

# Appendix A: Disease-Specific Chapters

Chapter: Tuberculosis

Revised April 2015

# Tuberculosis

Communicable

Virulent

## Health Protection and Promotion Act, Section 1

### Health Protection and Promotion Act:

#### Ontario Regulation 558/91 – Specification of Communicable Diseases

### Health Protection and Promotion Act:

#### Ontario Regulation 559/91 – Specification of Reportable Diseases

## 1.0 Aetiologic Agent

The infectious agent of tuberculosis (TB) infection and disease in humans is the *Mycobacterium tuberculosis complex*, which consists of *M. tuberculosis*, and includes *M. canetti*, *M. africanum*, *M. caprae*, *M. microti*, *M. pinnipedii*, and *M. bovis*.<sup>1</sup> *M. bovis* includes the vaccine strain *M. bovis BCG* however, *M. bovis BCG* is not in the Canadian case definition of TB.

Mycobacteria are aerobic, non-spore forming and non-motile bacteria.<sup>1</sup>

Other nontuberculous mycobacteria causing disease in humans are not communicable and not reportable in Ontario, with the exception of leprosy.<sup>1</sup>

## 2.0 Case Definition

### 2.1 Surveillance Case Definition

[See Appendix B](#)

### 2.2 Outbreak Case Definition

- The outbreak case definition varies with the outbreak under investigation. Consideration should be given to the following in establishing a TB outbreak case definition: Clinical, laboratory and/or epidemiological criteria;
- Time frame for occurrence;
- Geographic location(s) or place(s) where cases live or became ill/exposed; and
- Special attributes of cases (e.g., age, underlying conditions).

## 3.0 Identification

### 3.1 Clinical Presentation

Among those with newly developed latent TB infection (LTBI), approximately 90% will never develop active disease. The remaining 10% will develop active disease at some point in their lifetime, half of these within the first two years of infection. The risk of developing active TB is higher when other risk factors or comorbidities are involved, such as HIV co-

infection. Those with HIV co-infection have an increased risk of 10% per year of developing active TB disease.

Among those infected with TB, early lung lesions commonly heal, leaving no residual changes. However, in some cases pulmonary lesions do not heal, and as cellular infiltration continues, granulomata become caseous and necrotic. These may or may not become calcified or show scarring upon radiograph.

Pulmonary symptoms may include:

- Persistent cough (of more than 3 weeks);
- Sputum production, sometimes with hemoptysis;
- Chest pain; and
- Shortness of breath.

Systemic symptoms consistent with TB include:

- Fever and night sweats;
- Loss of appetite and weight loss; and
- Fatigue.

Extrapulmonary symptoms are dependent on the site affected, for example, TB of the spine might produce back pain; TB of the kidney may cause flank pain, frequency and dysuria; and TB involving lymph nodes presents with swelling in the affected lymph nodes.

Extrapulmonary TB should be suspected in anyone with systemic symptoms who is at high risk for TB.<sup>1</sup>

## 3.2 Diagnosis

[See Appendix B](#)

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage:

<http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

## 4.0 Epidemiology

### 4.1 Occurrence

Occurrence is worldwide. Tuberculosis cases in Ontario account for approximately 40% of the cases of TB reported in Canada each year.

In Ontario, the highest incidence of TB is seen in the city of Toronto, followed by other densely populated urban areas including Peel Region, Ottawa and Hamilton. Provincially, nearly 90% of reported TB cases occur among the foreign born. Persons at greater risk of developing active TB after being infected include persons with immunosuppressive conditions (especially HIV), homeless individuals, Aboriginal persons and children under 5 years old.

The incidence of multidrug-resistant TB (MDR-TB) in the province has fluctuated from 6 to 11 laboratory-confirmed cases per year. Extensively drug-resistant TB (XDR-TB) is very rare in Canada. In Ontario, only three cases of XDR-TB were reported between 2007 and 2012.

Please refer to the Public Health Ontario (PHO) Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario.<sup>2,3</sup> An example can be found at:  
[http://www.publichealthontario.ca/en/DataAndAnalytics/Documents/PHO\\_Monthly\\_Infectious\\_Diseases\\_Surveillance\\_Report\\_-\\_March\\_2014.pdf](http://www.publichealthontario.ca/en/DataAndAnalytics/Documents/PHO_Monthly_Infectious_Diseases_Surveillance_Report_-_March_2014.pdf)

## 4.2 Reservoir

The reservoir for *M. tuberculosis* is humans. Animals may be infected but are rarely a source of infection. Sporadic cases may result from inadvertent exposure of abattoir workers, veterinarians and wild game handlers to infected animals.<sup>1</sup>

## 4.3 Modes of Transmission

Transmission of tubercle bacilli in airborne droplet nuclei (1 to 5 microns in diameter) occurs via respiratory efforts such as coughing, sneezing, singing or speaking.<sup>1</sup>

This generally requires prolonged or repeated exposure to an infectious case. Laryngeal tuberculosis, although rare, is highly infectious. Healthcare workers may potentially be exposed during bronchoscopy, intubation and autopsy.<sup>1</sup>

Bovine tuberculosis results from exposure to cattle infected with *M. bovis*, usually through ingestion of unpasteurized milk or dairy products, and sometimes through airborne droplet nuclei that can be spread to farmers and animal handlers.

Extrapulmonary TB is generally not communicable.<sup>1</sup> Concurrent pulmonary involvement, however, should always be ruled out in any case of extrapulmonary TB.

## 4.4 Incubation Period

Variable. Five percent of infected individuals develop primary or progressive primary active disease within 18 to 24 months after infection, and 5% develop post primary disease over the remainder of their lifetime. While the subsequent risk of active pulmonary or extrapulmonary TB is greatest within the first 2 years after infection, without treatment, LTBI will persist for a lifetime. HIV co-infection and other immunocompromising conditions as well as age under 5 years increase the risk for the development of active TB disease following infection.<sup>1</sup>

## 4.5 Period of Communicability

Period of communicability is variable amongst infectious cases of TB; in theory it lasts as long as viable tubercle bacilli are discharged in the sputum. Some untreated or inadequately treated patients may be intermittently sputum-positive for years. The degree of communicability depends on the number of bacilli discharged, virulence of the bacilli, ventilation, exposure of bacilli to sun or UV light, and opportunities for aerosolization through coughing, sneezing, talking, singing or during procedures such as intubation, bronchoscopy and autopsy.<sup>1</sup>

For smear positive or symptomatic infections the period of communicability may start up to 3 months before respiratory symptom onset; smear negative, asymptomatic cases with no evidence of cavities may be considered infectious up to 4 weeks prior to date of diagnosis.<sup>1</sup>

To determine if treatment is effective in reducing infectiousness, one should consider objective clinical, radiographic and/or microbiologic improvement. For guidance on when to determine a case is no longer infectious, or for details on when to discontinue airborne precautions, please refer to the *Canadian Tuberculosis Standards, 2014* (or as current).<sup>1</sup>

Children with primary pulmonary TB are generally not considered infectious.<sup>1</sup>

## 4.6 Host Susceptibility and Resistance

Susceptibility is essentially universal. The risk of infection with the tubercle bacillus is related to multiple host, pathogen, and environmental factors.<sup>1</sup>

The first 18 to 24 months after infection constitutes the most hazardous period for the development of clinical disease.<sup>1</sup>

Once infected, the risk of developing active TB disease is influenced by the time since infection, age, and medical conditions or therapies that affect the immune system of the infected person. The risk is highest in the persons recently infected (i.e., the first 1 to 2 years), very young children (under 5 years of age), and in persons who are immunosuppressed, particularly those who have HIV/AIDS, diabetes, and certain types of cancer.<sup>1</sup>

## 5.0 Reporting Requirements

### 5.1 To local Board of Health

Individuals who have or may have TB shall be reported as soon as possible to the medical officer of health by persons required to do so under the *Health Protection and Promotion Act* (HPPA).<sup>4</sup>

### 5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry

Report only case classifications specified in the case definition.

Cases shall be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the ministry **within one (1) business day of receipt of initial notification** as per iPHIS Bulletin Number 17: Timely Entry of Cases.<sup>6</sup> The minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569* (Reports) under the HPPA;
- The iPHIS user guides published by PHO; and
- Bulletins and directives issued by PHO.<sup>2, 7, 4</sup>

Refer to the *Tuberculosis Prevention and Control Protocol, 2008* (or as current) for more details on reporting of data elements for confirmed and suspect cases, and contacts.<sup>5</sup>

## 6.0 Infection Prevention and Control (IPAC) Measures:

### 6.1 Personal Prevention Measures

Refer to the following documents and the other references listed below for information on prevention and education:

*Tuberculosis Prevention and Control Protocol, 2008 (or as current)*<sup>5</sup>

*Guidelines to Reduce TB Transmission in Homeless Shelters and Drop-In Centres*<sup>8</sup>

*Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]*<sup>9</sup>

### 6.2 IPAC Strategies

Refer to the following documents and the other references listed below for information on infection prevention and control strategies:

*Canadian Tuberculosis Standards*<sup>1</sup>

*Tuberculosis Prevention and Control Protocol, 2008 (or as current)*<sup>5</sup>

*Guidelines to Reduce TB Transmission in Homeless Shelters and Drop-In Centres*<sup>8</sup>

*Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]*<sup>9</sup>

Refer to PHO's website at [www.publichealthontario.ca](http://www.publichealthontario.ca) to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on IPAC. PIDAC best practice documents can be found at:

[http://www.publichealthontario.ca/en/eRepository/BP\\_IPAC\\_Ontario\\_HCSettings\\_2012.pdf](http://www.publichealthontario.ca/en/eRepository/BP_IPAC_Ontario_HCSettings_2012.pdf)

### 6.3 Management of cases of active TB, individuals with LTBI, and individuals placed on medical surveillance

Refer to the following documents and the other references listed below for information on prevention and education:

*Tuberculosis Prevention and Control Protocol, 2008 (or as current)*<sup>5</sup>

*Guidelines to Reduce TB Transmission in Homeless Shelters and Drop-In Centres*<sup>8</sup>

*Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]*<sup>9</sup>

### 6.4 Management of Contacts

Refer to the following documents and the other references listed below for information on prevention and education:

*Tuberculosis Prevention and Control Protocol, 2008 (or as current)*<sup>5</sup>

*Guidelines to Reduce TB Transmission in Homeless Shelters and Drop-In Centres*<sup>8</sup>

*Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]*<sup>9</sup>

### 6.5 Management of Outbreaks

Refer to the following documents and the other references listed below for information on prevention, education and outbreak management:

*Canadian Tuberculosis Standards*<sup>1</sup>

*Tuberculosis Prevention and Control Protocol, 2008* (or as current)<sup>5</sup>

*Guidelines to Reduce TB Transmission in Homeless Shelters and Drop-In Centres*<sup>8</sup>

## 7.0 References

1. Canadian Lung Association, Canadian Thoracic Society; Public Health Agency of Canada. Canadian tuberculosis standards. 7<sup>th</sup> ed. Ottawa, ON: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2014. Available from: [http://www.respiratoryguidelines.ca/sites/all/files/Canadian\\_TB\\_Standards\\_7th\\_Edition\\_ENG.pdf](http://www.respiratoryguidelines.ca/sites/all/files/Canadian_TB_Standards_7th_Edition_ENG.pdf)
2. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Monthly infectious diseases surveillance report. Toronto, ON: Queen's Printer for Ontario; 2014. Available from: <http://www.publichealthontario.ca/en/ServicesAndTools/SurveillanceServices/Pages/Monthly-Infectious-Diseases-Surveillance-Report.aspx>
3. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Reportable disease trends in Ontario, 2011. Toronto, ON: Queen's Printer for Ontario; 2014. Available from: [http://www.publichealthontario.ca/en/eRepository/Reportable\\_Disease\\_Trends\\_in\\_Ontario\\_2011.pdf](http://www.publichealthontario.ca/en/eRepository/Reportable_Disease_Trends_in_Ontario_2011.pdf)
4. *Health Protection and Promotion Act*, R.S.O. 1990, c. H.7. Available from: [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90h07\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm).
5. Ontario. Ministry of Health and Long-Term Care. Tuberculosis prevention and control protocol. Toronto, ON: Queen's Printer for Ontario; 2008. Available from: [http://www.health.gov.on.ca/en/pro/programs/publichealth/oph\\_standards/docs/tuberculosis\\_prevention\\_control.pdf](http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/tuberculosis_prevention_control.pdf)
6. Ontario. Ministry of Health and Long-Term Care. Timely entry of cases. iPHIS Bulletin. Toronto, ON: Queen's Printer for Ontario; 2014:17.
7. *Reports*, R.R.O. 1990, Reg. 569. Available from: [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_900569\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900569_e.htm).
8. Toronto Public Health. Environmental control best practices: guidelines to reduce TB transmission in homeless shelters and drop-in centres [Internet]. Toronto, ON: City of Toronto; 2007 [cited 2014 Nov 14]. Available from: [https://www1.toronto.ca/city\\_of\\_toronto/toronto\\_public\\_health/communicable\\_disease\\_control/tuberculosis/files/pdf/enviro\\_control\\_best\\_practices.pdf](https://www1.toronto.ca/city_of_toronto/toronto_public_health/communicable_disease_control/tuberculosis/files/pdf/enviro_control_best_practices.pdf)
9. Ontario. Ministry of Health and Long-Term Care. Tuberculosis prevention and control guidance document. Toronto, ON: Queen's Printer for Ontario; 2011. [Draft]

## 8.0 Additional Resources

Ontario Agency for Health Protection and Promotion (Public Health Ontario). iPHIS tuberculosis (TB) user guide. Toronto, ON: Queen's Printer for Ontario; 2008.

Ontario. Ministry of Health and Long-Term Care. Infectious diseases protocol, 2013. Toronto, ON: Queen’s Printer for Ontario; 2013. Available from:  
[http://www.health.gov.on.ca/en/pro/programs/publichealth/oph\\_standards/infdispro.aspx](http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/infdispro.aspx)

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee (PIDAC). Best practices for infection prevention and control programs in all health care settings. 3<sup>rd</sup> ed., 2012 revision. Toronto, ON: Queen’s Printer for Ontario; 2012. Available from:  
[http://www.publichealthontario.ca/en/eRepository/BP\\_IPAC\\_Ontario\\_HCSettings\\_2012.pdf](http://www.publichealthontario.ca/en/eRepository/BP_IPAC_Ontario_HCSettings_2012.pdf)

## 9.0 Document History

**Table 1: History of Revisions**

Revision Date	Document Section	Description of Revisions
April 2015	General	New template. Section 9.0 Document History added
April 2015	2.2 Outbreak Case Definition	Removed: “Cases should also be classified by levels of probability (i.e. confirmed, probable or suspect).”
April 2015	3.1 Clinical Presentation	Entire section revised.
April 2015	3.2 Diagnosis	Added: For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage: <a href="http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx">http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx</a>



Revision Date	Document Section	Description of Revisions
April 2015	4.1 Occurrence	<p>First paragraph: Revised “approximately half” to read “approximately 40%”.</p> <p>Second paragraph: Added “followed by other densely populated urban areas including Peel Region, Ottawa and Hamilton”.</p> <p>Revised “upwards of 90%” to read “nearly 90%”.</p> <p>Revised “(such as HIV)” to read “(especially HIV)”.</p> <p>Third paragraph: Revised “around approximately 10 cases per year” to read “from 6 to 11 laboratory confirmed cases per year”.</p> <p>Removed “To date, Ontario and Alberta are the only provinces in Canada that have had cases of extensively drug resistant TB (XDR-TB).”</p> <p>Replaced with “Extensively drug-resistant TB (XDR-TB) is very rare in Canada. In Ontario, only three cases of XDR-TB were reported between 2007 and 2012.”</p> <p>Added: Please refer to the Public Health Ontario (PHO) Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario. An example can be found at:  <a href="http://www.publichealthontario.ca/en/DataAndAnalytics/Documents/PHO_Monthly_Infectious_Diseases_Surveillance_Report_-_March_2014.pdf">http://www.publichealthontario.ca/en/DataAndAnalytics/Documents/PHO_Monthly_Infectious_Diseases_Surveillance_Report_-_March_2014.pdf</a></p>
April 2015	4.3 Modes of Transmission	<p>Second paragraph: Revised “is rare however” to read “although rare”.</p>
April 2015	4.5 Period of Communicability	<p>First paragraph: Revised “Is variable; in theory as long as viable tubercle bacilli are discharged in the sputum” to read “Period of communicability is variable amongst infectious cases of TB; in theory it lasts as long as viable tubercle bacilli are discharged in the sputum.”</p> <p>Removed “adequacy of” in second sentence.</p> <p>Second paragraph: Added “respiratory” before symptom onset, and changed “asymptomatic smear negative” to “smear negative, asymptomatic”, and changed “are infectious” to “may be considered infectious up to...”</p> <p>All of paragraph 3 revised.</p> <p>Paragraph 4: Revised “not infectious” to read “not considered infectious.”</p>

Revision Date	Document Section	Description of Revisions
April 2015	4.6 Host Susceptibility and Resistance	Added “Host” to section title, “Host Susceptibility and Resistance”. First paragraph: Removed “The risk of acquiring progressive disease due to infection with the tubercle bacillus is related to multiple factors including degree of exposure, nutritional and immune status of the host, and other factors including genetic factors.” Replaced with current language. Second paragraph: Replaced “12 to 24 months” with “18 to 24 months”. All of paragraph 3 revised.
April 2015	5.1 To local Board of Health	First paragraph: Removed “Clinical and or laboratory confirmed cases shall be reported to the medical officer of health by persons required to do so under the <i>Health Protection and Promotion Act</i> , R.S.O. 1990 .” Replaced with current language.
April 2015	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	Paragraph 1: Removed “to PHD”. Paragraph 2: Revised the second bullet from “The disease-specific user guides published by the Ministry” to “The iPHIS user guides published by PHO”. Revised the third bullet from “Bulletins and directives issued by the ministry” to “Bulletins and directives issued by PHO.”
April 2015	6.1 Personal Prevention Measures	Third Reference: Revised <i>Tuberculosis Prevention and Control Best Practices</i> (formerly called Tuberculosis Protocol 2006) (6)” to “ <i>Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]</i> <sup>9</sup> ”.
April 2015	6.2 Infection Prevention and Control Strategies	Added: “ <i>Canadian Tuberculosis Standards</i> ”. Fourth Reference: Revised <i>Tuberculosis Prevention and Control Best Practices</i> (formerly called Tuberculosis Protocol 2006) (6)” to “ <i>Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]</i> <sup>9</sup> ”. Added: Refer to PHO’s website at <a href="http://www.publichealthontario.ca">www.publichealthontario.ca</a> to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on IPAC. PIDAC best practice documents can be found at: <a href="http://www.publichealthontario.ca/en/eRepository/BP_IPAC_Ontario_HCSettings_2012.pdf">http://www.publichealthontario.ca/en/eRepository/BP_IPAC_Ontario_HCSettings_2012.pdf</a> ”.

<b>Revision Date</b>	<b>Document Section</b>	<b>Description of Revisions</b>
April 2015	6.3 Management of cases of active TB, individuals with LTBI, and individuals placed on medical surveillance	Revised title from “Management of Cases” to current title. Revised “ <i>Tuberculosis Prevention and Control Best Practices</i> (formerly called Tuberculosis Protocol 2006)” to “ <i>Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]</i> ”.
April 2015	6.4 Management of Contacts	Revised “ <i>Tuberculosis Prevention and Control Best Practices</i> (formerly called Tuberculosis Protocol 2006)” to “ <i>Tuberculosis Prevention and Control Guidance Document, 2011 [Draft]</i> ”.
April 2015	7.0 References	Updated.
April 2015	8.0 Additional Resources	Updated.

