Q FEVER

(Query Fever, Abattoir Fever, Balkan grippe)

REPORTING INFORMATION

- **Class B1:** Report by the end of the next business day in which the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - Ohio Confidential Reportable Disease form (HEA 3334, rev. 1/09), Positive Laboratory Findings for Reportable Disease form (HEA 3333, rev. 8/05), the local public health department via the Ohio Disease Reporting System (ODRS), or telephone.
- The Centers for Disease Control and Prevention (CDC) Q Fever Case Report Form is requested. Information collected from the form should be entered into ODRS **and** faxed to ODH at 614-564-2456. The mailing address for this form is: ODH, Outbreak Response & Bioterrorism Investigation Team (ORBIT), 246 N. High St., Columbus, OH 43215. Additional reporting information, with specifics regarding the key fields for ODRS Reporting can be located in Section 7.

AGENT

Coxiella burnetii is a rickettsial organism with two antigenic phases: phase I is found in nature and Phase II after multiple laboratory passages in eggs or cell cultures.

Comment:

Q fever infections can be acute, chronic or occasionally, asymptomatic. The case definition changed in 2009, with separate definitions for acute and chronic infections. Case information for acute and chronic infections is integated into each subheading below.

CASE DEFINITION

Q Fever, Acute

Clinical Description

Acute fever usually accompanied by rigors, myalgia, malaise, and a severe retrobulbar headache. Fatigue, night-sweats, dyspnea, confusion, nausea, diarrhea, abdominal pain, vomiting, non-productive cough, 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. Asymptomatic infections may also occur.

Note: Serologic profiles of pregnant women infected with acute Q fever during gestation may progress frequently and rapidly to those characteristic of chronic infection.

Clinical Evidence

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

Laboratory Criteria for Diagnosis
Confirmatory:

- 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 serum samples, (CDC suggests one taken during the first week of illness and a second 3-6 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.

Supportive:

- Has a single supportive IFA IgG titer of ≥1:128 to phase II antigen (phase I titers may be elevated as well).
- Has 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.

Case Classification
Probable acute Q fever: a clinically compatible case of acute illness (meets clinical evidence 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.

Confirmed acute Q fever: a laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.

Q Fever, Chronic
Clinical Description
Infection that persists for more than 6 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.

Laboratory criteria for diagnosis

Confirmed:

- 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 PCR assay, *or*
- Demonstration of *C. burnetii* antigen in a clinical specimen by IHC, *or*
- Isolation of *C. burnetii* from a clinical specimen by culture.

Supportive:

- Has an antibody titer to *C. burnetii* phase I IgG antigen ≥1:128 and <1:800 by IFA.

Note: 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 2) 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.

Case Classification

Probable Chronic Q Fever: 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).

Confirmed Chronic Q Fever: A clinically compatible case of chronic illness (meets clinical evidence criteria for chronic Q fever) that is laboratory confirmed for chronic infection.

Exposure

Exposure is usually via aerosol, is broadly interpreted, and may be unknown (especially for chronic infection), but often includes the presence of goats, sheep, or other livestock, especially during periods of parturition. Direct contact with animals is not required, and variable incubation periods may be dose dependent.

SIGNS and SYMPTOMS

Acute Q Fever

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

Chronic Q Fever

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.

DIAGNOSIS

Isolation of *C. burnetii* from blood, although diagnostic, is hazardous for laboratory workers. Diagnosis can be made by demonstrating a rise in specific phase I and phase II antibodies between acute and convalescent stages by immunofluorescent, enzyme immunoassay, complete fixation, and immune adherence hemagglutination tests. Serum specimens should be taken 3-6 weeks apart. The organism may be identified in liver biopsies or heart valve immunostains and electron microscopy.

To submit specimens to the CDC, please contact ORBIT at 614/ 995-5599. In addition to the Q Fever Case Report form, please complete the following for submission with the specimen(s): CDC DASH form 50.34, and Q Fever Submission form. The RZB Specimen Submission page gives additional details on this.

EPIDEMIOLOGY

Source

Sheep, cattle, goats, cats, dogs, some wild animals (such as feral rodents), birds and ticks are natural reservoirs. Infected animals, including sheep and cats, shed massive numbers of organisms in placental tissues at parturition. Tick transmission is not considered a major source of infection in the United States, but transovarial and transstadial transmission occurs where ticks are involved with wildlife cycles in rodents, larger animals, and birds. Consumption of unpasteurized (raw) milk may also be a source of infection.

Occurrence

The disease occurs worldwide. The incidence is greater than reported cases because many cases are mild. The disease is considered endemic in areas where reservoir animals are present.

Mode of Transmission

Q fever is transmitted by inhalation of dust from contaminated premises or contact with infected tissues. Of particular concern are placental tissues, birth fluids, and excreta of infected animals. People working in stockyards, meat packing or rendering plants, and necropsy areas are at higher risk. Transmission may also occur from direct contact with contaminated materials, such as wool, straw, fertilizer, or laundry from people working with infected animals.

Incubation Period

The incubation period is usually 14-21 days, but varies from 3-30 days depending on the size of the infecting dose.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

Routine investigation to determine source of infection.

Treatment
For acute disease, use doxycycline for 15-21 days. Treat again if relapses occur. For chronic Q fever cases (endocarditis), doxycycline in combination with other drugs may be used.

Isolation and Follow-up Specimens
No isolation is required. Collect a convalescent sample 3-6 weeks after the acute sample.

Public Health Significance
Person-to-person transmission is unlikely.

Contacts
No prophylaxis is indicated, because person-to-person transmission is unlikely.

Prevention and Control
Educate sheep and dairy farmers, veterinary researchers, packing and rendering plant workers, and necropsy workers on sources of infection. Educate general public on importance of consuming only pasteurized dairy products.

Vaccination
No commercially available vaccine is available in the United States. An investigational inactivated vaccine, prepared from *C. burnetii* (phase I), is available through the Department of Defense in situations where laboratory staff work with *C. burnetii* or for others in hazardous occupations.

What is Q fever?
Q fever is a rickettsial infection caused by a bacterium called *Coxiella burnetii,* which can affect the lungs, liver, heart, and other parts of the body. This disease is found worldwide. Because many people infected with Q fever show mild or no signs, it is unknown how many cases occur each year in the United States. In Ohio, the median number of cases from 2000-2009 was 1.5 (range 0-8).

What animals carry Q fever?
Cattle, sheep, and goats are most likely to carry *C. burnetii*. Infection has been noted with less frequency in many other animals including other types of livestock and domesticated pets. Most infected animals have no signs of disease, other than abortion in goats and sheep.

How is Q fever spread?
The bacteria can be found in the milk, urine, and feces of infected animals. Most importantly, during birthing the organisms are shed in high numbers within the amniotic fluids and the placenta. The organisms are resistant to heat, drying, and many common disinfectants which enables them to survive for long periods in the environment.

Infection of humans usually occurs by inhalation of these organisms found in airborne barnyard dust. Humans are often susceptible to the disease, and very few organisms may be required to cause infection. Occasionally, people can get Q fever from drinking contaminated milk or from tick bites. Direct human to human transmission can occur but is rare.

Who is most at risk for getting Q fever?
Most cases in the U.S. result from occupational exposure and typically involve veterinarians, meat processing plant workers, sheep and dairy workers, livestock farmers, and researchers at facilities housing sheep.

How long after exposure before symptoms appear?
For those who develop symptoms they usually appear within 2 to 3 weeks.

What are the symptoms of Q fever?
Only about one-half of all people infected with *C. burnetii* show signs of clinical illness. Those with symptoms typically develop a high fever (up to 104-105° F), severe headache, nausea, vomiting, diarrhea, abdominal pain, and chest pain. Fever usually lasts for 1 to 2 weeks. Weight loss can occur and persist for some time. Less than 2% of people die, but up to 50% may develop pneumonia or inflammation of the liver. Full recovery generally takes 1 to 2 months.

Infections lasting more than 6 months are rare, but they represent a much more serious, chronic illness. For these people, inflammation of the heart, especially the valves in the heart, can be a serious problem. These cases usually occur in people who have pre-existing heart or kidney disease.

How is Q fever diagnosed?
Confirming infection with *C. burnetii* requires laboratory testing of blood for specific antibodies or identification of the bacteria in blood or tissue samples.

How is Q fever treated?
Antibiotics, such as Doxycycline, are effective in treating Q fever. Severe cases may require hospitalization and the use of more than one antibiotic.

Is there a vaccine for Q fever?
There is no vaccine currently approved for use in the U.S.

How can I prevent Q fever?

- When possible, avoid contact with the placenta, birth products, fetal membranes, and aborted fetuses of sheep, cattle, and goats. When not possible, wear gloves and properly dispose of all birth related tissues.
- Eat and drink only pasteurized milk and milk products.
- Quarantine imported animals.
- If you have pre-existing heart valve disease or have had valve replacements, be extra careful around areas with sheep, cattle, and goats.

For more information visit these websites.
CDC Q fever fact sheet http://www.cdc.gov/qfever/index.html
CDC Q fever animal fact sheet http://www.cdc.gov/healthypets/diseases/qfever.htm