Q Fever

Important Notice:
*All public health recommendations for routine investigations are based on "Control of Communicable Diseases Manual, 20th edition, 2015" (CCDM) unless otherwise stated. Use the CCDM as primary resource for case investigations that meet routine follow up. In cases of complicated situations or unique issues not addressed by this manual, please refer to the Administrative Rules of Montana (ARM) Chapter **37.114** or contact the Communicable Disease Epidemiology section at the Montana DPHHS for further clarification.*

PROTOCOL CHECKLIST

- ☐ Confirm diagnosis, see case definition (see section 3 and 4.1)
- ☐ Verify submission for lab confirmation, if applicable (see section 4.2)
- ☐ Review background information on the disease and its epidemiology (see section 2)
- ☐ Prioritize reported cases for follow up, investigate and interview as appropriate (see section 1.2)
- ☐ Contact healthcare provider to gather more information, if necessary
- ☐ Notify state health department of case by entering available information into the Montana Infectious Disease Information System (MIDIS) within the time frame for the specific disease per (ARM) **37.114.204** (see section 1.3)
- ☐ Retrieve CDC Q Fever form (see SharePoint → CDEpi → CDEpi Disease Forms)
- ☐ Review for use, specific technical assistance guidance documents (see SharePoint →CDEpi →CDEpi Technical Guidance [Diseases A to Z] → Q fever → Guidance Documents)
- ☐ Interview patient, cover the following:
  - ☐ Review disease facts with patient (see section 2.2)
  - ☐ Educate patient on prevention (see section 6)
  - ☐ Ask about exposures to relevant risk factors (see section 4.3)
  - ☐ Identify persons exposed to same high-risk activities as case (see section 4.7)
  - ☐ Identify symptomatic contacts (see section 4.5)
  - ☐ Implement control measures (see section 5)
  - ☐ Address patient's questions or concerns
- ☐ Follow-up on special situations, including outbreaks (see section 5 and CCDM, review references and additional information or contact CDEpi at 406-444-0273)
- ☐ Enter additional data obtained from interview into MIDIS (fax completed form to DPHHS if indicated on the CD Reporting Reference form)
- ☐ Attach any additional laboratory reports to case investigation in MIDIS (Manage Associations)
- ☐ When done with investigation, close case in MIDIS

1 DISEASE REPORTING

1.1 Provider Notification to Public Health Authorities

Any person, including, but not limited to a physician, dentist, nurse, medical examiner, other health care provider, administrator of a healthcare facility or laboratory, public or private school administrator, or laboratory professional who knows or has reason to believe that a case exists of a reportable disease or condition defined in the Administrative Rules of Montana (ARM) **37.114.203** must immediately report the case to the local health officer.

1.2 Local Health Department Follow-up Responsibilities

Immediately after being notified of a case or a potential outbreak of a reportable condition, a local health officer must investigate and implement control measures as indicated by CCDM to prevent or control the transmission of disease per (ARM) **37.114.314**.

1.3 Local Health Department Reporting to State Public Health Authorities

A case of acute or chronic Q fever must be reported to DPHHS within seven days. The disease specific form needs to be submitted to DPHHS as part of the disease investigation process. Local health officers are required to report information about a case to DPHHS within the timeframes established in (ARM) **37.114.204**.

2 THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Public Health Significance in Montana

Q fever is rarely reported in Montana, with an average of 3 cases reported per year. In 2011, an outbreak associated with goats occurred in Washington and Montana, resulting in 16 cases of acute Q fever; of these, 8 cases occurred among Montana residents.

2.2 Clinical Description of Illness

Refer to CCDM for relevant disease information and its epidemiology.

3 CASE DEFINITION

3.1 Clinical Description

Acute Q fever

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 hepatitis, atypical pneumonia with abnormal radiograph, and meningoencephalitis. Pregnant women are at risk for fetal death and abortion. Clinical laboratory findings might include elevated liver enzymes, leukocytosis, and thrombocytopenia. Asymptomatic infections might also occur.

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

Chronic Q fever

Infection that persists for more than 6 months. Potential fatal endocarditis might evolve months to years after acute infection, particularly in persons with underlying valvular disease. Infections of aneurysms and vascular prostheses have been reported. Immunocompromised persons are particularly susceptible. Rare cases of chronic hepatitis without endocarditis, osteomyelitis, osteoarthritis, and pneumonitis have been described.

3.2 Laboratory Criteria for Diagnosis

Acute Q fever

Confirmed

- Serological evidence of a fourfold change in immunoglobulin G (IgG)-specific antibody titer to *Coxiella 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 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 serological evidence of elevated phase II IgG or immunoglobulin M (IgM) antibody reactive with *C. burnetii* antigen by enzyme-linked immunosorbent assay (ELISA), dot-ELISA, or latex agglutination.

Comment(s): 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.

Chronic Q fever

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.

Comment(s): 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. Serological 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.

3.3 Case Classification

Acute Q fever

Probable

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

A laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.

Chronic Q fever

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)

Confirmed

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

4 ROUTINE CASE INVESTIGATION

In accordance with (ARM) **37.114.314** conduct an epidemiologic investigation to determine the source and possible transmission of *C. burnetii*. **Because acute Q fever is an uncommonly reported disease, please call CDEpi at 406-444-0273 to discuss the case investigation after review of this section.** Interview the case and others who might be able to provide pertinent information.

4.1 Confirm the Diagnosis

Review the clinical presentation and laboratory results to confirm the diagnosis. Consult with the CCDM and CSTE case definition (**http://wwwn.cdc.gov/nndss/script/casedefDefault.aspx**) to determine if this is a case.

4.2 Laboratory Requirements

A *C. burnetii* isolate does NOT need to be sent to MTPHL for confirmation.

For more information on analysis and specimen collection please contact the laboratory conducting the test or the Montana Public Health Laboratory (MTPHL) at 1-800-821-7284. The MTPHL Laboratory Services Manual can be accessed at http://dphhs.mt.gov/publichealth/LaboratoryServices/PublicHealthLabTesting

4.3 Case Investigation

a. Contact the healthcare provider who ordered testing or is caring for the patient. Use the case reporting form to assist in obtaining all information necessary to complete a Q fever case report as outlined in (ARM) **37.114.205**.
b. Contact and interview the patient to determine risk factors for disease transmission and potential sources.

Investigate possible exposures during the 2–3 weeks before onset of acute disease. For chronic disease, ask about previous diagnosis of or illness consistent with acute Q fever. Ask about history of:

- Travel;
- Contact with potentially infected animals or their tissues, particularly postpartum fluid or tissues;
- Consumption of unpasteurized milk products;
- Work with sheep, goats, cattle;
- Work in a laboratory (especially animal necropsy);
- Tick exposure; and,
- Possible exposure to dust or other aerosols associated with livestock (reminder that *C. burnetii* can travel downwind up to several miles).

4.4 Contact Investigation

- Identify and contact persons who participated with the case in any of the activities described above.
- Identify laboratory workers who handled infected tissue or laboratory isolates. (Note that culture requires special methods and facilities so exposure to isolates is unlikely at most hospital and diagnostic laboratories; for instance, there is no risk for standard blood cultures handled using normal precautions).
- Identify surgeons, pathologists, and other staff present in surgical or autopsy rooms during aerosol-generating procedures (e.g., use of bone saws).

- Identify veterinarians, veterinary pathologists, and livestock owners who handled infected animal specimens (especially placentas or stillborn animals) or who were present during the delivery of infected animals.
- Inform all identified persons of their possible exposure and symptoms of Q fever. See "*Management of Other Exposed Persons*" below.
- Determine if the case donated blood or tissue. If donation occurred, alert DPHHS so the appropriate agency can be notified.

4.5 Environmental Evaluation

Surgical/autopsy areas can be decontaminated with 70% ethanol, MicroChem-Plus®, or quaternary ammonia solution. Contact time should be 30 minutes.

If the suspected source is farm animals or unpasteurized dairy products, contact CDEpi who will contact the Montana Departments of Livestock or Agriculture.

5 CONTROL MEASURES

In accordance with (ARM) **37.114.501** use the control measures indicated in the CCDM for Q fever. Contact DPHHS CDEpi for consultation and questions at 406-444-0273.

5.1 Case Management

Consult the following report on the diagnosis and management of Q fever: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm (also located on Sharepoint)

5.2 Contact Management

See Section 4.4. A symptomatic contact should be referred for laboratory testing.

5.3 Environmental Measures

C. burnetii can remain viable and infectious in contaminated soil for several years. Contact CDEpi at 406-444-0273 for consultation on management of an environment likely contaminated with *C. burnetii*.

5.4 Special Circumstances

Bioterrorism:

C. burnetii has been classified as a potential bioterrorism agent because of its very low infectious dose, ability to survive in the environment, and potential for dissemination via aerosol. One should suspect bioterrorist spread of Q fever if a cluster of patients with a non-specific febrile illness and pulmonary symptoms occur in about one-quarter of the cases. Chemoprophylaxis with tetracycline or doxycycline might be appropriate for persons exposed in a bioterrorism event. If bioterrorism is suspected, call CDEpi immediately (24/7) at 406-449-0273.

Persons potentially exposed should be educated regarding symptoms to facilitate early diagnosis and treatment. In general, no specific management is recommended for asymptomatic persons who have been exposed. For high-risk exposures (e.g., persons with artificial heart valves who are exposed), call CDEpi to discuss circumstances.

6 ROUTINE PREVENTION

6.1 Immunization Recommendations: there is currently no licensed vaccine against Q fever in the United States.

6.2 Prevention Recommendations

- Educate the public on sources of infection.
- Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing livestock, particularly sheep and goats.
- Follow good hygiene practices after animal contact, including washing hands and arms and removing coveralls and footwear used during farm work before entering homes.
- Restrict access to barns and laboratories used in housing potentially infected animals.
- Consume only pasteurized milk and milk products.
- Use appropriate procedures for bagging, autoclaving, and washing laboratory clothing.
- Quarantine imported animals.
- Ensure holding facilities for sheep and goats are located away from populated areas. Research animals should be routinely tested for antibodies to *C. burnetii*, and measures should be implemented to prevent airflow to other occupied areas.
- Counsel exposed persons at highest risk for developing chronic Q fever, especially pregnant women, persons with pre-existing cardiac valvular disease or vascular grafts, or immunocompromised persons.

7 ESCALATION/ACTIVATION OF EMERGENCY OPERATIONAL PLANNING

Investigation guidelines are designed to assist local health jurisdictions in the steps and actions needed to report, investigate and control reported cases of communicable diseases. In the event individual case investigations or other reported cases lead to clusters and/or outbreaks, or investigations outside of a local health jurisdiction, local health jurisdictions need to contact DPHHS under the Administrative Rules of Montana 37.114.314 and 37.114.315 so DPHHS can consider emergency operational escalation or activation under the Communicable Disease Annex to the DPHHS Emergency Operation Plan.

8 REFERENCES AND ADDITIONAL INFORMATION

Important references:

A. American Public Health Association. Control of Communicable Diseases Manual, 20th edition, 2015 (CCDM) https://secure.apha.org/imis/ItemDetail?iProductCode=978-087553-0185&CATEGORY=BK
B. Centers for Disease Control and Prevention (CDC). Q fever. http://www.cdc.gov/qfever/
C. CDC. Diagnosis and management of Q fever — United States, 2013: recommendations from CDC and the Q fever working group. MMWR. 2013;62(RR03);1–23. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm

D. Montana Department of Livestock. Q fever herd management plan. https://liv.mt.gov/Portals/146/ah/diseases/Q-Fever/Qfeverherdplan.pdf
E. CDC Q Fever Website http://www.cdc.gov/qfever/