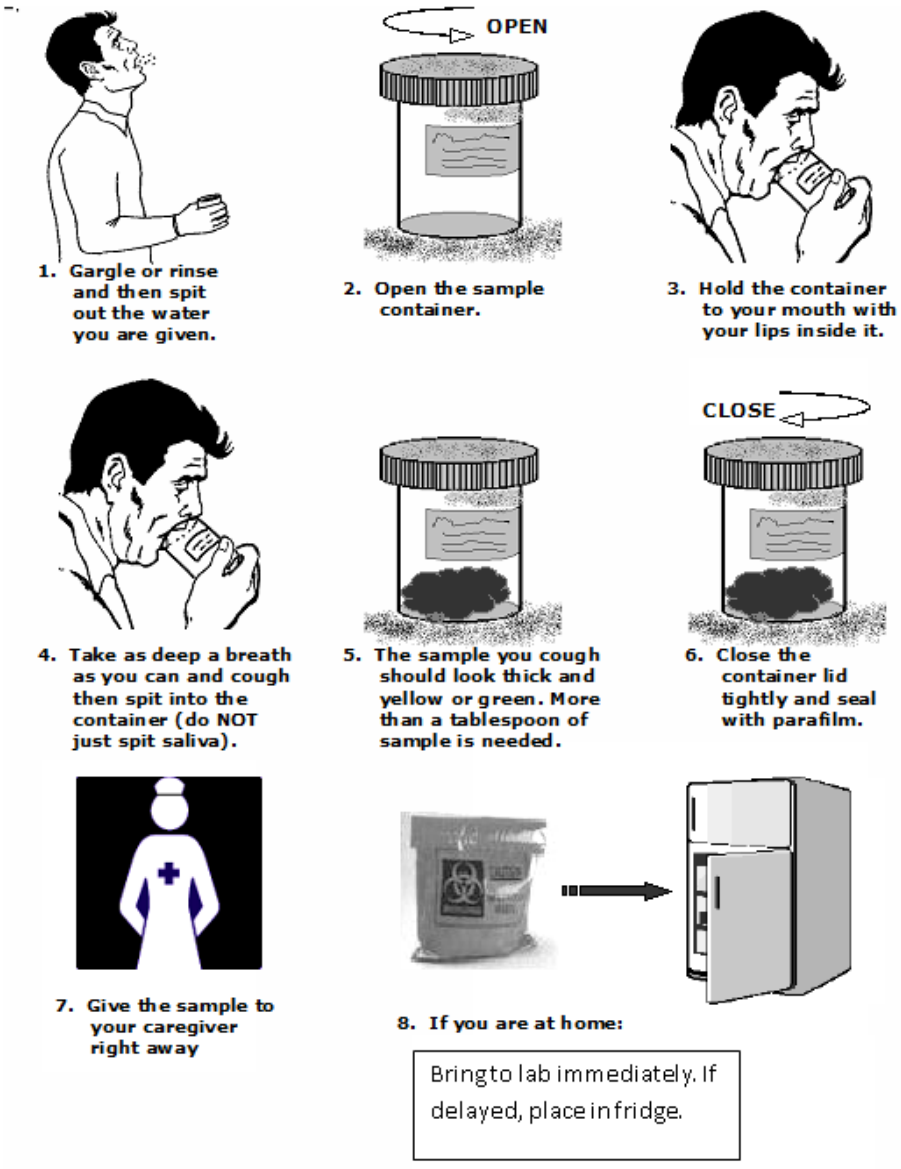
Signs/Symptoms Y=Yes N=No	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Nausea/vomiting												
Jaundice/yellowing of eyes/skin/dark yellow urine												
Weight loss or gain												
Itchiness/Rash												
Numbness/tingling of hands or feet												
Fatigue												
Determine if client has any other health issues which may impact on the LTBI treatment.												
Are you taking the medication daily?												
Do you have any other medical problems?												
Did you have a blood test? When?												
Date: Signature:												

If any concerns please contact the family physician or the CDCN. Return form to CDCN when treatment completed.

Date treatment completed: _____ **Public Health Nurse:** _____

The client should be advised to call the doctor or public health nurse **immediately** if symptoms occur.

Appendix 16: Sputum Collection Procedure – Information for Clients



Source: Nunatsiavut Health and Social Development TB Guideline – May 2007

Appendix 17: Sputum Induction

Sputum induction has been advocated for improving diagnostic yield in patients experiencing difficulty in expectorating sputum. The procedure uses hypertonic saline to irritate the airway, increase secretions, promote coughing, and produce a specimen. This procedure induces coughing, resulting in a greater likelihood that infectious droplet nuclei are expelled into room air. Airborne Precautions must be followed when sputum induction is performed. The procedure should be performed in an airborne infection isolation room.

Equipment

- Aerosol generator
- Clear plastic zip-lock bag with biohazard label
- Cup of water
- Gloves
- Laboratory requisition
- Respirator (N95 for HCW)
- Sterile sputum collection container
- Hypertonei saline as per doctor's order
- Surgical mask (for patient)
- Tissues

Procedure for sputum induction

Procedure	Key points
Staff must follow Airborne Precautions	• Hand hygiene prior to and after patient contact • A fit tested N 95 respirator must be worn when entering a sputum induction room during a cough inducing procedure • Aseptic technique must be observed when placing the sterile solutions in the nebulizer • Airborne Precautions sign must be on the door • Confirm quantity of sputum with your testing laboratory
Explain the procedure to the patient	• Purpose of procedure • How to use the aerosol generator • How to open and expectorate into sputum container • How to place container in plastic bag • How to notify nurse if assistance is needed or when procedure is completed • Importance of staying in the room or booth until coughing has stopped • Importance of replacing surgical mask before leaving room or booth (if appropriate)

Instruct patient in sputum induction	• Remind patient not to begin the sputum induction procedure until staff member has left the room and closed door (when possible) • Patient should sit upright • Rinse mouth or drink water prior to beginning procedure • Inhale mist with deep breaths • Cough vigorously if spontaneous coughing does not occur • Cover mouth with tissue when coughing, unless expectorating into a jar • Continue attempts until 5-10 ml of sputum have been obtained. (Show patient how much is needed in specimen container.)
Prepare compressor	• Test nebulizer to ensure that adequate mist is produced • Compressor devices that create an aerosol with compressed air
Patient must be observed at all times during the procedure	• Watch carefully for signs of respiratory distress and ensure that patient does not leave the room until coughing has stopped • A view window in the door should be provided to monitor the patient (if possible)
Ensure that patient remains in the room/booth until coughing has stopped (if outpatient)	• The room/booth contains infectious particles
Ensure that door is closed after patient completes the procedure and leaves the room	• Adequate time must be allowed for removal of at least 99% of airborne contaminants (usually one hour)
Document procedure and ensure specimen is sent to the laboratory promptly	**Note: Indicate on the requisition that the sputum was induced because the resulting specimen often appears watery.**

Appendix 18: Pediatric Gastric Aspirate (GA) Collection

Gastric aspirate has been the diagnositic procedure of choice in young children who are unable to produce sputum. During sleep, mucous from the lungs can be sweeped into themouth and then swallowed where it may be a source of TB organisms.

When to collect GA

- Aspirates are collected after at least six hours of sleep and before the stomach has emptied. The ideal time is just at the time of waking.
- Patients shound not drink or eat anything overnight to prevent the stomach from emptying. They should avoid exposure to the smell or sight of food, which may encourage gastric emptying.

Key tips

- A step by step guide for gastric aspiration and a demonstration video clip are available from the Curry International Tuberculosis Center at the following website http://www.currytbcenter.ucsf.edu/products/product_details.cfm?productID=ONL-06
- Traditionally, three gastric aspirates on consecutive mornings are performed for each patient. This is the number that seems to maximize yield. Of note, the first gastric aspirate collection has the very highest yield and should be collected using the best possible technique.

Laboratory information

The gastric aspirate material must be pH neutralized as soon as possible after aspiration as the gastric acid may **kill the *M. tuberculosis.*** **Sample must be neutralized within 1 hour for GA specimens.**

- The laboratory must be contacted prior to specimen collection to obtain details on specimen collection and transport of specimens.
- **If the laboratory is not available to immediately** pH neutralize the sample, it should be placed in a sterile container with the appropriate amount of sodium corbonaqte or a bicarbonate solution.

Equipment needed

Ensure that you have all necessary equipment before you start:

- An assistant
- Equipment for the placement of the nasogastric tube (as per RHA policy)
- Specimen container – check with laboratory to determine if a special bicarbonate container is required
    - If a special bicarbonate tube or cup is not available, the lab must neutralize the specimen with bicarbonate within ½ hour.
- Requisition and label

Procedure – Refer to the RHA policy & procedure for nasogastric (NG) tube placement

Obtain Gastric Aspirate

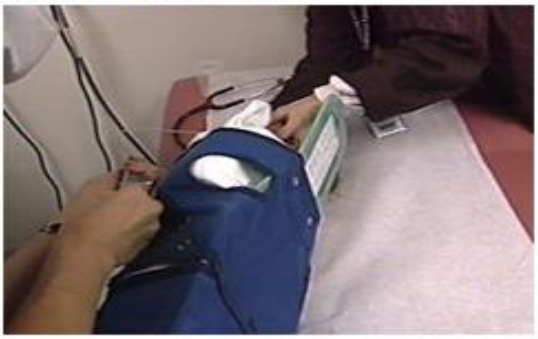
A) When the tube reaches the pen mark, aspirate the stomach contents with the syringe.

B) Place the gastric aspirates in a special bicarbonate-containing gastric aspirate tube or regular specimen cup.

C) If a special bicarbonate tube or cup is not available, the lab must neutralize the stomach acid with bicarbonate within ½ hour.

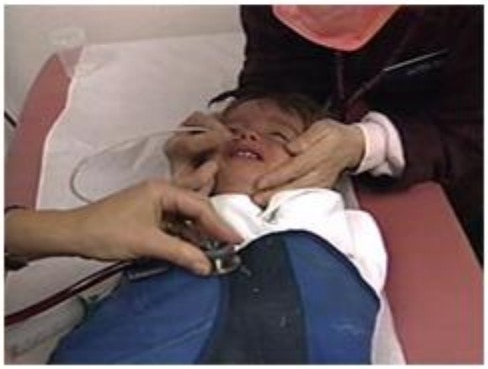
Respond to Insignificant Yield

A) If less than 5 - 10 cc of mucous returns, re-position the tube and/or the child in order to look for the pool of mucous. While continuing to gently aspirate with the syringe, pass the tube further along several inches and try rolling the child up onto his/her side.



B) If still < 5 - 10 cc of gastric contents have been aspirated, put any yield into your cup or tube.

C) Prepare to instill water into the tube. BEFORE instilling anything into a nasogastric tube, always check the position of the tube. Instill 10 cc of air quickly into the tube while listening with a stethoscope directly over the stomach. If the tube is properly positioned in the stomach, a loud gurgling sound will be heard. If you do not hear the air or if the child has any respiratory distress, remove the tube immediately.



D) If you hear the air go into the stomach, instill 20 - 30 cc of sterile water into the tube.

(Note: the organism is most viable when not exposed to saline or preservatives).

E) Quickly re-aspirate. If you still have no significant yield, try advancing or withdrawing the tube and changing the child's position in order to find mucous. Continue to aspirate syringe as you withdraw tube.

When the tube is ready for withdrawal - continue to aspirate - frequently you will find mucous on the way out.

The child can then be comforted.

Source: Curry International Tuberculosis Center. Available at website http://www.currytbcenter.ucsf.edu/products/pediatric-tuberculosis-guide-gastric-aspirate-procedure

Appendix 19a: Directly Observed Therapy (DOT) for TB Treatment Monthly Record

Name:		Physician:	Contact Number:
MCP:		Date of Diagnosis:	DOT start date:
Address:		Public Health Nurse:	
DOB:	Phone#:	Note: Date=yyyy-mmm-dd	

Medication/dose/frequency	# of doses	Date initiated	Date completed	Comments
1.				
2.				
3.				
4.				
5.				

Initials for date of DOT and √ to indicate DOT complete or X if an issue. Month: _____

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Initials																															
Med 1																															
Med 2																															
Med 3																															
Med 4																															
Med 5																															

Indicate Y (yes) for presence of any of the following symptoms and N (no) if no symptoms identified.

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Rash itching																															
Yellowing eyes/skin																															
Tingling of hands/feet																															
Nausea vomiting																															
Fever																															
Chills aches																															
Weight gain/loss																															
Bleeding/ bruising																															
Trouble seeing																															

Initials	Name Printed	Signature	Initials	Name Printed	Signature

Appendix 19b: Directly Observed Therapy (DOT) – Client Checklist

Name:	Physician: Contact Number:
MCP:	Date of Diagnosis:
Address:	Community: PHN:
DOB: Phone#:	Medication/Dose/Schedule:
Date DOT started:	

Indicate Y (yes) for presence of any of the following symptoms and N (no) if no symptoms identified.

Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
Rash itching																															
Yellowing eyes/skin																															
Tingling of hands/feet																															
Nausea vomiting																															
Fever																															
Chills aches																															
Weight gain/loss																															
Bleeding/ bruising																															
Trouble seeing																															

Directly Observed Therapy																															
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
Watched client swallow pills																															
Initials																															

Follow-up Tests/Reminders

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
CXR																															
Sputum																															
Blood Work																															
Weight																															
RN Review																															

Initials	**Signature**	**Title**	**Initials**	**Signature**	**Title**

Appendix 20: Tuberculosis Drug Treatment and Progress Yearly Record

Name:	Physician: Contact Number:
MCP:	Date of Diagnosis: DOT start date:
Address:	Community: PHN:
DOB: Phone#:	**Note: Date=yyyy-mmm-dd**

Medications/Dose/Schedule	# of Doses	Date Initiated	Completion Date	Comments
1.				
2.				
3.				
4.				
5.				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jan																															
Feb																															
Mar																															
Apr																															
May																															
June																															
July																															
Aug																															
Sept																															
Oct																															
Nov																															
Dec																															

Please initial date and √ to indicate DOT completed or X to indicate an issue.

		Baseline Date	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Completion of Treatment
Symptoms Inquiry	Date Result										
Social Monitoring	Date Result										
Weight	Date Result										

	Baseline Date	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Completion of Treatment
Physical Exam Date Result										
Sputum for AFB Date Result										
Chest x-ray Date Result (After 2 & 6 months of therapy)										
Transaminases Date (ALT, AST) * Result										
Creatinine/Uric Acid Date Result (Q Monthly for PZA)										
Bilirubin Date Result										
CBC + Platelets Date Result (Q 3 Months for Rifampin)										
Colour Vision Date Visual Acuity Result Monthly										
Hearing Test Date Streptomycin only Result										
BUN/Creatinine Date For Streptomycin Result										

*As indicated by risk factors.

Initials	Signature	Title	Initials	Signature	Title

Appendix 21: Interviewing the Index Case

Preinterview Phase

- History of previous exposure to TB
- History of previous TB disease and treatment
- Anatomical sites of TB disease
- Symptoms of the illness
- Date of onset
- Chest radiograph results and results of diagnostic imaging studies
- Current bacteriologic results
- Anti-TB chemotherapy regimen (with dates, medications, dosages, and treatment plan)
- Results from HIV testing
- The patient's concurrent medical conditions (e.g., renal failure implies that a renal dialysis center might be part of the patient's recent experience)
- Other diagnoses (e.g., substance abuse, mental illness, or dementia) that impinge directly on the interview, and
- Identifying demographic information (e.g., residence, employment, first language, given name and street names, aliases, date of birth, telephone numbers, other electronic links, and next-of-kin or emergency connections)

Interview Information

The following information should be obtained from the index case

- Any contact with children and their ages
- Any contact with immunosuppressed people (HIV, cancer patients etc)
- Description of the household/congregate setting
- Household contacts and their ages: includes anyone who regularly sleeps in the home
- Close friends and relatives who are seen at least once per week; how often and how long
- Work or school location and description of setting
- Type of work, size of room, ventilation, etc.
- Transportation to work/school; bus, car-pool, etc.
- Place of worship, clubs, sports teams, recreation programs or hobbies
- Any contacts who are ill with potential TB symptoms or who have TB disease
- Any major events the case attended while infectious
- Any recent travel or visitors staying at the home within the previous 2 years
- Attendance at any weddings, funerals, or parties

Appendix 22: Contact Tracing Record

TUBERCULOSIS CONTACT TRACING RECORD

Case:

Surname:	Given Name:	Diagnosis:	Date of diagnosis:	Date investigation started:
MCP:	Gender:	Date of Birth:	Bacterial Status: ☐ smear positive ☐ smear negative ☐ culture positive	
Community:		Date treatment started:		

Contacts:

Name (maiden name if applicable)	MCP	Address and telephone number	Date of birth	Date of last contact	Relationship to case [1]	Contact type [2]	BCG Status [3]	TB Related History: TST, CXR, Previous Contacts, Previous Active Case	First Check Date & Results: TST	First Check: IGRA	First Check: CXR	First Check: ACTION	Second Check Date & Result: TST	Second Check: CXR	Second Check: ACTION	Outcome [4]	Comments

Format dd-mm-yyyy

1. Relationship to case

1. Spouse	5. Grandparent	9. Co-worker
2. Child	6. Grandchild	10. Classmate
3. Parent	7. Friend	11.Caregiver
4. Sibling	8. Neighbor	12. Other

2. Contact type

1 = Close household (CH)

2 = Close non household (CNH)

3 = Casual (C)

4 = Community (CO)

3. BCG Status

Y = Yes

N = No

U=Unknown

4. Outcome

1 = Active Case (A)

2 = Preventive Therapy (PT)

3= Clinical Follow-up (f/u)

4 = Pending Results (PR)

5 = Discharged

Appendix 23: TST Interpretation for Contact Tracing

Table 1: TST interpretation for first test

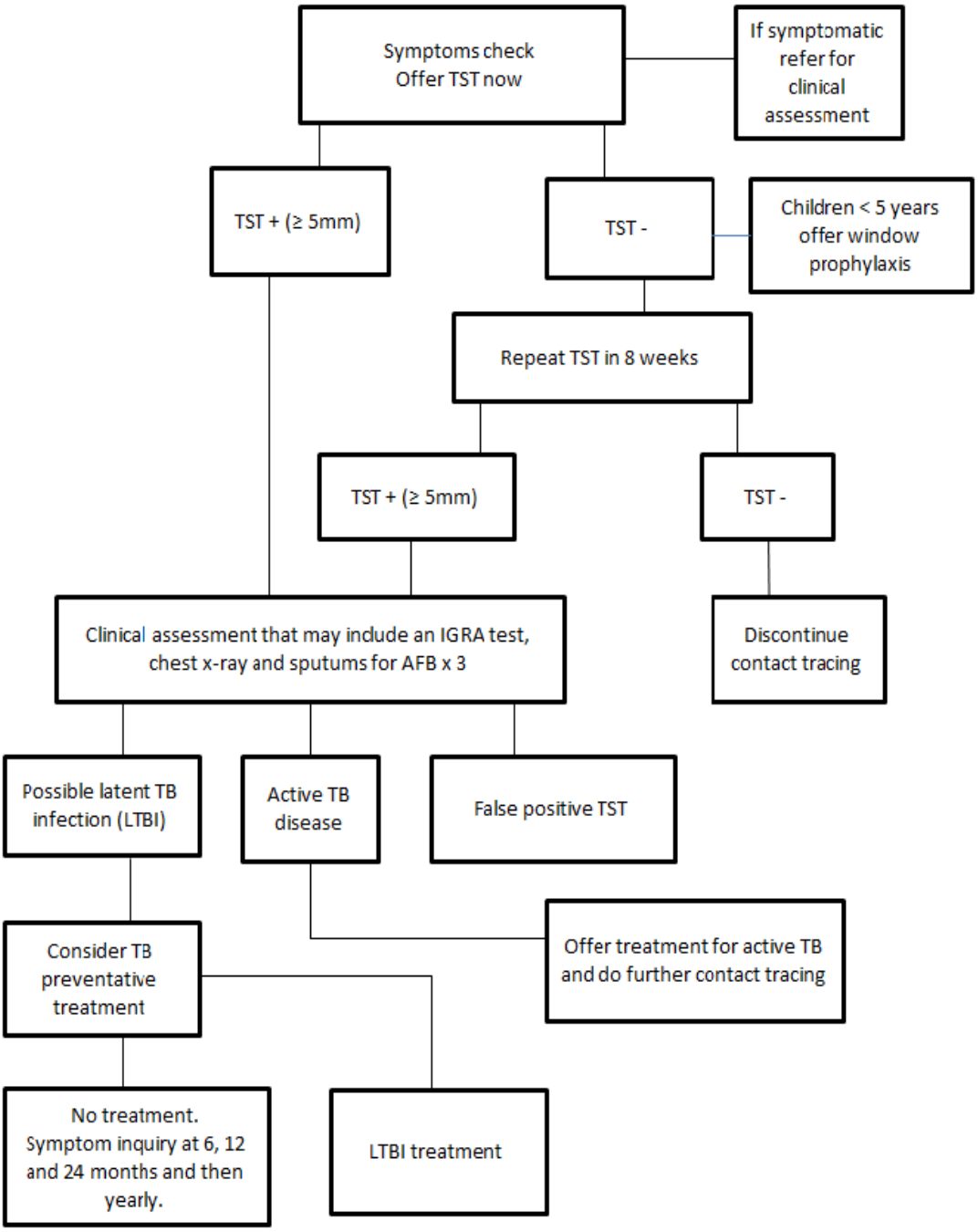
TST Status	Action	Result	Interpretation
• No previous TST • Previous TST Unknown • Previously documented negative TST • No past history of TB or LTBI • Remote history of BCG, tine test or cuti	• Do TST1	• <5 mm	• Consider negative • Schedule TST2 in 8 weeks
		• ≥5 mm	• Consider positive • No TST2 • Assess symptoms • Chest x-ray
• Previous documented TST <5 mm	• Do TST1	• < 5 mm	• Consider negative • Schedule TST2 in 8 weeks
		• ≥ 10 mm • TST ≥6mm from previous (individualize response)	• Consider significant • Review infectivity of case and host susceptibility • No TST2 • Assess symptoms • Chest x-ray
• Previously documented TST between 5 mm – 9 mm • No history of treatment for TB disease or LTBI	• Do TST1	• <5 mm	• Consider negative • Schedule TST2
		• TST is increased at least 6 mm from previous	• Consider positive • No TST2 • Assess symptoms • Chest x-ray
• Previously documented TST between 5 mm – 9 mm as a contact of a case and/or positive history of treatment for TB or LTBI	• Consider positive • No TST • Assess for symptoms		
• Previously documented TST ≥10 mm AND/OR • History of active TB or LTBI	• No TST • Assess symptoms • Additional investigations if deemed necessary o Chest x-ray, sputum o Results of assessment will guide treatment decisions		
• TST conversion with symptoms suggestive of active disease	• Refer for clinical assessment • Exclude from work/school until deemed non infectious		
• TST conversion with no active disease	• Refer for clinical assessment; no exclusion required		

Table 2: TST interpretation for second test

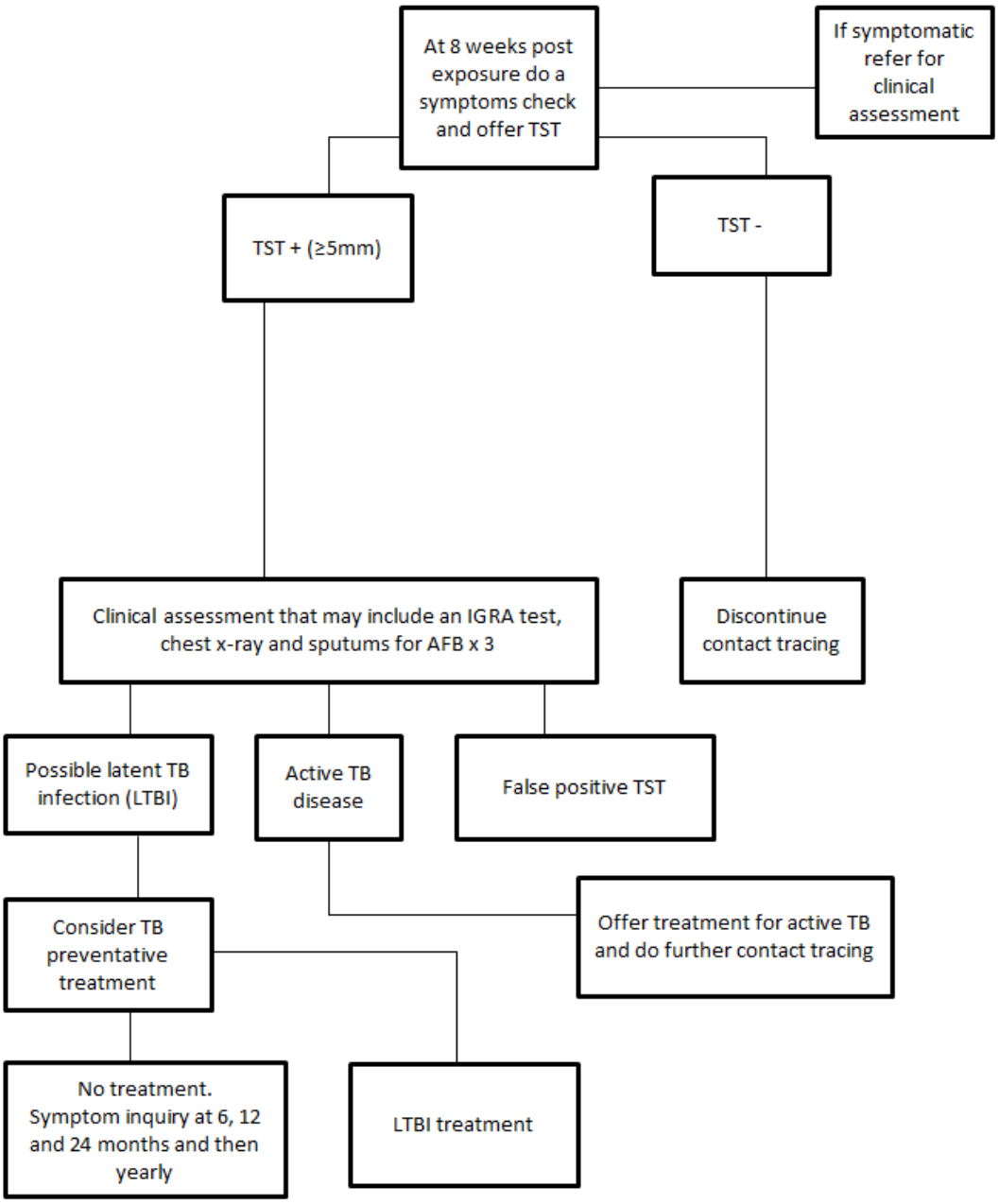
TST Status	Result	Interpretation	Action
• TST2 recommended	• <5mm	• Consider negative	• No further follow-up
	• ≥5mm	• Consider conversion • Assess for active disease • Refer for clinical assessment	• Discuss with RMOH

Appendix 24: TST Algorithms for Contact Tracing

High Priority Contacts



Low Priority Contacts



Appendix 25: RHA Follow-up

Sample procedure for the follow-up of TB contacts in the RHAs

The attending provider must notify the RMOH or designate immediately (same day) of a suspect or confirmed case of TB as per List A of Notifiable Disease List.
The CDCN notifies other key health care providers including Nurse Manager/Clinical Coordinator, Infection Control Practitioner, the Provincial DC office and others who may be providing care.
The Nurse Manager/Clinical Coordinator assigns a Community Health Nurse (CHN) to carry out the contact tracing.
The CDCN will collaborate with the CHN to develop a plan of action.
The CDCN or CHN will interview the case or designate within one day of identification of the case and generate a list of contacts and forward this list to the CDCN.

- The CDCN reviews the contacts and in collaboration with the CHN identifies contacts for follow-up.
- CDCN collaborated with the RMOH and CHN regarding the monitoring protocol.

Role of the Community Health Nurse

The CHN will:

- Maintain confidentiality of the contacts during the interview process;
- Interview contacts;
- Provide each contact with a fact sheet(s) on TB;
- Conduct assessment of the contacts;
    - Assess for signs & symptoms of TB infection and/or disease
    - Review TB history
    - Complete the required testing such as TST, if indicated;
        - If the initial test (TST1) is done 8 weeks after the last contact with the infectious case there is no need for further testing since adequate time for conversion has occurred
        - Two step TST is not done for contact tracing
        - Obtain information on the BCG vaccination record for those born prior to 1979 and previous TST history from the District Public Health Office or Provincial Immunization Database
    - Refer contacts with significant TST results for a chest x-ray;
- Report findings to the CDCN and discuss care plan for client;
- Provide treatment for LTBI if required; and
- Attend client management meetings .

Appendix 26: Healthcare Facility Risk Assessment for TB

Each RHA must have a policy in place defining the responsibility for the healthcare facility risk assessment for TB. An annual review of the indices of health care associated transmission should be done.

The risk classification of a healthcare setting is evaluated by determining the risk category of the facility (Table 17) and the activity category of the employee (Table 18).

Table 17: Risk classification for the healthcare facility

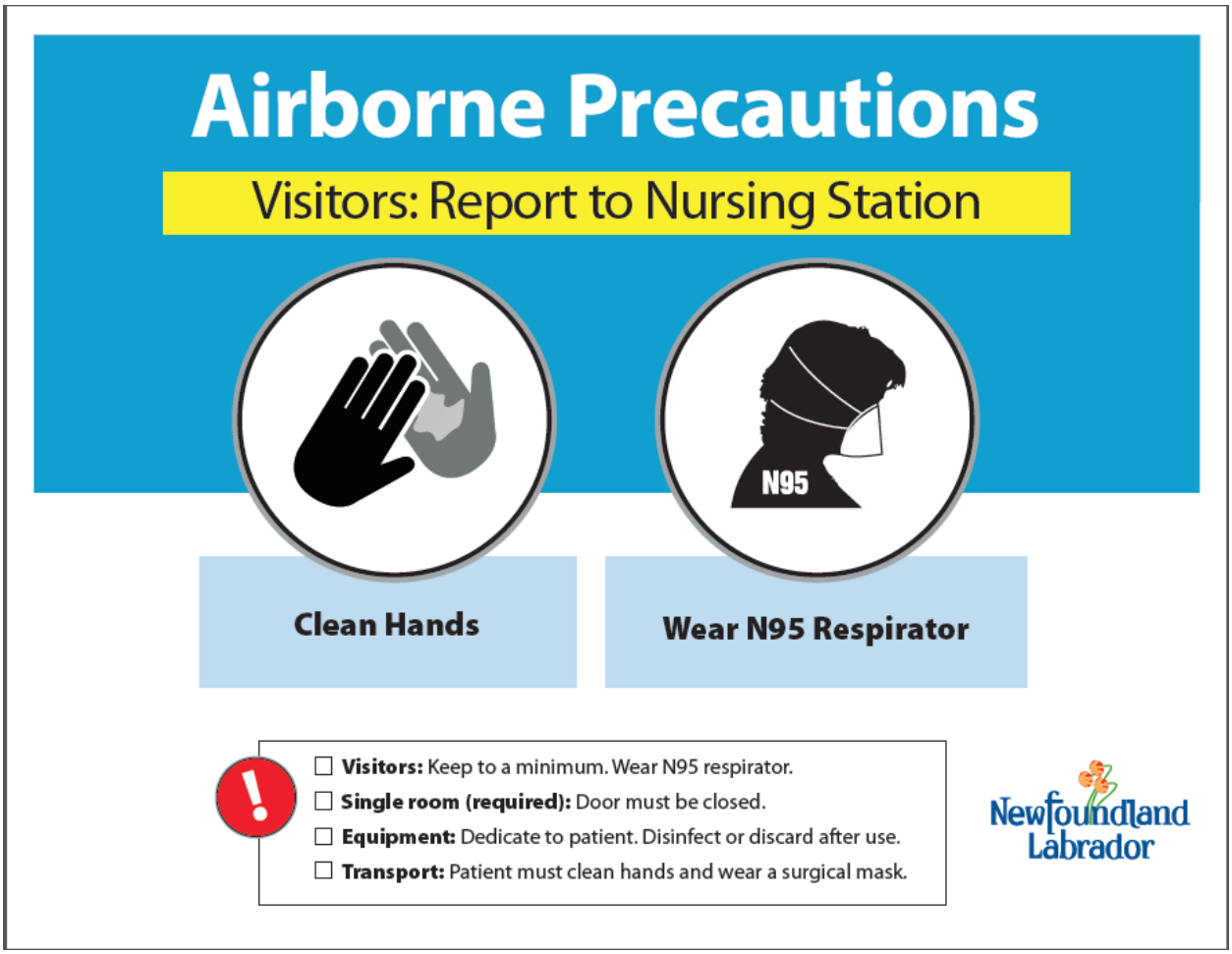
Risk category	Facility size	Number of active TB cases present annually
Not considered low	Hospitals ≥ 200 beds	≥ 6
	Hospitals <200 beds	≥ 3
	Long-term care institutions including homes for the aged, nursing homes, chronic care facilities, hospices, retirement homes, designated assisted living centres and any other collective living centre	≥ 3
	Infirmaries in correction facilities*	≥ 3
Low risk	Hospitals ≥ 200 beds	<6
	Hospitals <200 beds	<3
	Long-term care institutions (defined above)	<3

*Correctional facilities that have never reported active TB cases can be considered low risk.

Table 18: Risk categories for activities performed by HCWs

Highest-risk activities	Intermediate-risk activities	Low-risk activity
• Cough-inducing procedures (such as sputum induction) • Autopsy • Morbid anatomy and pathology examination • Bronchoscopy • Mycobacteriology laboratory procedures especially handling cultures of M. tuberculosis	• Work requiring regular direct patient contact on units where patients with respiratory TB disease may be present • Cleaning of rooms of patients with respiratory TB	• Work requiring minimal patient contact (such as clerical and administration) • Work on units where patient with respiratory TB are unlikely to be present

Appendix 27: Airborne Precautions Sign



Appendix 28: ABCs of Respirator Safety

Appendix 29: Medical Surveillance Undertaking Form

Citizenship and Immigration Canada / Citoyenneté et Immigration Canada

PROTECTED WHEN COMPLETED - A
PROTÉGÉ UNE FOIS REMPLI

MEDICAL SURVEILLANCE UNDERTAKING
SURVEILLANCE MÉDICALE - ENGAGEMENT

UCI - IUC	Date

PART A TO BE COMPLETED BY PROCESSING OFFICER — **PARTIE A RÉSERVÉ AU BUREAU COMPÉTENT**

1 Family name - Nom de famille	2 Given name(s) - Prénom(s)	3 Gender - Sexe

4 Date of birth - Date de naissance (Y-A M D-J)	5 Principal applicant UCI - IUC du demandeur principal ☐ Same as above or Le même que ci-haut ou	6 App. no. - N° de la demande

7 Address where you intend to reside in Canada - Adresse prévue au Canada ☐ No address available / Aucune adresse disponible

E-mail / Courriel

Telephone no. / N° de telephone

8 "S" code - Code « S »
☐ 2.01 ☐ 2.02 ☐ 2.02U ☐ 2.03 ☐ 2.04 ☐ 2.05 ☐ 2.06 ☐ 2.07

9 RMO where medical assessed / BMR où l'évaluation médicale a été effectuée	IME no. - N° EMR	10 Type of entry document and serial no. / Genre de document d'entrée et n° de série
		IMM _____ No. N° _____

11 I understand that provincial/territorial health authorities in Canada may wish to monitor my health. I agree to them doing so. I understand my landing in Canada is conditional upon my reporting to a provincial/territorial health clinic within ____ days of my admission to Canada as a permanent resident. I shall report any changes in residence forthwith to Canada Immigration and the appropriate provincial/territorial authorities.

Je sais qu'au Canada les autorités provinciales/territoriales de la santé voudront peut-être vérifier mon état de santé, ce à quoi je consens. Je sais que le droit d'établissement au Canada me sera accordé sous réserve que je me présente à une clinique provinciale/territoriale dans les ____ jours suivant mon admission comme résident permanent. Je signalerai sans délai tout changement d'adresse à Immigration Canada et aux autorités provinciales/territoriales compétentes.

Signature of applicant - Signature du demandeur

Date (Y-A M D-J)

The information you provide on this document is collected under the authority of the *Immigration and Refugee Protection Act* for the purpose of notifying provincial/territories public health authorities in Canada that your medical condition requires surveillance. It will be stored in one of the following Personal Information Banks: CIC PPU 042, 051, 052, 053 and 055 and is protected and accessible under the provisions of the *Privacy Act*.

Les renseignements que vous fournissez sur ce document sont recueillis en vertu de la *Loi sur l'immigration et la protection des réfugiés* aux fins d'informer les autorités provinciales/territoriales de la santé publique au Canada que votre état de santé doit faire l'objet d'une surveillance médicale. Ces renseignements seront versés à l'un des fichiers de renseignements personnels suivants : CIC PPU 042, 051, 052, 053 et 055 et sont protégés et accessibles en vertu des dispositions de la *Loi sur la Protection des renseignements personnels*.

PART B TO BE COMPLETED BY SECONDARY EXAMINATION OFFICER AT PORT OF ENTRY — **PARTIE B RÉSERVÉ À L'AGENT D'IMMIGRATION PRÉPOSÉ AU DEUXIÈME INTERROGATOIRE AU POINT D'ENTRÉE**

12 Confirmation/Update address in Canada / Confirmation/Mise à jour de l'adresse au Canada
☐ Same as in box 7 above or La même qu'à la case 7 ou

Street and no. - N° et rue | Apt. - App.

City - Ville | Province | Postal code - Code postal

Telephone no. / N° de telephone ▶ Area code / Ind. rég. ( )

Any change of address within three (3) months of date in box 14 should be provided to a Canada Immigration Centre. See blue pages of telephone directory.

Tout changement d'adresse au cours des trois (3) mois suivant la date inscrite à la case 14 doit être signalé à un Centre d'immigration Canada. Consulter les pages bleues de l'annuaire téléphonique.

13 Office stamp - Timbre du bureau

14 Signature of examining officer / Signature de l'examinateur

Date (Y-A M D-J)

IMM 0535 (05-2010) B GCMS/SMGC

THIS FORM HAS BEEN ESTABLISHED BY THE MINISTER OF CITIZENSHIP, IMMIGRATION AND MULTICULTURALISM
FORMULAIRE ÉTABLI PAR LE MINISTRE DE LA CITOYENNETÉ, DE L'IMMIGRATION ET DU MULTICULTURALISME

Canada

1 - HOLDER'S COPY / POUR LE REQUÉRANT

2 - CIC / MEDICAL SURVEILLANCE UNIT COPY / POUR L'UNITÉ DE SURVEILLANCE MÉDICALE / CIC

Appendix 30: Immigration Client Handout

IN-CANADA PUBLIC HEALTH FOLLOW-UP
MEDICAL SURVEILLANCE HANDOUT: INACTIVE TUBERCULOSIS

March 13, 2015

Date of birth
UCI
IME #
"S" Code 2.02

Dear Sir or Madam;

This letter contains important information. Please read it carefully. Failure to comply with all conditions in this letter could have a negative impact on your immigration status.

Your immigration medical examination for Canada, done in July 2012 has shown that you may have **inactive tuberculosis (TB).** This means that you either:

- received treatment for TB in the past or
- may have been exposed to TB bacteria and your body's defenses have contained the infection.

To prevent inactive TB from becoming active, early follow-up and ongoing monitoring of your condition is important. Active TB can easily be spread to other people through coughing or sneezing.

For your own health, and to protect the health of your family and the public, you must telephone the public health authority in the province or territory where you live, within thirty (30) days* of receiving this letter, except if you live in the province of Quebec. You will find the telephone number you need in the chart below.

If you live in the province of Quebec, the Public Health Department will contact you by mail with information on medical follow up. If you have not been contacted by the Public Health Department within one month, you must telephone them at (514) 528-2400 extension 3881.

You must comply with the instructions provided to you by the public health authority, including attending all appointments scheduled by the public health authority.

It is your responsibility to request that the public health officials return a proof of compliance to Citizenship and Immigration Canada – Public Health Liaison Unit, so that your immigration file reflects that you have met the conditions in this letter. Proof of compliance can be sent to:

Public Health Liaison Unit
Citizenship and Immigration Canada
300 Slater Street
Ottawa, Ontario
K1A 1L1
Fax: 613-952-3891

Failure to comply with all the conditions in this letter may be reportable under the *Immigration and Refugee Protection Act* and could have a negative impact on your immigration status. For example, your visa or permit might not be renewed or extended until you have complied fully with all the conditions in this letter. Or you could be denied Canadian citizenship until you provide proof that you have complied with the terms and conditions in this letter.

When you telephone the public health authority, you will be asked for information in this letter, which you should have available at the time you make the telephone call. If your first language is not English or French, you may wish to ask someone to help you make this telephone call.

Update: June 2014

You will be given a date, time and location for your follow-up appointment, which you must attend. **Please take this letter with you at that time.**

*You have received this letter because you have provided a Canadian address to Citizenship and Immigration Canada (at the time of your immigration medical examination). **If you have not yet arrived to Canada,** you are required to report to the public health authorities within thirty (30) days of your arrival.

If you change your address or telephone number before the public health follow-up is completed, you must provide updated information to the public health authority in your area and to Citizenship and Immigration Canada by contacting the CIC Call Centre at 1-888-242-2100 (toll-free) or by accessing CIC's on-line services (www.cic.gc.ca).

PUBLIC HEALTH AUTHORITIES IN CANADA FOR TUBERCULOSIS:

Ontario	Tel: 1-888-608-6880	British Columbia	Tel: (604) 707-2692
Nova Scotia	Tel: (902) 481-5888	Alberta	Tel: (780)735-1464
Nunavut	Tel: (867) 975-5700	Manitoba	Tel: (204) 945-4816
Prince Edward Island	Tel: (902) 368-4996	New Brunswick	Tel: (506) 444-3044
Saskatchewan	Tel: (866) 780-6482	Newfoundland	Tel: (709) 729-3430
Yukon	Tel: (867) 667-8323	Northwest Territories	Tel: (867) 920-8646

TUBERCULOSIS INFORMATION

Tuberculosis (TB) is a disease caused by a bacteria and it can be treated. When a person has active TB in the lungs and throat, it can spread to other people through coughing and/or sneezing. You may not know when you got TB and you may not have any TB symptoms.

While you do not have active TB now, you may still be in danger of getting it at some time in your life. Some medical conditions including diabetes, hepatitis, kidney disease, HIV/AIDS, addictions (including tobacco smoking), malnourishment and pregnancy increase the risk of inactive TB becoming active.

Signs and symptoms of active TB may include:

- prolonged fever and/or cough,
- coughing up blood,
- sweats at night or afternoon,
- constant tiredness, and
- loss of weight and loss of appetite.

To make sure you stay healthy, you need to see doctors or nurses who know a lot about TB. They will tell you what you need to do.

Thank you for your cooperation.

Public Health Liaison Unit/ Health Branch
Citizenship and Immigration Canada
Update: June 2014

Appendix 31: Provincial Immigration Notification Form

Citizenship and Immigration Canada (CIC) has advised the office of the Chief Medical Officer of Health (CMOH) that the client (named below) arrived in Canada with a diagnosis of inactive pulmonary tuberculosis and the person has agreed to medical surveillance undertaking.

To be completed by provincial office:

RHA: _____ Date of notification of RHA:_____

Contact person at RHA: Name: _____ Tel: (___)_____

Client Surname: _____ First Name: _____

DOB: _____ Address: _____Phone #: _____

Client Immigration Serial Number: _____

To be completed by RHA:

Actions		**Yes , No, UK, NA**
Contact with RHA	Client has contacted Public Health	
	Client has moved and new address is:	
	Unable to locate client	
	Client lost to follow-up	
Assessment for TB	Initial assessment for signs and symptoms of TB has been completed	
	Investigations completed include: □chest x-ray □sputum □other	
	Results discussed with RMOH	
	Family doctor advised	
Treatment	LTBI treatment required	
	Treatment for TB disease required	
Plan of Action		

Legend: Unknown = UK; Not applicable = NA; RMOH = Regional Medical Officer of Health

Form completed by: _____ Date returned to CMOH: _____

Please fax completed form to the Chief Medical Officer of Health
Fax Number 709-729-0730