Ministry of Health and Long-Term Care

Infectious Diseases Protocol

Appendix A: Disease-Specific Chapters

Chapter: Q Fever

Effective: February 2019

Ontario

Q Fever

☒ Communicable

☐ Virulent

Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)

1.0 Aetiologic Agent

Q fever is caused by *Coxiella burnetii (C. burnetti)*, a gram-negative intracellular bacterium.[1] *C. burnetti* can be found in the urine, feces and milk of infected animals, with the highest numbers of bacteria shed in birth products such as the placenta and amniotic fluid. *C. burnetti* is highly resistant to many disinfectants and environmental conditions.[2]

C. burnetii may be used as a bioterrorism agent.[1]

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to Appendix B for Case Definitions.

2.2 Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2018* (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (*i.e.* confirmed and/or probable).

3.0 Identification

3.1 Clinical Presentation

Approximately half of humans infected with *C. burnetii* do not show symptoms.[3] Q fever can cause acute or chronic illness in humans. The acute symptoms caused by infection with *C. burnetii* usually develop within 2-3 weeks of exposure.[2,3]

Symptoms commonly seen with acute Q fever include: fever, severe headache, general malaise, myalgia, chills/sweats, non-productive cough, nausea, vomiting, diarrhea, abdominal pain and chest pain, however, it is important to note that the combination, duration and severity of symptoms vary greatly from person-to-person.[2,3] Children with Q fever generally have a milder acute illness than adults.[4]

Although most persons with acute Q fever infection recover, others may experience serious illness with complications that include pneumonia, granulomatous hepatitis, and rarely myocarditis or central nervous system complications.[2,3] Pregnant women who are infected may be at risk for pre-term delivery, miscarriage, stillbirth or low infant birth weight.[3]

Chronic Q fever is a severe disease occurring in <5% of acutely infected patients. It may present soon (within 6 weeks) after an acute infection, or potentially manifest years or decades later.[3,4] Endocarditis is the most commonly identified manifestation of chronic Q fever and is fatal if untreated, whereas with treatment the 10-year mortality rate is 19%.[2,3] Other forms of chronic Q fever include aortic aneurysms and infections of vascular aneurysms, the bone, liver or reproductive organs, such as the testes in males.[3] The three groups at highest risk for chronic Q fever are pregnant women, immunosuppressed persons and patients with pre-existing heart valve defects.[2]

Although the majority of people with acute Q fever recover completely, a post-Q fever fatigue syndrome has been reported to occur in up to 20% of patients with acute Q fever. This syndrome is characterized by constant or recurring fatigue, night sweats, severe headaches, photophobia, pain in muscles and joints, mood changes, and difficulty sleeping.[4]

3.2 Diagnosis

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

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

Q fever has been reported from all continents. It is endemic in areas where reservoir animals are present. Outbreaks have occurred among workers in stockyards, meat processing plants, laboratories and medical and veterinary centres that use sheep (especially pregnant ewes) in research. Between 2007and 2010, an epidemic of Q fever affecting the general public occurred in The Netherlands, and was linked to infected goat farms. A lack of contact with animals should not preclude a clinical suspicion or diagnosis, as infections that are caused by airborne transmission of *C. burnetti* often present with no direct animal exposure.[2]

The true incidence is greater than the reported number of cases because of asymptomatic cases, under-reported mild cases, and under-diagnosis.

The number of cases of Q fever reported per year in Ontario has fluctuated, but remains low. Between 2013 and 2017, an average of 12 cases of Q fever were reported per year in Ontario, ranging from 8 to 16 cases in a given year.*

Please refer to Public Health Ontario's (PHO) Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

4.2 Reservoir

Sheep, cattle, goats are the primary reservoirs for *C. burnetti*. However, infection has been confirmed in other species, including cats, dogs, some wild mammals (*e.g.* rodents), birds and ticks.[2] Infected animals, including sheep and cats, are usually asymptomatic but shed massive numbers of organisms in placental tissues and birth fluids at parturition.[2,3]

4.3 Modes of Transmission

When infected, animals shed the bacteria in urine, feces, milk and especially birth products such as placenta.[1,2] Shedding of organisms may be intermittent.[4]

Transmission occurs most commonly through air-borne dissemination of *C. burnetti* in dust or aerosols from premises contaminated by placental tissues, birth fluids, and excreta of infected animals. Airborne particles containing organisms may be carried downwind one kilometer or more. As a result, individual cases may occur where no animal contact can be demonstrated. Infections may also occur from direct exposure to infected animals or tissues or through exposure to contaminated materials such as wool, straw, or even laundry.[1,2] Raw milk from infected goats or cows contains viable organisms and may be responsible for human transmission.[2] Person-to-person transmission is possible, though rare, through sexual transmission, transplacental transmission and by blood or marrow transfusion.[2,4]

4.4 Incubation Period

Depends on the size of the infectious dose, usually 2-3 weeks for acute Q fever, with a range of 3-30 days.[2] Chronic Q fever can develop years after an initial infection.[1]

* Data included in the epidemiological summary are from January 1, 2013 to December 31, 2017. Data were extracted from Query on February 7, 2018 and therefore are considered preliminary.

4.5 Period of Communicability

C. burnetti is extremely resistant to physical stresses, including heat, disinfectant chemicals and desiccation and can survive in the environment for months to years.[1,4] Direct person-to-person transmission occurs rarely, although sporadic cases of nosocomial transmission during autopsies and obstetrical procedures of infected women have occurred.[2]

4.6 Host Susceptibility and Resistance

Susceptibility is general. Persons with valvular heart disease or vascular defects, pregnant women, and persons who are immunosuppressed are at greater risk for chronic Q fever after an acute infection.[2] Those who recover from infection may possess lifelong immunity against re-infection.[4]

5.0 Reporting Requirements

As per Requirement #3 of the "Reporting of Infectious Diseases" section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569* (Reports) under the *Health Protection and Promotion Act* (HPPA);[5]
- 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:

- Education of workers in high risk occupations such as sheep and dairy farmers, veterinary researchers, abattoir workers, veterinarians and meat workers about the sources of infection and the need for adequate disinfection and disposal of animal products of parturition;[2]
- Education on proper hygiene practices; and
- Consumption of only pasteurized milk and dairy products from cows, goats and sheep.

6.2 Infection Prevention and Control Strategies

Refer to PHO's website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control.

6.3 Management of Cases

In addition to the requirements set out in the Requirement #2 of the "Management of Infectious Diseases – Sporadic Cases" and "Investigation and Management of Infectious Diseases Outbreaks" sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation.

Additional disease-specific information that may be collected includes:

- History of animal exposure during 2-3 weeks prior to symptom onset;
- Earliest and latest exposure date;
- Occupation; and
- Residency/living near a farm or livestock operation.

Treatment is under the direction of the attending health care provider (acute cases, generally require treatment with antibiotics).[2]

Provide cases with information about the infection and how it spreads.

If a source has been identified, ask the case(s) for a list of persons who may also have come in contact with the infectious item or area.

6.4 Management of Contacts

None, except if exposed to same source, then manage contacts as indicated above in Management of Cases and monitor contacts for clinical signs and symptoms of Q fever. Contacts should seek medical attention if they display signs and symptoms of Q fever.

6.5 Management of Outbreaks

Please see the *Infectious Diseases Protocol, 2018* (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

Outbreaks are generally of short duration. Control measures focus primarily on the elimination of sources of infection, observation of exposed persons and provision of antibiotics.[2]

Cases involved in foodborne transmission may not display localized geographical clustering. Non-foodborne illness outbreaks of Q fever will tend to manifest with geographically linked cases.

7.0 References

1. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Q Fever. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2018 Report of the Committee on Infectious Diseases. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.

2. Heymann DL, editor. Control of Communicable Diseases Manual. 20 ed. Washington, D.C: American Public Health Association; 2015.
3. Centers for Disease Control and Prevention. Q Fever [Internet]. Atlanta, GA: U.S. Department of Health & Human Services 2017 [updated December 26, 2017; cited July 18, 2018]. Available from: https://www.cdc.gov/qfever/index.html
4. Centers for Disease Control and Prevention. Diagnosis and Management of Q Fever — United States, 2013: Recommendations from CDC and the Q Fever Working Group. Morbidity and Mortality Weekly Report: Recommendations and Reports. 2013;62(3):1-28.
5. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: https://www.ontario.ca/laws/regulation/900569

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
December 2014	General	New template. Title of Section 4.6 changed from "Susceptibility and Resistance" to "Host Susceptibility and Resistance". 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". Section 9.0 Document History added.
December 2014	2.1 Outbreak Case Definition	Removed "For use during outbreaks".
December 2014	3.1 Clinical Presentation	Entire section revised.
December 2014	3.2 Diagnosis	Entire section revised.
December 2014	4.1 Occurrence	Entire section revised.
December 2014	4.3 Modes of Transmission	Entire section revised.
December 2014	4.4 Incubation Period	Addition of "for acute Q Fever."

Revision Date	Document Section	Description of Revisions
December 2014	5.1 To Local Board of Health	Entire section revised.
December 2014	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	Removal of "PHD". "The disease-specific User Guides published by the Ministry, and" changed to "The iPHIS User Guides published by PHO, and". "Bulletins and directives issued by the Ministry" changed to "Bulletins and directives issued by PHO".
December 2014	6.1 Personal Prevention Measures	Removal of second bullet "Recommend that infections in domesticated animal population be identified by a veterinarian".
December 2014	6.2 Infection Prevention and Control Strategies	Addition of "Refer to Public Health Ontario's website…"
December 2014	6.3 Management of Cases	Entire section revised.
December 2014	6.4 Management of Contacts	Entire section revised.
December 2014	6.5 Management of Outbreaks	Addition of "**Cases involved in foodborne transmission may not display localized geographical clustering**…"
December 2014	7.0 References	Updated.
December 2014	8.0 Additional Resources	Updated.
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.

Revision Date	Document Section	Description of Revisions
February 2019	1.0 Aetiologic Agent	Entire section revised.
February 2019	3.1 Clinical Presentation	Minor revisions to entire section. Addition of last sentence to fourth paragraph: “The three groups at highest risk for chronic Q fever are pregnant women, immunosuppressed persons and patients with pre-existing heart valve defects.”
February 2019	4.1 Occurrence	Entire section revised.
February 2019	4.2 Reservoir	Entire section revised.
February 2019	4.3 Modes of Transmission	Minor revisions to entire section.
February 2019	4.5 Period of Communicability	Entire section revised.
February 2019	4.6 Host Susceptibility and Resistance	Entire section revised.


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