Interior Health
INFECTION PREVENTION & CONTROL

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Tuberculosis Resource

Purpose

The goal of the Tuberculosis (TB) Management Program is to prevent transmission of TB to health care providers (HCPs) and patients.

Overview

Definitions: see page 8

Note: in this document the term "patient" is inclusive of resident and client.

Epidemiology

Globally, TB is ranked as one of the top 10 leading causes of death and leading cause of death from a single infectious organism. In Canada, the rate of TB disease is one of the lowest in the world with 1600-1800 new cases reported annually. In British Columbia (BC), approximately 300 new cases of TB disease are diagnosed.

In BC, people born outside of Canada and Canadian-born Indigenous peoples are disproportionately affected by TB, but anyone can get it. Health inequities (e.g., housing, socio-economic status, access to healthcare) play a significant role in an individual's risk of being exposed and their development of TB disease. People with weakened immune systems are also at greater risk of developing TB disease, such as:

- Babies, young children, and the elderly.
- People with chronic medical conditions such as HIV infection and cancer.
- People taking medications that weaken the immune system's ability to fight infection.
- People with previous history of TB or people who were not taking the right medication to treat a previous infection.

Signs & Symptoms

As TB disease can be found in various parts of the body, signs and symptoms of presenting illness will differ based on location. Symptoms typically develop gradually and worsen over time. Common signs and symptoms include:

- Fevers, chills, and night sweats.
- Loss of appetite and unexplained weight loss.
- Weakness or feeling very tired.

Pulmonary TB

Usual site of disease presentation, other common signs and symptoms include:

- A new or worsen cough lasting longer than 3 weeks.
- Coughing up mucous (sputum), sometimes with blood.
- Trouble breathing.

Extrapulmonary TB

Signs and symptoms will vary depending on location of TB disease located outside of the lungs: Some examples include:

- Glands: lumps in the neck.
- Bones: pain in the bones or back.
- Joints: pain, redness, swelling.
- Kidney: painful urination or cloudy pee.
- Brain: headaches, stiff neck, pain in moving the head or eyes.
- Heart: Shortness of breath, chest pain.
- Intestines: stomach pain and change in bowel movements.

Mode of Transmission

The organism which causes TB disease, *Mycobacterium tuberculosis,* is spread through the air (airborne) from one person to another. When a person with TB disease in their lungs any coughs, sneezes, laughs, or sings they release the aerosolized TB into the air. TB in the air can be breathed into the lungs of susceptible patients and HCPs. When TB is in someone's lungs, it can begin to grow and lead to TB disease or TB Infection. It can move through the blood to other parts of the body; but it is usually only spread to others via the air when it is in the lungs or larynx, with the lungs being the most common site of infection.

Procedures such as bronchoscopy, nebulized therapy, BIPAP or CPAP, and intubation can produce substantial amounts of infectious particles as aerosols.

Patients with Extrapulmonary TB are usually not of significant risk of transmission unless there is exposure to the infected body fluid (e.g., irrigation and debridement of wounds or operative procedure) of the involved body part. Risk is only when there is potential for aerosolization and then a N95 mask is required.

Incubation Period

- The incubation period for TB is between two and twelve weeks from first exposure.

Period of Communicability

- TB can remain contagious as long as there are viable organisms in sputum. After a person has been on *effective* TB treatment this usually eliminates the contagiousness within two-four weeks.
- Untreated or inadequately treated patients with active pulmonary TB disease can remain contagious for years with intermittent AFB-positive sputum.

Testing & Diagnosis

Testing

- There are two types of screening tests to detect if the TB bacteria is in the body. However, a positive tuberculin skin test (TST) or TB blood test only identifies if the bacteria present in the body, it does not differentiate if the person has latent TB infection or has developed TB disease.
    - TB skin test (TST).
    - TB blood test.
- These tests can become positive eight-ten weeks after first exposure.

Diagnosis

Pulmonary TB disease is diagnosed by medical history, physical examination, chest x-ray, and other laboratory tests.

Laboratory diagnostic involves the collection of three sputum specimens for TB PCR, AFB smear, and culture. Sputum specimens of good quality with minimum of 5ml each, can be collected at least 1-hour apart and preferably one should be an early morning specimen. If possible (depending on sputum quality and amount), microbiology laboratory will perform PCR TB testing automatically. Please note that AFB smear and culture testing are still required and will be forwarded to reference laboratory (BCCDC) for growth detection/identification, for antimicrobial susceptibility testing, for genotyping and to track response to treatment.

Please refer to Elsevier: Specimen Collection: Sputum from the IH Clinical Care Resources for additional support resources:

- Quick Sheet.
- Supplies List.
- Collection Procedure Checklist.

Refer to the Interior Health Microbiology Laboratory Test Directory for guidance on specimen handling.

- **Sputum AFB smear** detects the presence of acid-fast-bacilli (AFB). This test is quick and easy, but this does not confirm diagnosis as some AFBs are not *M. tuberculosis*.
- **Sputum TB culture** is performed on all initial samples to confirm diagnosis of TB disease.
- **TB PCR** is more sensitive than AFB smear but less sensitive than culture.
    - TB PCR testing should not be used to monitor response to treatment or to discontinue Airborne isolation for confirmed TB patient as it cannot differentiate live from dead bacteria.
- The initial *M. tuberculosis* isolate should be tested for drug resistance to ensure effective treatment is prescribed.

*TB culture is considered gold standard for exclusion of TB and negative PCR testing of sputum and/or negative AFB smears must be interpreted in conjunction with clinical presentation including presence of alternative diagnosis.

*A positive culture is not always necessary to begin or continue TB treatment when there is a high clinical suspicion of TB disease based on medical history, physical examine, screening tests, and chest x-ray.

Best Practices

This section is for patients with suspected or confirmed Pulmonary TB disease in a Healthcare Setting.

Additional Precautions

- Patient must be immediately placed on Airborne Precautions in an appropriately ventilated Airborne Infection Isolation Room (AIIR) with the appropriate Airborne Precautions signage posted outside the patients' door.
- Refer to additional Precautions section of this manual for more detailed information on Airborne Precautions.
- Inform Infection Prevention and Control (IPAC) of all patients with confirmed TB and patients who have a high suspicion of TB who are in the Healthcare Setting.

Discontinuing Precautions

- In the hospital setting, the decision to discontinue Airborne Precautions must be approved by IPAC/Medical Microbiology (MM) in conjunction with the clinical care team (e.g., Respirology/Infectious Diseases).
- In the community and Long-term Care Setting the decision to discontinue isolation must be approved by MHO (Medical Health Officer) and Public Health (PH).

Presumed TB Cases

Discontinuation of Airborne Precautions may be considered when:

- Three successive sputum specimens (spontaneous or induced) are negative on AFB smear and PCR not performed/available, TB is not strongly suspected, cultures are pending, and alternative diagnosis has been made; **OR**
- When two successive samples of sputum (out of which one sample is preferably collected in early morning) are negative on TB PCR testing and TB is not strongly suspected, cultures are pending, and alternative diagnosis has been made.
- A single negative AFB smear or TB PCR from bronchoalveolar lavage (BAL) does NOT definitively exclude active TB and three induced sputum specimens have equivalent or better yield for the diagnosis of TB disease than a single bronchoscopy. Discontinuation of Airborne Precautions may be considered when two BAL samples are negative on TB PCR testing and TB is not strongly suspected, cultures are pending, and alternative diagnosis has been made.

Confirmed Respiratory TB Cases

Table: Recommendation on discontinuation of Airborne Precautions adapted from BCCDC[1]

AFB Smear and Culture Status	Recommendations
AFB Smear- Negative or TB PCR-Negative, Culture- Positive, Drug- Susceptible TB disease. **Note:** Repeat sputum smears are required at the initiation of treatment to re-confirm smear-negative status and support decision- making around length of isolation.	Discontinuation of Airborne Precautions may be considered when there is clinical evidence of improvement, documented tolerance to first line treatment, and at least **two weeks** of effective therapy dosing has been completed.[2]
AFB Smear- Positive or TB PCR-Positive, Culture-Positive, Drug Susceptible TB disease.	Discontinuation of Airborne Precautions may be considered when there is clinical evidence of improvement, at least two weeks of effective therapy (based on the known or presumed antibiotics sensitivity of the case's organism) has been tolerated and completed, and there have been three consecutive AFB-negative sputum-smears. Some patients will continue to produce AFB smear-positive sputum specimens for several weeks into treatment. Home isolation for such cases can usually be discontinued provided there is evidence of clinical improvement, adherence to treatment and three consecutive sputum cultures (not AFB smears) reported as negative after six weeks of incubation.
AFB Culture-Positive	If sputum specimens continue to be culture-positive after four months of treatment or if they become culture-positive after a period of negative results, drug susceptibility testing should be repeated.[2] Consultation with TB Services is recommended.
Mono-Resistance to Rifampin and Multi-Drug Resistant (MDR) TB disease	Airborne Precautions should be maintained for the duration of the case's hospital stay or until three consecutive sputum cultures (not AFB smears) are reported as negative after six weeks of incubation and the case is on an effective regimen. If discharge is being planned, refer to *Discharge Planning*.

[2]Drug susceptibility test results are usually available within four weeks in AFB smear- negative/culture positive cases and three weeks in AFB smear-positive cases. Drug susceptibility test results confirm effectiveness of treatment regimen to date.

Patients who are TB PCR-Negative and AFB Smear-Positive

- Require assessment by the Infection Control Professional (ICP), the Respirologist, the Infectious Diseases Physician, the Medical Microbiologist on Call / the IPAC Medical Director or the MHO as they are not consistent with active TB and most likely represent infection with nontuberculous mycobacteria.

Notification

- Any suspected or confirmed case of active TB disease must **immediately** be reported to CDU (1-866-778-7736) Monday to Friday 0830- 1630 **or** MHO On-call (1-866-457-5648) after hours, weekends, and STATs.
- Report suspected or confirmed cases to the ICP and/or MM.
- IP to investigate all confirmed TB disease laboratory reports and complete a Communicable Disease Notification Tool.

Management of Exposed Patients and HCPs:

Contact a person exposed to an infectious case of TB disease. Prioritizing contacts is a critical component of TB prevention as it allows persons of contact with the greatest risk of TB exposure and the development of TB disease to be evaluated in a timely manner.

- When a TB disease case is identified and appropriate Airborne Precautions had not been implemented in a facility, many contacts who need to be assessed can result. This includes patients, hospital HCPs, physicians, volunteers, and visitors who were exposed to the case during the infectious period.
- As soon as possible after a patient is confirmed as having TB disease, the CDU will coordinate a case teleconference – this is a collaborative process for the purpose of information sharing, identification of case contacts, early recognition of discharge planning needs and coordination of key partners.
- The MHO defines the parameters of an exposure and who will be considered a contact requiring follow up in all settings.
    - IPAC is responsible for identifying in facility exposures which is shared with the Provincial Workplace Health Contact Centre (PWHCC) and CDU.
    - The PWHCC will investigate and follow up IH HCPs who have met the exposure criteria.
    - The CDU/PH will investigate and follow up with community contacts as well as discharged patients, volunteers, students, and contracted employee (e.g. physicians).
- Individuals who believe they have had a breach in Personal Protective Equipment (PPE) or exposure to a communicable disease at work should contact the Provincial Workplace Health Contact Centre (PWHCC) at 1-866-922-9464 for an assessment or email OHN@WHcallcentre.ca. (The PWHCC is for IH employees only.)
- For inpatients – ICP to let CDU/PH know of exposed inpatients. CDU/PH to arrange for TB screening of patient. Asymptomatic inpatient contacts are NOT infectious and DO NOT require Airborne Precautions; however, they do require follow-up evaluation by their physician.
- Symptomatic inpatient contacts will require Airborne Precautions in an AIIR. Notify ICP and/or MM and physician for further investigation and follow up.

Discharge Planning

- Infectious patients may be discharged provided a smooth transition plan has been developed between the hospital and community public health for follow–through provision of TB medications and ongoing care. The discharge planner is to notify the CDU for coordination of discharge with community public health.
- Some TB patients may be non-compliant, be experiencing homelessness or have circumstances where community care is unlikely to succeed and may need hospitalized provision of treatment medications until they become non-infectious. This process may be voluntary by the patient OR under an Order by the Medical Health Officer under the Health Act
- Public Health (the CDU, MHO, and community public health) is responsible for evaluating conditions necessary for the discharge to proceed. Contact the CDU for coordination with community public health and the MHO.

Process for Discharge Planning

- Once it has been identified that a case of TB disease is approaching a state where discharge could occur, the person responsible for organizing discharge should organize a planning teleconference. Key partners should be invited, including:
    - CDU, who may involve the MHO as needed
    - Public Health Nurse (specific to geographic area)
    - Hospital Transition Nurse/Discharge Planner (specific to unit where patient is located)
    - Patient Care Coordinator [PCC] (specific to unit where patient is located)
    - Hospital Infectious Disease Pharmacist [or designate]
    - Urban Outreach Social Worker (if case in Kelowna)
    - Urban Outreach Case Manager (if case in Kelowna)
    - Hospital Social Worker (if patient not an Urban Outreach client)
    - Home & Community Care Manager [or designate] (specific to geographic area)
    - Infection Preventionist
    - WH&S Consultant (for fit testing),
    - Others may join teleconference as needed
- Discharge planning is a collaborative process between the hospital physician and MHO/CDU to determine appropriateness of discharge.
- CDU will coordinate with local Public Health and the hospital discharge planner, to ensure an adequate discharge plan is in place prior to patient release, including the out-patient prescription medications and home isolation procedures, as well as any other medical supports to be organized.
- Hospital Discharge Planner to notify family doctor for follow-up appointments.
- Hospital Discharge Planner to notify Home/Community Care Services to prepare for receiving and attending the patient, giving sufficient time to allow for adequate fit-testing and education of HCPs, if required.

- Health Care Facility Transport services, if required, are to be notified of any additional precaution recommendations if TB case is discharged to the community during infectious period.
- CDU to advise on all other *community transportation* restrictions or required infection control measures (e.g., patient to wear medical mask during transport).
- Once all parties have been notified and a **discharge date has been agreed upon** (minimum of 3 working days (Mon-Fri) required to ensure services are in place), the discharge can proceed.

Visitors

- Educate as per Airborne Precautions signage.
- Visitors should be offered an N95 respirator, HCPs to train visitors on how to put on the N95 respirator and perform a seal check.
- Visitors should be limited and visits by children should be discouraged because of their increased susceptibility.

Definitions

Acid-fast bacteria (AFB) (bacilli) – microorganisms that are distinguished by their retention of specific stains even after being rinsed with an acid solution. Most AFB in clinical specimens are mycobacteria, including species other than *Mycobacterium tuberculosis*.

Incubation Period is the time interval between invasion by an infectious agent and appearance of the first sign or symptom of the disease.

Contact a person exposed to an infectious case of TB disease. Prioritizing contacts is a critical component of TB prevention as it allows persons of contact with the greatest risk of TB exposure and the development of TB disease to be evaluated in a timely manner.

TB infection (also called *Latent TB Infection*) is when someone breathes in the TB bacteria, their body usually starts fighting it and wins. The bacteria still exist in these people, but it does not make them sick. With TB Infection, a person does not have symptoms and cannot spread TB to anyone else. The main problem with TB Infection is that it can become TB disease.

TB disease (also called Active TB disease) is if someone has TB bacteria in their body and their body cannot fight it, then it becomes TB disease. This can happen right after breathing in the TB bacteria or years later. Once a person has TB disease, they become sick and can spread TB to others. TB disease can be deadly, but it can be treated and cured.
TB disease usually lives in people's lungs (pulmonary TB), but it can live anywhere in the body (extrapulmonary TB). It can also live in more than one place at a time (disseminated TB).

References

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2. BC Centre for Disease Control [BCCDC]. About Tuberculosis. Retrieved on April 3, 2024, from http://www.bccdc.ca/health-info/diseases-conditions/tuberculosis
3. BC Centre for Disease Control [BCCDC]. About Tuberculosis. Appendix B: Infection prevention and control. Retrieved on April 3, 2024, from http://www.bccdc.ca/resource-gallery/Documents/Communicable-Disease-Manual/Chapter%204%20-%20TB/Appendix%20B.pdf
4. Canadian Tuberculosis Standards 8th Edition. (2022). Canadian Thoracic Society. Chapter 1: Epidemiology of Tuberculosis in Canada. Retrieved on April 3, 2024, from https://manuals.cts-sct.ca/documentation/chapter-1/

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