

Ontario Public Health Standards:
Requirements for Programs, Services and Accountability

Infectious Disease Protocol

Appendix 1:

Case Definitions and Disease-Specific Information

Disease: Q Fever

Effective: May 2022

Q Fever

Communicable

Virulent

[Health Protection and Promotion Act \(HPPA\)](#)

[Ontario Regulation \(O. Reg.\) 135/18 \(Designation of Diseases\)](#)

Provincial Reporting Requirements

Confirmed case

Probable case

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:

- [O. Reg. 569](#) (Reports) under the HPPA;⁵
- The iPHIS User Guides published by Public Health Ontario (PHO); and
- Bulletins and directives issued by PHO.

Type of Surveillance

Case-by-case

Case Definition

Confirmed Case

Laboratory confirmation of infection with clinically compatible signs and symptoms:

- A significant (*i.e.*, four fold or higher) rise in specific IgG antibody titer to *Coxiella burnetii* (*C. burnetii*) phase II antigen

OR

- Isolation of *C. burnetii* from a clinical specimen

OR

- Detection of *C. burnetii* DNA from a clinical specimen by nucleic acid amplification test (NAAT)

Probable Case

Clinically compatible signs and symptoms in a person with:

- An epidemiologic link to a laboratory-confirmed case.

OR

- An asymptomatic individual with positive laboratory evidence and with an epidemiologic link to a confirmed source (*i.e.*, human, animal or environment).

OR

- Single convalescent serum sample (IgG phase II \geq 1: 256) from a patient who has been ill > 1 week.

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).

Clinical Information

Clinical Evidence

An acute febrile disease; onset may include sudden chills, myalgia, weakness, malaise, headache and sweats.

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

Laboratory Evidence

Laboratory Confirmation

The following will constitute a confirmed case of Q fever:

- Isolation of *C. burnetii* from a clinical specimen
- A four-fold or higher rise in IgG antibodies to phase II antigen

Approved/Validated Tests

- Complement Fixation
- IgG immunofluorescence assay (IFA) for the detection and semi quantification to phase I and phase II *C. burnetii* antigens and as an aid in the diagnosis of Q fever

Indications and Limitations

- IgM antibodies have lower specificity than IgG antibodies. IgM antibodies may cross react with other bacteria and rickettsia (*i.e.*, *Bartonella*, *Legionella*, etc.).
- Low levels of phase II IgG only antibody (<1:256) may be considered non-specific.
- During acute infection, phase II antibodies appear first and are higher than phase I antibodies.
- The results obtained should be used in conjunction with the clinical information available to the physician.
- Serologic responses are time dependent. Specimens obtained too early in the infection may not contain detectable antibody levels. If Q fever is suspected, obtain a second specimen 3 to 6 weeks after onset of symptoms.

For further information about human diagnostic testing, contact the [Public Health Ontario Laboratories](#).

Case Management

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 Provincial 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.

Contact Management

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.

Outbreak Management

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.

Prevention and Control Measures

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 from parturition;²
- Education on proper hygiene practices; and
- Consumption of only pasteurized milk and dairy products from cows, goats and sheep.

Infection Prevention and Control Strategies

Refer to [PHO's website](#) to search for the most up-to-date information on Infection Prevention and Control (IPAC).

Disease Characteristics

Aetiologic Agent - Q fever is caused by *Coxiella burnetii* (*C. burnetii*), a gram-negative intracellular bacterium.¹ *C. burnetii* 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. burnetii* is highly resistant to many disinfectants and environmental conditions.²

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

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}

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

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

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}

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

Please refer to [PHO's Reportable Disease Trends in Ontario reporting tool](#) for the most up-to-date information on infectious disease trends in Ontario.

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

References

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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.
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Document History

Revision Date	Document Section	Description of Revisions
April 2022	Entire Document	New template. Appendix A and B merged. No material content changes.
April 2022	Epidemiology: Occurrence section	Removed.
April 2022	ICD Codes	Removed.