Q Fever

Case Definitions

Q fever is a reportable disease in Nova Scotia. The case definitions for Q fever and Q fever outbreaks are available in the Nova Scotia Surveillance Guidelines.

Causative Agent

Q fever is caused by the bacterium *Coxiella burnetii. C. burnetii* is extremely infectious and highly resistant to heat, desiccation, and disinfectant chemicals, and can persist for long periods of time in the environment.

Source

Q fever is a zoonotic infection. The primary reservoirs are cattle, sheep, and goats. The bacterium has also been identified in cats, dogs, other wild and domestic mammals, birds, and ticks. Previous outbreaks in Nova Scotia were associated with infected parturient cats and dogs. Q fever has been reported worldwide and is endemic in regions with animal reservoirs. Outbreaks have occurred among individuals working in meatpacking and rendering plants, stockyards, veterinarians/animal workers, as well as among researchers working with pregnant ewes or in laboratory settings.

C. burnetii is found in the excreta, blood, and milk of infected animals and is present in particularly high volumes in the placenta and amniotic fluid. Viable organisms are shed in placenta and other birth products, vaginal mucus, urine, feces, and milk. After drying, *C. burnetti* remains viable in soil and standing water and may become aerosolized. Bulk tank milk is frequently positive for *C. burnetti* DNA; however, pasteurization effectively eliminates the risk of infection.

Incubation

The incubation period for acute infection is typically 2 - 3 weeks, with a range of 1 - 6 weeks. Chronic Q fever can develop months to years after initial infection.

Transmission

Q fever is highly infectious and is most commonly transmitted to humans through inhalation of airborne *C. burnetii* from contaminated dust or aerosols. Windborne particles containing the bacteria can travel long distances. Proximity to dust-generating activities in areas with infected livestock or wildlife may increase exposure risk.

Transmission can also occur through direct contact with infected animals, presence during parturition, or direct contact with contaminated products, such as wool or bedding (i.e., straw). Less commonly, infection may occur through consumption of unpasteurized dairy products.

Ticks are a vector for Q fever in wild animals; however, they are not believed to play a significant role in the human transmission.

C. burnetii is a potential risk for use as a bioterrorism agent because of its low infectious dose, environmental resilience, and ability to spread through inhalation.

Communicability

Person to person transmission is very rare but can occur through:

- Blood transfusion,
- Donation of cells, tissues, and organs,
- Exposure to contaminated birth products,
- Exposure during autopsy of infected tissues,
- Transplacental transmission.

While *C. burnettii* has been found in breastmilk, no cases of transmission to infants through human milk have been documented.

Clinical Presentation and Severity

Q fever may present as either an acute or chronic illness.

Common symptoms of acute Q fever include fever, rigors, muscle aches, fatigue, cough, and headache. Approximately 60% of cases are asymptomatic or manifest only as a fever of unknown origin. Severe manifestations may include acute hepatitis, pneumonia, and meningoencephalitis. Laboratory findings can include elevated liver enzymes and abnormal chest imaging.

Children are less likely than adults to exhibit symptoms and generally experience milder illness, with severe complications being rare.

Infection during pregnancy may result in pre-term delivery, miscarriage, stillbirth, or low infant birth weight.

Individuals who recover from acute infection are thought to acquire lifelong immunity against reinfection. Most people will recover fully; however, a post-illness fatigue syndrome has been described in up to 20% of cases. Q fever fatigue syndrome refers to post-infectious systemic symptoms such as profound fatigue, concentration and memory problems, headaches, and myalgia that continue for more than 12 months after the acute illness resolves.

Chronic Q fever is a severe infection that occurs in fewer than 5% of infected individuals and may present one month to several years after the acute illness. The most common manifestation of chronic Q fever is endocarditis or other endovascular infections, which can be potentially fatal. Additional manifestations may include hepatitis and bone or joint infections.

Individuals at increased risk for chronic Q fever include those with underlying valvular disease, arterial aneurysm, vascular grafts, pregnant people, and immunosuppressed individuals.

Diagnostic Testing

Diagnosis of Q fever is based on nucleic acid detection or serologic evidence of antibodies from acute and convalescent serum.

Refer to the Nova Scotia Surveillance Guidelines for additional guidance.

For more detailed laboratory testing information, consult the Nova Scotia PPHLN Microbiology Users Manual.

Treatment

Early treatment of acute Q fever is effective in shortening the duration of illness and reducing symptom severity and should be initiated for all symptomatic individuals. Chronic Q fever requires treatment with combination antibiotic therapy. Referral to an Infectious Disease physician is recommended for acute and chronic Q fever. Treatment recommendations fall outside the scope of Public Health.

Public Health Management and Control

Person Under Investigation

Case Management

Upon notification of a human case, Public Health shall initiate an investigation:

- Contact the healthcare provider to ascertain that the case has been notified of the positive result, and obtain clinical information about the case, including history of blood transfusion. Explain the role of Public Health.

- Interview the case:

    - Review clinical information and symptom onset.

    - Assess for risk factors or chronic medical conditions that may increase the likelihood of chronic Q fever (e.g., valvular heart defect, arterial aneurysm, vascular grafts, or immunocompromised status).

    - Review possible exposures to the source of infection:

        - Recent animal contact or exposure (e.g., sheep, goats, cattle, or parturient animals).
        - Exposure to feces, urine, milk, or blood from an infected animal.

- Presence in a setting with newborn animals or birthing products (e.g., placenta, amniotic fluid) in a building, farm, or laboratory.
- Recent visit to, or residence near, a farm or agricultural petting zoo. Even without direct contact, there is a risk of exposure through inhalation of dust from contaminated environments.
- Consumption of raw milk or unpasteurized dairy products.
- If consumption of a possible food source is identified, determine the location of the source (i.e., local farm, hobby farm).
- Occupational exposure may occur among individuals such as farmers, veterinarians, laboratory staff, or research personnel working with animals or in laboratory environments.

- Identify individuals who may share the same exposure source, if a source is identified.

- Determine if recent travel occurred, including travel within Nova Scotia, elsewhere in Canada, or internationally.

- For pregnant people, provide education about the potential risks to the fetus and emphasize the importance of follow-up with their health care provider.

- Discuss receipt and/or donation of blood products.

  - If receipt and/or donation of blood products, cells, tissues, or organs are identified, collect as much information as possible, including dates, institution, and address at the time. Consider whether a Look-back or Trace-back through Canadian Blood Services (CBS) is required. Refer to the Nova Scotia Surveillance Guidelines for additional information.

  - Individuals should not donate blood, blood products, or tissues until they have completed treatment and fully recovered, whichever period is longer.

  - Refer the individual to the Canadian Blood Services donor questionnaire to assess eligibility:
    Canadian Blood Services Donor questionnaire, or call
    1- 888- 2 -DONATE (1-888-236-6283) prior to arriving.

- Provide education on Q fever disease and prevention measures. See Prevention Measures for more information.

- No exclusion or isolation is required.

Public Health communication with employers and workers should occur when occupational exposure is relevant. Notifications and consultations with the Environmental Health Consultants, the Chief Veterinary Officer, and the Department of Natural Resources (if involving wildlife) should be considered at the discretion of the Regional Medical Officer of Health.

Contact Management

Person- to-person transmission is very rare (see communicability).
Co-exposures to animal or environmental sources are common. A co-exposed person is defined as anyone who may have experienced the same occupational, animal, or shared environmental exposure as the case. Contact co-exposed individuals and advise them of the early signs and symptoms of Q fever to support timely diagnosis and treatment.

Co-exposed individuals who are asymptomatic but at high risk for chronic Q fever should be referred to a physician for assessment, and testing or treatment should be considered, if indicated, to prevent progression to Q fever. For further details about individuals at increased risk, refer to Clinical Presentation and Severity.

Outbreak Management

Situations that meet the outbreak definition, as described in the Nova Scotia Surveillance Guidelines, are investigated to identify a common source of infection and prevent further exposures.

Cases associated with foodborne transmission (e.g., unpasteurized milk) may not show localized geographical clustering. In contrast, non-foodborne illness outbreaks of Q fever typically present with geographically linked cases.

Outbreaks are generally of short duration. Control measures focus primarily on eliminating the sources of infection.

Prevention Measures

There is currently no vaccine available for humans in Canada. The only commercially available vaccine, Q-VAX (a whole-cell, formalin-inactivated vaccine), is used in Australia for individuals at high risk.

Animal and human health issues related to Q fever are complex and require a multidisciplinary One Health approach. Prevention strategies should incorporate actions across human, animal, and environmental health sectors.

Education, Prevention Measures, and Environmental Controls

- Discuss Q fever signs and symptoms, and provide instruction on risks and the proper use of personal protective equipment (PPE).
- Wash hands thoroughly with soap and water after contact with animals or their bodily excretions (feces, urine, milk, blood, or birthing products).
- Educate workers in high-risk occupations about sources of infection and the importance of proper disinfection and disposal of animal products of conception.

- Restrict access to areas where potentially infected animals are present.
- Consume only pasteurized milk and dairy products from cows, goats, and sheep.
- Use protective clothing, gloves, and masks while working with animals, particularly pregnant animals.
- Bag and wash contaminated clothing appropriately to prevent infection in laundry workers.
- Properly decontaminate surfaces.
- Properly dispose of contaminated waste.
- Additional information about personal precautions and workplace hygiene is available at CCOHS: Q Fever.
- During pregnancy, avoid contact with infected livestock.
- When visiting farms, livestock auctions, or agricultural shows, ensure careful sanitation of hands, footwear, vehicles, and transport trailers.

References

American Academy of Pediatrics. (2024). Q Fever (*Coxiella burnetii* infection). 2024-2027 Report of the Committee on Infectious Diseases. Retrieved from *Q Fever (Coxiella burnetii Infection) | Red Book: 2024–2027 Report of the Committee on Infectious Diseases | Red Book Online | American Academy of Pediatrics*

Canadian Centre for Occupational Health and Safety. (2023). Diseases, Disorders and Injuries: Q Fever. Retrieved on 2026 02 23 from CCOHS: Q Fever

Christodoulou, M., and Papagiannis, D. (2025). Q Fever Vaccines: Unveiling the Historical Journey and Contemporary Innovations in Vaccine Development. Jan. 31;13(2). Retrieved from Q Fever Vaccines: Unveiling the Historical Journey and Contemporary Innovations in Vaccine Development - PMC

Communicable Diseases Network National Guidelines for Australia Public Health Units Q Fever (2018). CDNA. Retrieved from *Q fever - CDNA National Guidelines for Public Health Units*

European Centre for Disease Prevention and Control (2010). Technical report: Risk Assessment on Q fever. Retrieved from *TER_Risk_Assessment_Qfever.*

Fatima, A., Upadhyay, R. (2025). Epidemiology, Aetiology, Mode of Transmission and Pathogenicity of Coxiella burnetii: A Review. Advances in Infectious Diseases. 15, 462-488. Retrieved from Epidemiology, Aetiology, Mode of Transmission and Pathogenicity of Coxiella burnetii: A Review

Ghanem-Zoubi, N., and Paul. M. (2020). Q fever during pregnancy: a narrative review. Clinical Microbiology and Infection. Vol. 26 (7), 864-870. Retrieved from *Q fever during pregnancy: a narrative review - ScienceDirect*

Hamadeh, G., Turner, B., Trible, W., Hoffman, B., & Anderson, R. (1992). Laboratory outbreak of Q Fever. Journal of Family Practice. December. Retrieved from *Laboratory outbreak of Q fever. | Semantic Scholar*

Henning K, Hotzel H, Peters M, et al. (2009) Unanticipated outbreak of Q fever during a study using sheep, and its significance for further projects. Berliner und Munchener Tierarztliche Wochenschrift. Jan-Feb;122(1-2):13-19. Retrieved from Unanticipated outbreak of Q fever during a study using sheep, and its significance for further projects]. - Abstract - Europe PMC

Langley, J., Marrie, T., Covert, A., Waag, D., and Williams, J. (1988). Poker Players Pneumonia An Urban Outbreak of Q Fever Following Exposure to a parturient Cat. The New England Journal of Medicine. 319: No 6. Retrieved from *Poker Players' Pneumonia | New England Journal of Medicine*

Manitoba Public Health Branch Communicable Disease Management Protocol Q Fever (*Coxiella burnetti*) (2016). Retrieved from *Q Fever (Coxiella burnetii) Protocol*.+

Marrie, T., Campbell, N., McNeil, S., Webster, D., and Hatchette, T. (2008). Q fever update, Maritime Canada. Emerging Infectious Diseases. 14(1): 67-69. Retrieved from *Q fever update, Maritime Canada - PubMed*

Maurin, M.,Raoult, D. (1999). Q fever. Clinical Microbiology Review. 12(4) 518-53. Retrieved from Q Fever | Clinical Microbiology Reviews

Miller, H., Priestley, R., and Kersh, G. (2021). Q Fever: A troubling disease and a challenging diagnosis. Clinical Microbiology Newsletter.43(13): 109-118. Retrieved from *Q Fever: A Troubling Disease and a Challenging Diagnosis - ScienceDirect*

Public Health Agency of Canada (2010). Pathogen Safety Data Sheets: Infectious Substances-*Coxiella burnetti*. (2010). Retrieved from *Pathogen Safety Data Sheets: Infectious Substances – Coxiella burnetii - Canada.ca*

Racult, D., stein. A. (1994). Q fever during pregnancy—a risk for women, fetuses, and obstetricians. New England Journal of Medicine. 330(5: 371). Retrieved from Q Fever during Pregnancy -- A Risk for Women, Fetuses, and Obstetricians

Spronk, I., Brus, I., de Groot, A., Tieleman, P., et. al., (2013). Long-term health outcomes of Q-fever fatigue syndrome patients. Epidemiology and Infection. 19;151:e179. Retrieved *from Long-term health outcomes of Q-fever fatigue syndrome patients - PMC*

Tan, T., Heller, J., Firestone, S., Stevenson, M., and Wiethoelter, A., (2024). A systematic review of global Q fever outbreaks. One Health. Vol. 18. Retrieved from A systematic review of global Q fever outbreaks - ScienceDirect