Brucellosis

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The following chapter is adapted with permission from Alberta Health, for additional guidance related to the management of brucellosis see: Alberta Public Health Disease Management Guidelines: Brucellosis.

1. CASE DEFINITION

Confirmed Case

Clinical illness* with laboratory confirmation of infection:

- Isolation of *Brucella* species from an appropriate clinical specimen (e.g., blood, bone marrow)** ***OR***
- Detection of *Brucella* nucleic acid (e.g., PCR) from an appropriate clinical specimen (e.g., blood, CSF, biopsy tissue)*** ***OR***
- Seroconversion or significant (i.e., fourfold or greater) rise in *Brucella* agglutination titre between acute and convalescent phase serum specimens obtained 2 or more weeks apart

Probable Case

Clinical illness* and one of the following:

- Epidemiologically linked to a confirmed animal case ***OR***
- Supportive serology (*Brucella* agglutination titre of 1:160 or higher in one or more serum specimens obtained after onset of symptoms)

*Clinical Illness is characterized by acute or insidious onset of fever, night sweats, undue fatigue, anorexia, weight loss, headache, and arthralgia.

**Refer to the Provincial Laboratory for Public Health (ProvLab) Guide to Services for current specimen collection and submission information.

***Refer to the National Microbiology Laboratory (NML) Guide to Services for current specimen collection and submission information.

2. DIAGNOSIS

- **Often, public health measures need to be implemented prior to confirmation of the diagnosis**
- Diagnosis is made by isolation of the infectious agent from an appropriate clinical specimen
- Diagnosis may also be made by serology when paired sera show a rise in antibody titre (see case definition)
- Interpretation of serologic tests in "chronic" and recurrent cases is especially difficult since titres are usually low
- Speciation is made by taking a positive culture specimen and running specific biochemical tests
- The time from initial inoculation of a clinical specimen to identification at the species level may take at least 10 to 12 days
- With recovery, antibody titres decline slowly but are usually not detected after 2 to 3 years
- Persistent elevation of immunoglobulin G antibodies is prognostic of chronic infection or relapse

3. REPORTING

All HCPs must follow the NWT *Public Health Act*. Measures for contact tracing and legislative requirements are laid out within the *Reportable Disease Control Regulations* and reporting timelines are found in the *Disease Surveillance Regulations*.

Note: the only acceptable methods of reporting to the OCPHO are outlined below. Information provided outside of these methods will not be considered reported unless otherwise stated by a CPHO delegate.

Health Care Professionals

For **Part 2** written report within 24 hours

- Confirmed and probable cases are to be reported to the Office of the Chief Public Health Office (OCPHO) within **24 hours** after diagnosis is made or opinion is formed by completing the Communicable Disease Report Form then submitting to:
  - Environmental Health via Secure File Transfer (SFT): environmental health@gov.nt.ca **AND**
  - Communicable Disease Control Unit (CDCU) via secure medical fax 867-873-0442 or Secure File Transfer CDCU@gov.nt.ca
- If there are any updates regarding the case or contacts the appropriate form will need to be resent with the additional information.
- **Immediately** report all outbreaks or suspect outbreaks by telephone (867)-920-8646 to the OCPHO

Laboratories

- Report all positive results to the OCPHO by fax (867) 873-0442 within **24 hours**

4. OVERVIEW

Causative Agent

- Brucellosis is caused by the bacteria genus *Brucell*a, which are gram negative cocci or small rods, aerobic, non-motile, and urease positive
- The bacteria live naturally in animals as *Brucella abortus* in cattle, *Brucella melitensis* in sheep and goats, *Brucella suis* in pigs, and *Brucella canis* in dogs
- The North has several wildlife reservoirs of brucellosis:
  - Rangiferine brucellosis (Biovar 4 of *B. suis)* is present in free-roaming caribou and reindeer in arctic and sub-arctic Canada
  - Bovine brucellosis (*B. abortus)* is present in free-ranging bison herds in and around Wood Buffalo National Park, which straddles the border between Alberta and the Northwest Territories
  - *Brucell*a *suis* has also been identified in marine mammals such as whales, dolphins, seals, narwhals, and walruses, as well as in polar bears. Most recently it has been identified in muskox in high-arctic communities

Clinical Presentation and Major Complications

For information regarding brucellosis presentation and complications see: Alberta Public Health Disease Management Guidelines: Brucellosis.

Transmission

- Humans can become infected by all types of brucellosis
- Transmission occurs through ingestion, direct contact via skin abrasions and mucous membranes, and inhalation
- The most common mode of transmission is via the ingestion of raw or undercooked meat, and unpasteurized milk or cheese from infected animals
- Contact with infected tissues, blood, urine, vaginal discharge, aborted fetuses from animal reservoirs that include muskox, cattle, swine, goats, sheep, elk, bison, caribou, some species of deer, coyotes, and occasionally dogs
  - New *Brucella* species have also been found in marine mammals
- Aerosolization in abattoirs or laboratories
- Direct transmission from person to person is extremely rare; however, transmission may occur via breast milk or during unprotected sex

Incubation Period

- Highly variable ranging from 5 to 60 days and occasionally several months
- Average onset 2-4 weeks

Clinical Guidance

For patient specific clinical management consult your local healthcare professional, paediatrician, infectious disease specialist, and/or the NWT Clinical Practice Guidelines.

5. PUBLIC HEALTH MEASURES

Key investigations

- **Owing to the length of time required for definitive laboratory evidence of brucellosis, public health measures must often be implemented prior to the confirmed diagnosis**
- Determine possible source of infection
- Transmission required ingestion and/or contact between open skin and infectious material
- Specific *Brucella* species may dictate source, for example:
- *B. melitenis*
  - History of travel or immigration (especially involving the Mediterranean)
  - History of contact with goats/sheep, ingestion of imported cheese, imported non-pasteurized milk or imported sausage
- *B. abortus*
  - History of travel or immigration
  - Contact (e.g., hunting/wild meat preparation) with animals such as wild or farmed bison, elk, deer, etc.
- *B. canis*
  - History of travel or immigration (especially Southeast Asia, South America)
  - Exposure to infected dogs (especially blood, semen, or placenta), coyotes in the United States, and kennels
- *B. suis* biovar 4
  - History of hunting, preparing, or ingesting wild muskox, caribou, or handling or harvesting whales
- Determine the ingestion of potentially contaminated foodstuffs
- Identify occupational risk
- Recent history of travel to or immigration from an endemic area
- Determine history of infection as this may indicate a relapse

Management of a Case

- Contact precautions are required if wound drainage cannot be contained by dressings, otherwise routine practices are sufficient
- Contaminated dressings should be disposed of in a safe manner

Management of Contacts

- Symptomatic and asymptomatic contacts should be investigated if a common source is suspected

Preventive Measures

- No human vaccine is available
- The prevention of human brucellosis depends on the continued control and elimination of the disease in domestic animals
- Provide education for populations who, by the nature of traditional meat-eating practices, may be at risk of acquiring the disease
  - Given the integral role of animals and their products to the cultural practices of the NWT Indigenous populations, it is essential that healthcare workers recognize the potential risk to these populations, while also respecting the significance and longevity of these cultural practices
- Signs to looks for in infected wildlife include:
  - Swollen joints
  - Limping or lameness
  - Swollen glands or pus-filled swelling under the skin
  - Swollen testicles
  - Swollen womb
  - Abortion, or early birth of weak or dead offspring
- Wear gloves when butchering any animal
- Do not butcher or touch any parts of the carcass that look diseased
- Wash hands with soap and water after butchering is completed
- Boil tools after butchering is completed
- Completely cook all meat
- Educate the public, especially travelers to areas where brucellosis is endemic, not to consume unpasteurized dairy products, e.g., milk, cheese, or ice cream
- Educate individuals about the dangers of consuming the uncooked viscera of animals
- Discarded animal remains should be buried
- Educate farmers and workers in slaughterhouses, meat processing plants and butcher shops about the nature of the disease, and the risks in handling carcasses and products of potentially infected animals,
  - Exercise care in handling and disposal of placenta, vaginal/uterine discharge, and aborted fetuses
  - Appropriate disinfection of contaminated areas is essential
- Laboratory Safety
  - Require biosafety level 3 practices
  - See the Canadian Food Inspection Agency – Brucellosis: Material Safety Data Sheet for essential laboratory precautions

6. PUBLIC & HEALTH PROFESSIONAL EDUCATION

For more information on Brucellosis:

- Government of the Northwest Territories: Field guide to wildlife diseases
- The Government of Canada website: Brucellosis Fact Sheet
- The Canadian Food Inspection Agency website: Brucellosis: Material Safety Data Sheet
- US Centers for Disease Control and Prevention website: Brucellosis

7. EPIDEMIOLOGY

- For information on the epidemiology of brucellosis in the NWT see: Epidemiological Summary of Communicable Diseases HSS Professionals.

8. REFERENCES

Information for this chapter was adapted from Alberta Health's Public Health Disease Management Guidelines: Brucellosis.

Additional resources used for this chapter include:

1. Government of Canada Fact Sheet- Brucellosis: https://inspection.canada.ca/animal-health/terrestrial-animals/diseases/reportable/brucellosis/fact-sheet/eng/1305673222206/1305673334337
2. Government of the Northwest Territories Field Guide to Common Wildlife Disease and Parasites: https://www.enr.gov.nt.ca/sites/enr/files/field_guide_wildlife_diseases.pdf