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IS0500A: Tuberculosis

EFFECTIVE DATE: September 2006

REVISED DATE: November 2010

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1.0 PURPOSE

The goal of the Tuberculosis (TB) Management Program is to prevent transmission of TB to staff and patients.

2.0 DEFINITIONS

The most common site of TB infection is in the upper regions of the lungs. *Mycobacterium tuberculosis* is spread by the airborne route when patients expectorating viable tubercle bacilli contaminate the surrounding airspace. Aerosolized tubercule bacilli can be inhaled by susceptible patients and staff and can lead to primary tuberculosis infection. The incubation period for TB is between two and twelve weeks.

Pulmonary and laryngeal TB are the only types of TB that are spread via the airborne route.

In Canada, TB occurs in well-defined populations including Aboriginal Canadians, the urban poor or immigrants from high-incidence countries in Asia, Eastern Europe, Africa and Latin America. Immunocompromised persons such as those with HIV and diabetes are also at an increased risk of developing active TB. Other groups at risk include people who live or work in long-term care care facilities (e.g. jail, nursing homes, drug treatment centers), alcoholics, indigent persons and IV drug users. Persons who live in the same household with a high risk individual are also at risk. Because healthcare providers have frequent contact with persons in these groups, the risk of transmission of TB remains an important potential occupational hazard.

3.0 GUIDING PRINCPLES

A high index of suspicion must be maintained – early diagnosis is key in preventing healthcare associated transmission from infectious cases which often occurs before diagnosis.

3.1 Determinants of TB Transmission

- TB is spread by the inhalation of airborne organisms when a patient coughs, sneezes or speaks – once infectious particles have been aerosolized, they are spread throughout a room or building by air currents and can be inhaled by other individuals.
- Procedures associated with increased risk of generation of infectious aerosolized particles including bronchoscopy, laboratory and autopsy procedures, cough inducing procedures (i.e. sputum induction), administration of aerosolized therapies that induce coughing and irrigation of TB-infected wounds.
- Patients with respiratory secretions that are acid-fast bacilli (AFB) smear positive are more infectious than those whose smear results are negative.
- Patients with laryngeal involvement are particularly contagious.

- The risk of transmission increases with the increasing amount of time spent with an infectious patient without wearing appropriate personal protective equipment (PPE).
- In buildings with sealed windows and mechanical ventilation systems,

recirculation of air can contribute to transmission in healthcare facilities.

3.2 Risk classification: healthcare facilities

- •Classification is based on the number of active inpatient beds and the number of TB cases of all forms and sites.

Hospital with > 200 beds:

< 6 TB patients admitted annually = low risk.
≥ 6 TB patients admitted annually = medium risk.

Hospital with < 200 beds AND other facilities such as long-term care:

< 3 TB patients admitted annually = low risk.
≥ 3 TB patients admitted annually = medium risk.

- In Medium-risk hospitals a TB management committee is recommended, whose members should include persons with day-to-day responsibility for infection prevention and control and employee health, representation from senior administration, laboratory, nursing, medicine, other health disciplines (e.g. respiratory technology) and public health (additional members may be added from support services such as pharmacy, housekeeping, physical plant).

3.3 Risk classification: healthcare workers

- **High-risk activities** including cough-inducing procedures (sputum induction, pentamidine aerosol), autopsy, morbid anatomy and pathology examination, bronchoscopy, designated mycobacteriology laboratory procedures, especially handling cultures of M. tuberculosis.
- **Intermediate-risk activities** including regular direct patient contact (e.g. by nursing, respiratory, social workers, physiotherapists, housekeeping) on units to which patients with active TB may be admitted.
- **Low-risk activities** including minimal direct patient contact (medical records, administration, maintenance) and those who work on units where TB patients are unlikely to be admitted such as obstetrics or pediatrics.
- IH WH&S (Workplace Health & Safety) have developed a tool and will work collaboratively with Infection Control Practitioners to establish risk classifications

I.H FACILITY	REFER TO THE FACILITY TUBERCULOSIS RISK ASSESSMENT FORM
NON I.H. FACILITY	REFER TO THE FACILITY TUBERCULOSIS RISK ASSESSMENT FORM.

- Recommend that all facilities make available to their healthcare workers annual summary information on the clinical, epidemiologic and microbiologic features of patients whose TB is diagnosed within the hospital – will help to increase awareness of TB in the patient population served by the hospital.

3.4 Early identification of patients with suspected TB

- Symptoms consistent with active TB include fever, cough for more than 3 weeks, unexplained weight loss, hemoptysis, loss of appetite, and night sweats.
- Chest x-ray done in suspect cases.
- Sputum specimens tested for acid-fast bacilli (AFB) in suspect cases
  - Collect 3 sputum specimens 8 – 24 hours apart and at least one should be collected in the early morning upon awakening.
  - Do gastric aspirates in children too young to produce sputum.

4.0 PROCEDURE

There are 6 specific processes:

- Airborne Precautions
- Environmental Engineering Controls
- Respiratory Protection Program
- Personal Controls: Screening & Follow-up
- Contact Investigation for Patient & Staff
- Discharge Planning

4.1 Airborne Precautions

(back to PROCEDURE)

Inform Infection Prevention and Control of all patients with confirmed TB and patients who have a high suspicion of TB who are in the facility.

- Patient must be placed on Airborne Precautions in an appropriately ventilated Airborne Isolation Room
  REFER TO IH0200 – AIRBORNE PRECAUTIONS GUIDELINE
- If an Airborne Isolation Room is not available then arrange to have the patient transferred to a facility with the necessary room requirements as quickly as possible.
- Staff entering the room must wear approved respiratory protection (will be referred to as N95 respirators for remainder of document), ensuring the seal checks are done when the N95 respirator is put on.
  REFER TO IH0200 – AIRBORNE PRECAUTIONS GUIDELINE
- Visitors entering the room should be offered an N95 respirator, staff to teach the seal check and how to put the N95 respirator on. Visits by children should be discouraged because of their increased susceptibility.
- Patient is to leave the room for essential procedures only and is to wear a surgical/procedure mask when outside their isolation room.
- Exceptions due to extenuating circumstances must be reviewed and approved by the attending physician & Infection Control – a written order is required.
- Notify receiving departments of Airborne Precautions requirements – staff will need to wear an N95 respirator when the patient is unable to wear a surgical/procedure mask.
- If transport between facilities is required, patient should be transported in well-ventilated vehicles (i.e. with the window open) and attendants should wear an approved respirator mask – DO NOT use public transportation.

4.1.1 Special Situations:

ICU

- Maintain Airborne Precautions.
- Place patient in an Airborne Isolation Room with door closed.
- Staff must wear N95 respirator.
- If intubation and mechanical ventilation is required, an appropriate bacterial
- Filter should be placed on the endotracheal tube to prevent contamination of the ventilator and the ambient air.
- Use closed suction apparatus for endotracheal suctioning.

Surgery

- Surgery should be postponed or scheduled at the end of the day.
- If intubation and mechanical ventilation is required, an appropriate bacterial filter should be placed on the endotracheal tube to prevent contamination of the ventilator and the ambient air.
- Use Airborne Isolation Room (if available) for procedure.
- Staff must wear N95 respirator.
- Door to room patient is in must remain closed.

Minor procedures that are not high risk for TB transmission

- Refers to urgent procedures needed for medical care that cannot be postponed until the patient is deemed non-infectious such as blood work or diagnostic imaging.
- Preference is to perform procedure in room with appropriately ventilated negative pressure with staff wearing approved N95 respirator.
- If not possible, patient should be instructed to wear a surgical/procedure mask during procedure, recovery and transport. Patient should be instructed to keep the mask on and change the mask if it becomes wet.

4.1.2 Discontinuation of Airborne Precautions for Patients with suspect TB

on approval only by the Infection Prevention & Control Practitioner, the Respirologist, the Infectious Diseases Physician or the Medical Director for Infection Prevention and Control

- When three successive samples of sputum are negative on smear, unless TB is still strongly suspected, cultures are pending and no other diagnosis has been made.
- The sputum specimens should be collected 8-24 hours apart and at least one should be an early morning specimen.
- When another definitive diagnosis is made and active TB is considered unlikely.

Note:

A single negative AFB smear from bronchoalveolar lavage (BAL) does NOT definitively exclude active TB and three induced sputum specimens have superior yield for the diagnosis of active TB than a single bronchoscopy.

- ***Patients with smear-positive TB*** – require three consecutive negative sputum smears - the sputum specimens should be collected 8-24 hours apart and at least one should be an early morning specimen AND there should be clinical evidence of improvement AND evidence of adherence to at least 2 weeks of multidrug therapy based on the antibiotic sensitivity of the patient's organism.

- ***Patients with smear-negative, culture-positive TB*** – discontinue Airborne Precautions after 2 weeks of appropriate multidrug therapy as long as there is clinical evidence of improvement.

- In the event that a smear-positive, culture-negative condition develops during treatment, Airborne Precautions may be discontinued provided three consecutive sputum specimens are culture negative after 6 weeks of incubation.
- ***Patients with active Multidrug resistant (MDR-TB)*** – must remain in Airborne Precautions for the duration of their hospital stay or until three consecutive sputum cultures are negative after 6 weeks of incubation; if discharge is being planned (refer to Section7.0 Discharge Planning.)

  Patients with pleural TB – if unable to collect sputum cultures, recommend bronchoscopy to obtain specimens to rule out pulmonary TB – must ensure samples are taken from various areas of effusion.

4.2 Environmental Engineering Controls
(back to PROCEDURE)

4.2.1 Ventilation

- Newly constructed Airborne Isolation Rooms should have 12 air changes per hour; pre-existing rooms should have at least 6 air changes per hour or as per current CSA Standards.
- The direction of air flow should be from the hall and into the room and then exhausted outdoors.
- Direction of air flow should be tested with smoke tubes at all four corners of the door daily when the room is occupied, unless the room is equipped with automatic pressure monitoring.
- Windows and doors should be kept closed at all times.
- The air changes and direction of air flow should be verified at least every 6 months AND if any changes occur such as HVAC equipment failure or alarm failure.
- Time needed to remove airborne contaminants after generation of infectious droplet nuclei has ceased is **45 minutes**.

4.2.2 Sputum Induction, Pentamidine Aerosol, Bronchoscopy Suites and Autopsy Suites

- Airborne Isolation Room requires at least 12 air changes per hour or as per current CSA Standards.
- Time needed to remove airborne contaminants after generation of infectious droplet nuclei has ceased is **45 minutes.**

4.3 Respiratory Protection Program
(back to PROCEDURE)

- Current recommendations call for particulate respirator masks that filter 95% of particles of 1 micron or larger and have less than 10% leak to protect workers against airborne TB.
- Most common product used are NIOSH-designated N95 respirators.
- Healthcare providers require education regarding the occupational risk of TB, the role of respiratory protection to reduce that risk, the importance of wearing the N95 respirator properly, doing a seal check each time the N95 respirator is put on so that there is a tight facial seal and ensuring the N95 respirator is put on correctly before entering the patient's room.
- N95 respirators must be available for staff whenever a patient is identified who is suspected of or confirmed to have active TB.
- N95 respirators should be worn by workers involved in the transport of patients suspected of or confirmed as having active TB, e.g. ambulance workers, particularly when patient cannot wear a surgical/procedure mask.
- N95 respirators should be available for caregivers, e.g. community healthcare workers who may have to provide care while waiting for patient transfer to a

facility with appropriate environmental controls.

- TB patients can wear surgical/procedure mask when they leave their rooms as these mask are effective in trapping the large infectious particles expelled by TB patients.
- Visitors should be offered an N95 respirator, staff to teach the seal check and how to put the mask on.

4.4 Personal Controls: Screening & Follow-up

(back to PROCEDURE)

4.4.1 Baseline Tuberculin Skin Testing (TST) For Healthcare Workers

- Appropriate baseline TST for all potentially exposed healthcare workers in all healthcare settings is important (BCCDC TB Control does not recommend a two step TST).
- Upon hire, all employees should have a TST unless they have documented results of a prior positive test.
- Workers with reactions of less than 10 mm induration should be considered TST negative for baseline screening purposes.
- Workers with a reaction of 10 mm induration or greater on the test should be considered TST positive, be referred for chest radiography and medical evaluation and consideration of prophylactic treatment of Latent TB Infection (LTBI).
- Healthcare workers with history of a positive TST should not receive further TSTs – performing annual chest radiography of asymptomatic TST-positive staff is not recommended (Pg. 338 Canadian TB Standards 2007).

4.4.2 TST Following Unprotected Exposure

- Any healthcare worker who has unprotected exposure to a patient who is confirmed to have active, contagious TB must be considered at risk of infection.
- For TST-negative workers, a TST should be done as soon as possible and, if negative, repeated after 8 to 12 weeks. If TST conversion occurs, the worker should be referred for chest radiography and medical evaluation.
- For TST-positive workers, the worker should be educated regarding the signs and symptoms of TB and if such symptoms develop, chest radiography should be performed and three sputum specimens should be tested for AFB.

4.4.3 Periodic TST for Workers in Medium Risk Hospitals and Programs OR Those Performing High Risk Activities in All Hospitals

- Annual TST is recommended for healthcare workers with negative baseline TST who are involved in moderate-risk activities in medium-risk hospitals AND for workers involved in high-risk activities in all hospitals.

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4.5 Contact Investigation for Patients and Staff

(back to PROCEDURE)

(A person identified as having come in contact with a case of active disease. The degree of contact is usually further defined on the basis of closeness. Contacts may be classified as close, casual or community).

- When a case of TB is identified and appropriate Airborne Precautions had not been implemented, a large number of contacts who need to be assessed can result. This includes patients, hospital staff, physicians, volunteers and visitors who were exposed to the case during the infectious period.
- If the case arrived from the community or was transferred from another facility, contacts outside the institution would also need to be considered.
- ICP to work collaboratively with the Communicable Disease (CD) Unit, WH&S and medical staff to ensure appropriate contact investigation and follow up is implemented promptly.
- Patients are considered a contact if they have shared a room with another patient confirmed with TB – they have had regular, prolonged contact with the source case and share breathing space daily.
- Patient contacts are NOT infectious and DO NOT require Airborne Precautions, however, they do require follow up evaluation by their family physician.
- ICP notifies CD Unit of positive active TB case and potential contacts in hospital – Public Health will assist in follow up of discharged patients, visitors and volunteers.
- ICP notifies WH&S regarding the contact investigation of an active case of TB – WH&S will carryout follow up for staff exposures (Section 5.2 above).
- • ICP notifies the 'contact' patient's attending physician regarding the potential exposure of their patient to an active TB case and advises that follow up is necessary - if patient still in hospital, a baseline TST can be done by the institution.
- • ICP notifies the Patient Transport Office (PTO) of potential external contacts such as ambulance personnel, first responders and other transport services and advises that follow up is necessary – PTO will ensure contact is made with the necessary providers in this regard.

4.6 Discharge Planning

(back to PROCEDURE)

- Initially smear-positive patients may be discharged home even if they are still smear positive 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.
- Some TB patients may be noncompliant, homeless or have circumstances where community care is unlikely to succeed and may need hospitalized provision of treatment medications until they become non-infectious (sputum is smear negative) – this process may be voluntary by the patient OR under an Order by the Medical Health Officer under the Health Act.
- Once all parties have been notified and a discharge date has been agreed upon (**minimum of 3 working days required** to ensure services are in place), the discharge can proceed.
- Public Health is responsible for evaluating conditions necessary for the discharge to proceed including directly observed therapy (DOT) if indicated, evaluation of household air recirculation in housing units such as apartment complexes, review of household contacts including infants and children, patient counseling about precautions necessary during infectious period of disease and to refrain from

going into any other indoor environment where TB transmission could take place AND if patient has to attend an outpatient clinic, they must wear a mask until they are no longer infectious.

4.7 Process/Protocol

As soon as possible after an in-patient is confirmed as having active pulmonary tuberculosis, the CD Unit 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 stakeholders, including:

- CD Unit.
- 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).
- Public Health Nurse (specific to geographic area).
- Hospital Social Worker (if patient not an Urban Outreach client).
- Home & Community Care Manager [or designate] (specific to geographic area).
- Occupation Health Nurse Specialist.
- Hospital Infection Control Practitioner.
- WH&S Consultant (for fit-testing), Community Infection Control Practitioner and others may join teleconference as needed.

- Needs to be a collaborative process between the hospital physician, MHO and consultant TB physician from BCCDC TB Control division to determine appropriateness of discharge.
- MHO will notify public health services to assure the out-patient prescription medications are in place and that community protection protocols are established, should the patient still be infectious.
- CD Unit will coordinate with local Public Health Nursing staff and the hospital discharge planner, to ensure an adequate discharge plan is in place prior to patient release.
- Notify family doctor for an appropriate follow-up appointment.
- 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 staff, if required.
- Notify transport services, if required.
- Once all parties have been notified and a discharge date has been agreed upon, (minimum of 3 working [Mon-Fri] days required to ensure services are in place - additional time may be required depending on the complexity of the case), the discharge can proceed.

5.0 REFERENCES:

5.1 **Canadian Tuberculosis Standards** 6th Edition by The Public Health Agency of Canada and The Lung Association, 2007; Chapter 16.

5.2 **APIC Text of Infection Control and Epidemiology** 3rd Edition 2009; Chapter 91.

5.3 **Canadian Standards Association CAN**/CSA-Z317.2-01 Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities 2008.

5.4 **WorksafeBC Occupational Health and Safety Regulations** available:

TUBERCULOSIS MANAGEMENT PROGRAM QUICK REFERENCE

Goal is to prevent transmission of TB to staff and patients
Early diagnosis necessary
If TB suspected, implement Airborne Precautions immediately – place patient in Airborne Isolation room and staff to wear N95 respirators
Place appropriate Airborne Precautions sign on door and ensure that the negative pressure is turned on and working. Room pressure must be checked each shift.
Collect 3 sputum specimens 8 – 24 hours apart with at least one being an early morning specimen
Patient to wear surgical/procedure mask when outside of Airborne Isolation room
Visitors to be offered N95 respirator – teach re seal check
Children should not visit
Discontinue Airborne Precautions only on approval from ICP, Infectious Disease physician, Respirologist, or Medical Director for IP&C
When Airborne Precautions are discontinued and room is cleaned, 45 minutes is required to remove airborne contaminants
Discharge planning done collaboratively with Public Health and others – requires minimum of 3 working days to ensure necessary services are organized and available

Interior Health

Facility Tuberculosis Risk Assessment Form

Facility				
# Beds				
# Annual TB Admissions / year				
Facility Assessment Date				
Facility Risk Assessment				
Activity Risk Assessment				
Department	High-risk Activity	Intermed - risk ctivity	Low-risk Activity	Surveil!. Frequency
Emergency				
Outpatient				
Intensive Care				
Respiratory				
Operating Room				
PARR				
Morgue				
Laboratory				
Nrsg Unit admitting active TB				
Nrsg Unit admitting active TB				
Nrsg Unit admitting active TB				

ICP	*Pnnt*	*Signature*	*Date*
OHN	*Pnnt*	*Signature*	*Date*

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FACILITY RISK ASSESSMENT

Facility Size	Medium Risk	Low Risk
Hospital 200 beds	6 TB admissions / year	<6 TB admissions / year
Hospital<200 beds	3 TB admissions / year	< 3 TB admissions / year
Other Facility (e.g.LTC)	3 TB admissions / year	< 3 TB admissions / year

WORK ACTIVITY RISK ASSESSMENT

	Work Activity
High-risk	.r cough-inducing procedures .r autopsy examinations -/ morbid anatomy and pathology examinations -/ bronchoscopy procedures\ .r designated Mycobacterium laboratory procedures (manipulation of mycobacterial cultures) -/ units where increased rates of TST conversion have been documented (where no known exposure has occurred in department or community)
Intermediate-risk	.r regular direct patient contact and work on units where patients with active TB are admitted
Low-risk	.r minimal patient contact (e g medical records, administration, or regular patient contact but in low risk units i.e 08/GYN/NICU)

TB SURVEILLANCE BASED ON FACILITY / WORK ACTIVITY RISK

	High-risk Activities	Intermediate -risk Activities	Low-risk Activities
Medium	ANNUAL	ANNUAL	Post exposure
Low	ANNUAL	Post exposure	Post exposure