Wisconsin Department of Health Services
Division of Public Health
P-01920 (Rev 08/2017)

Communicable Disease Case Reporting and Investigation Protocol

Q FEVER

I. IDENTIFICATION AND DEFINITION OF CASES

Note that there are separate case definitions for Acute Q fever and Chronic Q fever.

A. Clinical Description:

1. **Acute Q fever:** An acute febrile zoonotic disease caused by the rickettsial bacteria *Coxiella burnetii*. Clinical manifestations vary greatly from person to person and most commonly include an acute fever accompanied by nonproductive cough, rigors, myalgia, malaise, and a severe retrobulbar headache. Fatigue, night sweats, dyspnea, confusion, nausea, diarrhea, abdominal pain, vomiting, and chest pain have also been reported. Severe disease can include acute hepatitis, atypical pneumonia with abnormal radiograph, and meningoencephalitis. Pregnant women are at risk for fetal death and abortion. Clinical laboratory findings may include elevated liver enzyme levels, leukocytosis, and thrombocytopenia. Approximately 50% of infected persons are asymptomatic or have mild self-limiting clinical signs and rarely require treatment.

   Clinical evidence: Acute fever and one or more of the following: rigors, severe retrobulbar headache, acute hepatitis, pneumonia, or elevated liver enzyme levels.

2. **Chronic Q fever:** Infection with *Coxiella burnetii* that persists for more than six months. Potentially fatal endocarditis may evolve months to years after acute infection, particularly in persons with underlying valvular disease. Infections of aneurysms and vascular prostheses have been reported. Immunocompromised individuals are particularly susceptible. Rare cases of chronic hepatitis without endocarditis, osteomyelitis, osteoarthritis, and pneumonitis have been described.

   Clinical evidence: Newly recognized, culture-negative endocarditis, particularly in a patient with previous valvulopathy or compromised immune system, suspected infection of a vascular aneurysm or vascular prosthesis, or chronic hepatitis, osteomyelitis, osteoarthritis, or pneumonitis in the absence of other known etiology.

B. Laboratory Criteria:

Coxiella burnetii occurs in two antigenic phases called phase I and phase II. This antigenic difference is important in diagnosis. In acute cases of Q fever, the antibody level to phase II is usually higher than that to phase I, often by several orders of magnitude, and generally is first detected during the second week of illness. In chronic Q fever, the reverse situation is true (i.e., phase I titers are higher than phase II). Thus, high levels of antibody to phase I in later specimens in combination with constant or falling levels of phase II antibodies and other signs of inflammatory disease suggest chronic Q fever. Antibodies to phase I and II antigens have been known to persist for months or years after initial infection. Serologic profiles of pregnant women infected with acute Q fever during gestation may progress rapidly to those characteristic of chronic infection.

1. **Acute Q fever**:

   - Confirmatory laboratory evidence:
     - Serological evidence of a fourfold change in immunoglobulin G (IgG)-specific antibody titer to *C. burnetii* phase II antigen by indirect immunofluorescence assay (IFA) between paired (acute and convalescent) serum samples, (Centers for Disease Control and Prevention [CDC] suggests one taken during the first week of illness and a second three to six weeks later, antibody titers to phase I antigen may be elevated or rise as well), **or**
     - Detection of *C. burnetii* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, **or**
     - Demonstration of *C. burnetii* in a clinical specimen by immunohistochemical methods (IHC), **or**

- Isolation of *C. burnetii* from a clinical specimen by culture (This can only be performed at CDC).

- Supportive laboratory evidence:
  - A single supportive IFA IgG titer of ≥1:128 to phase II antigen (phase I titers may be elevated as well) **or**
  - Serologic evidence of elevated phase II IgG or IgM antibody reactive with *C. burnetii* antigen by enzyme-linked immunosorbent assay (ELISA), dot-ELISA, or latex agglutination.

Note: For acute testing, CDC uses in-house IFA IgG testing (cutoff of ≥1:128), preferring simultaneous testing of paired specimens, and does not use IgM results for routine diagnostic testing. Wisconsin follows CDC testing and interpretation guidance.

2. **Chronic Q fever**:

- Confirmatory laboratory evidence:
  - Serological evidence of IgG antibody to *C. burnetii* phase I antigen ≥ 1:800 by IFA (while phase II IgG titer will be elevated as well; phase I titer is higher than the phase II titer), **or**
  - Detection of *C. burnetii* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, **or**
  - Demonstration of *C. burnetii* in a clinical specimen by immunohistochemical methods (IHC), **or**
  - Isolation of *C. burnetii* from a clinical specimen by culture (This can only be performed at CDC).
- Supportive laboratory evidence:
  - An antibody titer to *C. burnetii* phase I IgG antigen ≥1:128 and < 1:800 by IFA, **and**
  - Phase I IgG titer exceeds the phase II IgG titer. (While phase II IgG titer may be elevated as well; phase I titer is higher than the phase II titer when person has Chronic Q fever).

Notes: Samples from suspected chronic patients should be evaluated for IgG titers to both phase I and phase II antigens. Current commercially available ELISA tests (which test only for phase II) are not quantitative, cannot be used to evaluate changes in antibody titer, and hence are not useful for serological confirmation. IgM tests are not strongly supported for use in serodiagnosis of acute disease as the response may not be specific for the agent (resulting in false positives) and the IgM response may be persistent. Complement fixation (CF) tests and other older test methods are neither readily available nor commonly used.

Serologic test results must be interpreted with caution, because baseline antibodies acquired as a result of historical exposure to Q fever may exist, especially in rural and farming areas.

C. **Wisconsin Surveillance Case Definition:**

1. Acute Q fever:

- **Confirmed:** A laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.
- **Probable:** A clinically compatible case of acute illness (meets clinical criteria for acute Q fever illness) that has laboratory supportive results for past or present acute disease (antibody to phase II antigen) but is not laboratory confirmed.

2. Chronic Q fever:

- **Confirmed:** A clinically compatible case of chronic illness (meets clinical evidence criteria for chronic Q fever) that is laboratory confirmed for chronic infection.
- **Probable:** A clinically compatible case of chronic illness (meets clinical evidence criteria for chronic Q fever) that has laboratory supportive results for past or present chronic infection (antibody to phase I antigen).

II. REPORTING

A. **Wisconsin Disease Surveillance Category II – Methods for Reporting:** This disease shall be reported to the patient's local health officer or to the local health officer's designee within 72 hours of recognition of a case or suspected case, per Wis. Admin. Code § DHS 145.04 (3) (b). Report electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), or mail or fax a completed Acute and Communicable Disease Case Report (F-44151) to the address on the form.

B. **Responsibility for Reporting**: According to Wis. Admin. Code § DHS 145.04(1), persons licensed under Wis. Stat. ch. 441 or 448, laboratories, health care facilities, teachers, principals, or nurses serving a school or day care center, and any person who knows or suspects that a person has a communicable disease identified in Appendix A.

C. **Clinical Criteria for Reporting:** Clinical diagnosis with confirmatory or supportive laboratory findings.

D. **Laboratory Criteria for Reporting:** Laboratory evidence of measurable antibody titer to *Coxiella burnetii* phase I or II antigens, or infection by molecular assay (e.g., PCR), histopathology or culture.

III. CASE INVESTIGATION

A. **Responsibility for case investigation**: It is the responsibility of the local health department (LHD) to investigate or arrange for investigation of suspected or confirmed cases as soon as is reasonably possible. A case investigation may include information collected by phone, in person, in writing, or through review of medical records or communicable disease report forms, as necessary and appropriate.

B. **Required Documentation:**

1. Complete the WEDSS disease incident investigation report, including appropriate disease-specific tabs.
   OR
2. Complete and scan into the WEDSS filing cabinet the CDC Q Fever Case Report Form: https://www.cdc.gov/qfever/pdfs/qfevercasereport_2010.pdf.

IV. PUBLIC HEALTH INTERVENTIONS AND PREVENTION MEASURES

A. In accordance with Wis. Admin. Code § DHS 145.05, local public health agencies should follow the methods of control recommended in the current editions of *Control of Communicable Diseases Manual*, edited by David L. Heymann, published by the American Public Health Association, and the American Academy of Pediatrics' *Red Book: Report of the Committee on Infectious Diseases*, unless otherwise specified by the state epidemiologist.

B. **On-farm Preventive Measures**:

1. Educate persons in high-risk occupations (sheep and dairy farmers, veterinarian researchers) on the sources of infection and the necessity for adequate disinfection and infection control measures.
2. Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
3. Restrict access to barns and laboratories used in housing potentially infected animals.
4. Use only pasteurized milk and milk products.
5. Use appropriate procedures for bagging, autoclaving, and washing of laboratory clothing.
6. Counsel persons at highest risk for developing chronic Q fever, especially pregnant women, immune suppressed persons, persons with pre-existing cardiac valvular disease, or individuals with vascular grafts.
7. Division of Public Health (DPH) recommendations exist for workers on farms where Q fever has been diagnosed in livestock. Call a state public health veterinarian for these at 608-267-9003.

C. **Bioterrorism Considerations:** *Coxiella burnetii* is a highly infectious agent that is relatively resistant to heat and drying. It can become airborne and inhaled by humans. A single organism may cause disease in a susceptible person. This agent could be developed for use in biological warfare and is considered a potential terrorist threat.

V. CONTACTS FOR CONSULTATION

A. Local health departments and tribal health agencies: https://www.dhs.wisconsin.gov/lh-depts/index.htm

B. Bureau of Communicable Diseases, Communicable Diseases Epidemiology Section: 608-267-9003

C. Wisconsin State Laboratory of Hygiene: 1-800-862-1013

VI. RELATED REFERENCES

A. Heymann DL, ed. Q Fever. In: *Control of Communicable Diseases Manual*. 20th ed. Washington, DC: American Public Health Association, 2015: 493-497.

B. Pickering LK, ed. Q Fever. In: *Red Book*: *2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015: 656-658.

C. Centers for Disease Control and Prevention website: https://www.cdc.gov/qfever/

D. CDC Q Fever: Diagnosis & Laboratory Guidance for Clinicians: https://emergency.cdc.gov/agent/qfever/clinicians/diagnosis.asp

E. *Prevention and Control of Coxiella burnetii Infection among Humans and Animals: Guidance for a Coordinated Public Health and Animal Health Response, 2013*. National Association of State Public Health Veterinarians and National Assembly of State Animal Health Officials http://www.nasphv.org/Documents/Q_Fever_2013.pdf.

F. Wisconsin Q Fever Fact Sheet: https://www.dhs.wisconsin.gov/publications/p01753.pdf.