Appendix A: Disease-Specific Chapters

Chapter: Brucellosis

Revised December 2014
**Brucellosis**

- Communicable
- Virulent

*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**

Brucellosis is caused by the bacterium *Brucella*. *Brucella* species are small, nonmotile, gram-negative coccobacilli. The species that most commonly infect humans include *B. suis*, *B. abortus*, *B. melitensis*, and *B. canis*. While rare, *B. ceti* (reservoirs: dolphins, porpoises, whales), *B. pinnipedialis* (sea lions, seals, walruses) and *B. inopinata* (unknown reservoir) are recently described *Brucella* species known to cause disease in humans.

*Brucella* spp. are potential bioterrorism agents.

**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 when establishing an outbreak case definition:

1. Clinical, laboratory and/or epidemiological criteria;
2. The time frame of occurrence;
3. The geographic location(s) or place(s) where cases live or became ill/exposed; and
4. Special attributes of cases (e.g., age, underlying conditions and/or aetiologic agent).

Cases may be classified by levels of probability (e.g., confirmed, probable and/or suspect).

**3.0 Identification**

**3.1 Clinical Presentation**

Acute or insidious onset of symptoms, such as intermittent fever, headache, weakness, profuse sweating, chills, arthralgia, depression, weight loss, and generalized aching. Localized infections of organs, including the liver and spleen, may be present. Physical findings include lymphadenopathy, hepatosplenomegaly and occasionally arthritis. Serious complications include meningitis, endocarditis and osteomyelitis.
3.2 Diagnosis
Laboratory demonstration of *Brucella* in blood or appropriate clinical specimen.

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

See Appendix B for diagnostic criteria relevant to the Case Definition.

4.0 Epidemiology

4.1 Occurrence
Worldwide, especially in Mediterranean countries, the Middle East, Africa, Asia, Central and South America, India and Mexico. The disease is often unrecognized and under-reported.3

Predominantly an occupational disease of those who work with infected animals or their tissues, especially farm workers, veterinarians, meat inspectors and abattoir workers. Infection is more common in those who consume raw caribou, raw milk or raw milk products. There have been reports of isolated cases of infection with *B. canis* occurring in animal handlers from contact with dogs, and *B. suis* occurring in those with contact with feral swine.3

Between 2007 and 2011, an average of three cases of brucellosis were reported per year in Ontario, most of which were related to travel.

Please refer to the Public Health Ontario Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario.4, 5 http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx

4.2 Reservoir
Domestic animals such as cattle, swine, goats and sheep as well as wild animals such as caribou, bison, elk and some species of deer.1

Ontario has a brucellosis free status for cattle.

4.3 Modes of Transmission
Transmission occurs through ingestion of raw milk and unpasteurized dairy products from infected animals, through direct contact of breaks in the skin and mucous membrane with infected animal tissue and body fluids, and from fetuses and placentas. Airborne inhalation in laboratories and abattoirs has also been reported.1

4.4 Incubation Period
The incubation period is usually 5 - 60 days; commonly 1-2 months; occasionally up to several months.1

4.5 Period of Communicability
There is no evidence of person-to-person transmission.1
4.6 Host Susceptibility and Resistance

The severity and duration of the illness varies widely and the duration of acquired immunity following infection is uncertain.¹

5.0 Reporting Requirements

5.1 To local Board of Health

Individuals who have or may have brucellosis 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, R.S.O. 1990 (HPPA).⁶

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 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.⁷

The minimum data elements to be reported for each case are specified in the following sources:

- Ontario Regulation 569 (Reports) under the Health Protection and Promotion Act (HPPA);⁸,⁶
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

6.1 Personal Prevention Measures

Preventive Measures:

- Travellers to foreign countries should be advised not to consume unpasteurized dairy products and undercooked meat products¹
- If an outbreak is suspected among a particular subset of the population then potentially affected farmers, hunters and animal handlers should be educated about the proper handling of carcasses.³ This includes burying the remains and using protective clothing and gloves
- Protective clothing and gloves should be worn when handling feral swine
- No one should consume raw unpasteurized milk
- Direct contact with body fluids and/or products of parturition from infected animals should be avoided
6.2 Infection Prevention and Control Strategies
For hospitalized cases, routine practices are recommended and contact precautions are indicated when dealing with individuals with draining wounds and or lesions.1

Refer to Public Health Ontario’s website at www.publichealthontario.ca to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on Infection Prevention and Control (IPAC). PIDAC best practice documents can be found at: http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx

6.3 Management of Cases
Investigate cases of brucellosis to determine the source of infection.

Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation. In addition to the requirements of HPPA Regulation 569 (Reports),6,8 the following disease-specific information should also be obtained:

- History of exposure to possible sources based on specific species identified on culture (in past 60 days)
- History of occupational risks (see above)
- History of recent (international) travel
- Food history
- Date of symptom onset
- History of past infection, as relapses of prior infection can occur

Notify Canadian Food Inspection Agency (CFIA) if disease is traced to imported or domestic animals/sources. Consider testing suspect food samples or other products. Consult the Public Health Ontario Laboratories advice on testing availability, sampling, and transport considerations. Collaborate with CFIA to ensure proper removal/disposal of implicated product or animal.

Treatment is under the direction of the attending physician and depends on clinical symptoms and age of the case; antibiotics are usually prescribed for six weeks to prevent recurring infection.1

6.4 Management of Contacts
Investigate contacts, such as co-workers and family members, to identify people who may have been exposed to the same source and who could also be infected.3

6.5 Management of Outbreaks
Two or more cases linked in time and space is suggestive of an outbreak. If no common source is identified, consideration may be given to a bioterrorism event where there is potential to infect humans and animals through aerosol exposure.
Provide public health management of outbreaks or clusters in order to identify the source of illness and stop the outbreak.

The likelihood of an outbreak of brucellosis is low, given Ontario’s brucellosis-free status in cattle; however clusters of cases could possibly occur following exposure to an animal with brucellosis other than cattle, such as deer.

In addition, as per this Protocol, outbreak management shall be comprised of, but not limited to, the following general steps:

- Confirm diagnosis and verify the outbreak
- Establish an outbreak team
- Develop an outbreak case definition
- Implement prevention and control measures
- Implement and tailor communication and notification plans depending on the scope of the outbreak
- Conduct epidemiological analysis on data collected
- Conduct environmental inspections of implicated premise where applicable
- Coordinate and collect appropriate clinical specimens where applicable
- Prepare a written report
- Declare the outbreak over in collaboration with the outbreak team

### 7.0 References


8.0 Additional Resources


9.0 Document History

Table 1: History of Revisions

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<tr>
<th>Revision Date</th>
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<tr>
<td>December 2014</td>
<td>General</td>
<td>New template.</td>
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<tr>
<td></td>
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<td>Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”.</td>
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<td>Title of Section 5.2 changed from “To Public Health Division (PHD)” to “To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry”.</td>
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<tr>
<td>December 2014</td>
<td>1.0 Aetiologic Agent</td>
<td>Entire section revised.</td>
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</table>
| December 2014 | 2.2 Outbreak Case Definition | Number two added, “2. The time frame of occurrence”. Number three bullet added, “3. The geographic location(s) or place(s) where cases live or became ill/exposed”. Number four added, “4. Special attributes of cases (e.g., age, underlying conditions and/or aetiologic agent)”.
<p>| December 2014 | 3.1 Clinical Presentation | First sentence removed. New first sentence added, “Acute or insidious onset of symptoms, such as intermittent fever, headache, weakness, profuse sweating, chills, arthralgia, depression, weight loss, and generalized aching.” |
| December 2014 | 3.2 Diagnosis | Entire section revised. |
| December 2014 | 4.1 Occurrence | First paragraph, second sentence, “un-reported” replaced with “under-reported”. Second paragraph, second sentence, changed from “Infection is common in those…” to “Infection is more common in those who consume raw caribou, raw milk or raw milk products.” Second paragraph, third sentence, addition of “and B. suis occurring in those with contact with feral swine.” Third paragraph removed. New third paragraph added, “Between 2007 and 2011, an average of three cases of brucellosis were reported per year in Ontario, most of which were related to travel.” Fourth paragraph added, “Please refer to the Public Health Ontario Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more information on disease trends in Ontario…” |
| December 2014 | 4.3 Modes of | First sentence, replaced “and their discharges” |</p>
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<tr>
<td>December 2014</td>
<td>Transmission</td>
<td>with “and body fluids”.</td>
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<tr>
<td>December 2014</td>
<td>4.4 Incubation Period</td>
<td>First sentence changed from “The incubation is variable, and difficult to ascertain…” to “The incubation period is usually…”</td>
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<tr>
<td>December 2014</td>
<td>4.5 Period of Communicability</td>
<td>Replaced “communicability” with “transmission”.</td>
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| December 2014 | 5.1 To local Board of Health | Changed from “Confirmed and suspected cases shall be reported immediately…” to “Individuals who have or may have brucellosis shall be reported as soon as possible…”  
Addition of “(HPPA)” to the end of the sentence. |
| December 2014 | 5.2 To Ministry of Health and Long-Term Care (the ministry), or Public Health Ontario (PHO), as specified by the ministry | First paragraph, first sentence, removed “to PHD”.  
Bullet two, changed from “The disease-specific User Guides published by the ministry” to “iPHIS User Guides published by PHO”.  
Bullet three, changed from “the ministry” to “PHO”. |
| December 2014 | 6.1 Personal Prevention Measures | Bullet two, changed from “Farmers, hunters and animal handlers should…” to “If an outbreak is suspected among a particular subset of the population then potentially affected farmers, hunters and animal handlers should be educated about the proper handling of carcasses. This includes burying the remains and using protective clothing and gloves.”  
New third bullet added, “Protective clothing and gloves should be worn when handling feral swine”.

Previous bullet three moved to bullet four.

Bullet four, removed “and milk products from potentially infected cows, goats, and sheep or have direct contact with infected animal body fluids or products of conception”.

New fifth bullet added, “Direct contact with body fluids and/or products of parturition from infected animals should be avoided”.

December 2014 | 6.2 Infection | First paragraph, addition of “when dealing with |
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<td>Prevention and</td>
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<td>Second paragraph added, “Refer to Public Health Ontario’s website at <a href="http://www.publichealhontario.ca">www.publichealhontario.ca</a> to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on Infection Prevention and Control (IPAC). PIDAC best practice documents can be found at…”</td>
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<td>December 2014</td>
<td>6.3 Management of Cases</td>
<td>First paragraph, second sentence, changed from “The following disease-specific information should also be obtained during case management…” to “In addition to the requirements of HPPA Regulation 569 (Reports), the following disease-specific information should also be obtained”. New fifth bullet added, “Date of symptom onset”. Previous fifth bullet becomes sixth bullet. Second paragraph, first sentence, addition of “/sources”. Second paragraph, second sentence, changed from “Test all suspect food samples” to “Consider testing suspect food samples or other products”. Second paragraph, addition of sentence “Consult the Public Health Ontario Laboratories advice on testing availability, sampling, and transport considerations.” Second paragraph, sentence four, changed from “incriminated product” to “implicated product”.</td>
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<tr>
<td>December 2014</td>
<td>6.5 Management of Outbreaks</td>
<td>Paragraph three, “The occurrence of possible outbreaks of” is replaced with “The likelihood of an outbreak of”. Paragraph three, “occur if exposed to” replaced with “occur following exposure to”.</td>
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