

# Q Fever

## (*Coxiella burnetii* Infection)

# Investigation

# Guideline

### CONTENT:

### VERSION DATE:

#### Investigation Protocol:

- Investigation Guideline 12/2013
- CDC Q-Fever Case Report Form 02/2008

#### Supporting Materials found in attachments:

- Fact Sheet 12/2013

### Revision History:

Date	Replaced	Comments
12/2013	07/2009	Reformatted and added notification section.
02/2012	-	Removed references to KS-EDSS.

# Q Fever (*Coxiella burnetii* Infection)

## Disease Management and Investigative Guidelines

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### CASE DEFINITIONS

#### Acute (CDC 2009)

##### Clinical Evidence for Surveillance:

Acute fever **and** one or more of the following:

- rigors,
- severe retrobulbar headache,
- acute hepatitis,
- pneumonia, or
- elevated liver enzyme levels.

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

##### Laboratory Criteria:

###### **Confirmatory laboratory:**

- Serological evidence of a fourfold change in IgG antibody titer to *C. burnetii* phase II antigen by IFA between paired serum samples, (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 specific target by PCR assay, or
- Demonstration of *C. burnetii* in a clinical specimen by IHC, or
- Isolation of *C. burnetii* from a clinical specimen by culture.

###### **Supportive laboratory:**

- Single supportive IFA IgG titer of  $\geq 1:128$  to phase II antigen (phase I titers may be elevated as well).
- Serologic evidence of elevated phase II IgG or IgM antibody reactive with *C. burnetii* antigen by ELISA, dot-ELISA, or latex agglutination.

#### Chronic (CDC 2009)

##### Clinical Evidence for Surveillance:

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:

###### **Confirmatory laboratory:**

- Serological evidence of IgG antibody to *C. burnetii* phase I antigen  $\geq 1:800$  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 specific target by PCR assay, or
- Demonstration of *C. burnetii* in a clinical specimen by IHC, or
- Isolation of *C. burnetii* from a clinical specimen by culture.

###### **Supportive laboratory:**

- An IgG antibody titer to *C. burnetii* phase I antigen  $\geq 1:128$  and  $< 1:800$  by IFA.

##### Abbreviations:

**IgG:** immunoglobulin G

**IFA:** indirect immunofluorescence assay

**PCR:** polymerase chain reaction

**IHC:** immunohistochemical methods

**IgM:** immunoglobulin M

**ELISA:** enzyme-linked immunosorbent assay

## Case Classification:

- **Confirmed acute Q fever:** A laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.
  - **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 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.
  - **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).
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## LABORATORY ANALYSIS

- The State Public Health Laboratory forwards all specimens and isolates to the CDC. Specimens sent to CDC must have prior authorization from the State Epidemiology Program (1-877-427-7317) before they are processed.
- For additional information and/or questions call (785) 296-1620 or refer to [www.kdheks.gov/labs/lab\\_ref\\_guide.htm](http://www.kdheks.gov/labs/lab_ref_guide.htm).
- Recommendations from CDC:
  - Paired serum samples: take one sample during the first week of illness and a second sample 3-6 weeks later.
  - For acute testing: The CDC uses in-house IFA IgG testing (cutoff of  $\geq 1:128$ ), preferring simultaneous testing of paired specimens, and does not use IgM results for routine diagnostic testing.
    - 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.
    - Serologic profiles of pregnant women infected with acute Q fever during gestation may progress frequently and rapidly to those characteristic of chronic infection
  - For chronic testing: 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.
  - 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.

- Serological testing – Phase I and II antigens:
  - 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.
  - Antibodies to Phase I antigens of *C. burnetii* generally require longer to appear and indicate continued exposure to the bacteria. 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.

## EPIDEMIOLOGY

A zoonotic disease, Q fever is caused by *C. burnetii*. It is unable to replicate outside a host but the spore-like form of the organism is resistant to heat, dehydration and many antiseptic compounds. *C. burnetii* is very infectious and is usually associated with direct contact to domestic goats, cattle or sheep. The risk is greatest when humans are exposed to these animals during the birthing process when the organism may be aerosolized from the uterus.

## DISEASE OVERVIEW

### A. Agent:

*Coxiella burnetii* is a pleomorphic intracellular coccobacillus.

### B. Clinical Description:

Acute symptoms include 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.

Chronic disease is characterized by an 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. Rare cases of chronic hepatitis without endocarditis, osteomyelitis, osteoarthritis, and pneumonitis have occurred.

### C. Reservoirs: Domestic and wild animals.

### D. Mode(s) of Transmission:

Dissemination often occurs by the airborne dissemination of *C. burnetii* in the dust from premises contaminated by placental tissues, birth fluid and excreta of infected animals. Transmission may also occur from direct contact with infected animals and/or other contaminated materials, such as: wool, straw and laundry.

**E. Incubation Period:**

Usually 14-22 days; range 9-39 days.

**F. Period of Communicability:**

Direct transmission from person-to-person rarely, if ever, occurs.

**G. Susceptibility and Resistance:**

Susceptibility is general and immunity following illness is life-long.

**H. Treatment:**

Q fever usually resolves without treatment within 15 days; however, tetracycline or doxycycline have been shown to shorten the duration of illness and are the drugs of choice; chloramphenicol may be used in children.

## NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

As a potential bioterrorism agent, all confirmed or suspected Q fever cases shall be reported within 4 hours by phone:

1. Health care providers and hospitals: report to the local public health jurisdiction (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)
4. KDHE-BEPHI will contact the local public health jurisdiction by phone within one hour of receiving any suspected Q fever report.

**Kansas Department of Health and Environment (KDHE)  
Bureau of Epidemiology and Public Health Informatics (BEPHI)  
Phone: 1-877-427-7317  
Fax: 1-877-427-7318**

### **Further responsibilities of state and local health departments to the CDC:**

*As a nationally notifiable condition, confirmed and probable Q fever cases require a STANDARD report to the Center of Disease Control and Prevention (CDC).*

1. STANDARD reporting requires KDHE-BEPHI to file an electronic report for within the next reporting cycle.
  - KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested as soon as possible, ensuring that the electronic form is completed within 7 days of receiving a notification of a Q fever report.

## INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all information that helps to confirm or rule-out cases to the KDHE within seven days of the initial report.
- 2) Use current [case definition](#), to confirm diagnosis with the medical provider.
- 3) Conduct [case investigation](#) to determine the individual's at-risk activities and potential site of exposure.
- 4) Complete and report all information requested in the Kansas electronic surveillance system.
- 5) As appropriate, use the disease [fact sheet](#) to notify the case, contacts and other individuals or groups.

# STANDARD CASE INVESTIGATION AND CONTROL METHODS

## Case Investigation

*Keep in mind that for Q fever, exposure is usually via aerosol but may be unknown (especially for chronic infection). Known exposures often include 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. Infectious particles can be carried downwind a half-mile or more, contributing to sporadic cases with no apparent animal contact.*

- 1) Contact the medical provider who reported or ordered the testing of the case.
  - Determine what information has been released about the patient's diagnosis and identify if needed epidemiologic data can be found in the clinical record.
  - If hospitalized: obtain admission/progress notes and discharge summary.
    - Record hospitalizations: reason, location and duration of stay
  - If pregnant: obtain the due date.
  - Obtain information that supports clinical findings in the case definition and information on the onset date of the symptoms, especially:
    - Acute
      - Fever **and**
      - rigors, severe **retrobulbar** headache, acute hepatitis, pneumonia, or elevated liver enzyme levels
    - Chronic: Newly recognized, culture-negative endocarditis or chronic hepatitis, osteomyelitis, osteoarthritis, or pneumonitis in the absence of other known etiology.
  - Obtain information on any laboratory tests performed and fax results to KDHE at 1-877-427-7318, if not previously reported.
    - Results of liver enzyme testing.
    - Results of x-rays or other radiographical testing
    - Results of culture, if done.
  - Collect case's demographic data and contacting information (birth date, county, sex, race/ethnicity, address, phone number(s))
  - Record outcomes: survived or date of death
- 2) If data found in patient charts does not provide information on risk factors, interview the case to determine source, risk factors and transmission settings.
- 3) Focus case investigation within the incubation period of the specific infectious agent, and consider:
  - Occupation: Laboratory worker, veterinarian, farmer, dairyman, wool-processor or in a packinghouse, stockyard or rendering plant. Also consider rural construction workers, laundry workers and undertakers.
  - Exposure to cattle, sheep and goat byproducts (e.g., wool, fertilizer, birth products, etc.) and dust from contaminated corrals.
  - Use and source of unpasteurized dairy products or imported foods.
  - Travel (location and dates) to areas with large concentrations of cattle, sheep, and goats.

### Contact Investigation

- 1) Contacts are defined as those with possible exposure to the source of infection.
- 2) Symptomatic acquaintances contacts should be strongly urged to contact their physician for a medical evaluation.

### Isolation, Work and Daycare Restrictions

- 1) Q fever is not transmissible from person-to-person. No respiratory isolation is needed.
- 2) No restrictions are indicated for outpatient management.

### Case Management

None.

### Contact Management

- 1) If any are ill, inform them (or their physician) of possible exposure, in order to facilitate proper diagnosis and therapy.
- 2) Persons who are not ill but who were potentially exposed should be educated on the signs and symptoms and incubation period and instructed to inform their medical providers of the potential exposure if symptoms do develop.

### Environmental Measures

- 1) Pasteurize all milk and dairy products.
- 2) Exercise care when handling placenta and fetus from aborted animals.
- 3) Disinfect contaminated areas with a bleach solution or other commercial disinfectant.

### Education

As opportunities allow, the following general messages should be distributed:

- 1) Discuss availability of medical services for people engaged in activities associated with farm animals, their body wastes and by-products.
- 2) Educate public on sources of infection and the need to pasteurize milk.
- 3) Counsel persons at highest risk for developing chronic Q fever, especially persons with pre-existing cardiac valvular disease or individuals with vascular grafts.

## MANAGING SPECIAL SITUATIONS

### A. Outbreak Investigation:

- There are no formal outbreak definitions; however, the investigator may consider the possibility of an outbreak when there is an unusual clustering of cases in time and/or space.
- Notify KDHE immediately, 1-877-427-7317.
- Active case finding will be an important part of any investigation.

## B. Intentional Contamination

Q fever has been proposed as a biological warfare agent. *Coxiella burnetii* is a highly infectious agent that is rather resistant to heat and drying. It can become airborne and inhaled by humans. A single *C. burnetii* organism may cause disease in a susceptible person. Because the laboratory confirmation could be delayed, any findings that suggest the possibility of an intentional release of *C. burnetii* should result in the immediate issue of a health alert.

If suspected:

- Notify local law enforcement and state public health officials.
- Implement "[Chain of Custody](#)" procedures for all samples collected, as they will be considered evidence in a criminal investigation.
- Work to define population at risk which is essential to guide response activities. Public health authorities will play the lead role in this effort, but must consult with law enforcement, emergency response and other professionals in the process. The definition may have to be re-evaluated and redefined at various steps in the investigation and response.
- Once the mechanism and scope of delivery has been defined, identify symptomatic and asymptomatic individuals among the exposed and recommend treatment and/or chemoprophylaxis.
- Establish and maintain a detailed line listing of all cases and contacts with accurate identifying and locating information.

Safety Considerations:

- Risks to response personnel are not significant.

Risk Communication Materials:

- Factsheet(s) for Q fever:

Vaccination:

- A vaccine for Q fever has been developed and has successfully protected humans in occupational settings in Australia. However, this vaccine is not commercially available in the United States.
- Persons wishing to be vaccinated should first have a skin test to determine a history of previous exposure. Individuals who have previously been exposed to *C. burnetii* should not receive the vaccine because severe reactions, localized to the area of the injected vaccine, may occur.

Treatment:

- Drug-resistant organisms might be used as a weapon, conduct antimicrobial susceptibility testing quickly and alter treatments as needed.
- Antibiotics for treating patients infected with Q Fever in a bioterrorist event are included in the national pharmaceutical stockpile maintained by CDC, as are ventilators and other emergency equipment.

Postexposure prophylaxis (PEP):

- Not recommended for contacts. However, all exposed should be monitored closely to allow for quick initiation of antibiotics upon onset of symptoms.

Surveillance:

- Arrange for medical monitoring of contacts for 6 weeks to detect sudden

onset of: high fevers (104-105° F), severe headache, general malaise, myalgia, confusion, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhea, abdominal pain, and chest pain.

## DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Organize and collect data.
  - The [CDC Q-Fever Case Report Form](#) can help with data collection.
- B. Report data via the state electronic surveillance system.

## ADDITIONAL INFORMATION / REFERENCES

- A. **Treatment / Differential Diagnosis:** American Academy of Pediatrics. 2009 Red Book: Report of the Committee on Infectious Disease, 28th Edition. Illinois, Academy of Pediatrics, 2009.
- B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, 19th Edition. Washington, DC, American Public Health Association, 2009.
- C. **Animals in Public Places Compendium:**  
[www.kdheks.gov/epi/human\\_animal\\_health.htm](http://www.kdheks.gov/epi/human_animal_health.htm)
- D. **Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: [www.cdc.gov/osels/ph\\_surveillance/nndss/casedef/case\\_definitions.htm](http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm)
- E. **Chain of Custody:** KDHE Chain of Custody Standard Operating Guide, [www.kdheks.gov/cphp/operating\\_guides.htm#coc](http://www.kdheks.gov/cphp/operating_guides.htm#coc)
- F. **CDC Q-Fever Case Investigation Report.** Access online at: [www.cdc.gov/qfever/pdfs/qfevercasereport\\_2010.pdf](http://www.cdc.gov/qfever/pdfs/qfevercasereport_2010.pdf)
- G. **Additional Information (CDC):** [www.cdc.gov/qfever/info/index.html](http://www.cdc.gov/qfever/info/index.html)

## ATTACHMENTS

- **Fact Sheet**

*To view attachments in the electronic version:*

1. Go to <View>; <Navigation Pane>; <Attachments> – OR – Click on the “Paper Clip”  icon at the left.
2. Double click on the document to open.



# Q Fever Case Report

Use for: Acute Q Fever and Chronic Q Fever

Visit <http://www.cdc.gov> and use "Search" for complete Case Definition or to visit the Q Fever disease web site for a fillable/downloadable PDF version of this Case Report.



Form Approved  
OMB 0920-0009

Patient's name: \_\_\_\_\_ Date submitted: \_\_\_\_\_ (mm/dd/yyyy)  
 Address: \_\_\_\_\_ (number, street) Physician's name: \_\_\_\_\_ Phone no.: \_\_\_\_\_  
 City: \_\_\_\_\_ NETSS ID No.: (if reported) \_\_\_\_\_ Case ID (13-18) Site (19-21) State (22-23)

1. State of residence: \_\_\_\_\_ (24-25) 2. County of residence: \_\_\_\_\_ (26-50) 3. Zip code: \_\_\_\_\_ (51-59) 4. Date of birth: \_\_\_\_\_ (60-61) (62-63) (64-67) 5. Sex: (68)  Male  Female  Not specified 6. Race: (69)  White  Black  American Indian/Alaskan Native  Asian  Pacific Islander  Not specified 7. Hispanic ethnicity: (70)  Yes  No  Unk

8. Occupation at date of onset of illness (Check all that apply)  wool or felt plant (71)  tannery or rendering plant (72)  dairy (73)  veterinarian (74)  medical research (75)  animal research (76)  slaughterhouse worker (77)  laboratory worker (78)  rancher (79)  live in household with person occupationally related to above? (80)  other (please specify) (81) 9. Any contact with animals within 2 months prior to onset? (check all that apply)  Cattle (82)  Sheep (83)  Other (please specify) (88)  Goats (84)  Pigeons (85)  Rabbits (87)  Cats (86)

10. Any exposure to birthing animals?  Yes  No  Unk (89) If yes, which animal \_\_\_\_\_ 11. Exposure to unpasteurized milk?  Yes  No  Unk (90) If yes, which animal \_\_\_\_\_ 12. Any travel in last year? (91-92) If yes, State \_\_\_\_\_ County \_\_\_\_\_ Foreign Country \_\_\_\_\_ 13. Other family member with similar illness in last year? (93)  Yes  No  Unk

14. Date of Onset of Symptoms: \_\_\_\_\_ (94-95) (96-97) (98-101) (mm/dd/yyyy) 15. Clinical Signs and syndromes (check all that apply) Evidence of clinically compatible illness is necessary. See CSTE/CDC Q Fever case definition, and case categorization summaries below.  fever (>100.5) (102)  malaise (105)  headache (108)  pneumonia (111)  Other (please specify) (114)  myalgia (103)  rash (106)  splenomegaly (109)  hepatitis (112)  retrobulbar pain (104)  cough (107)  hepatomegaly (110)  endocarditis (113) Acute Q fever: Acute fever and one or more of the following: Rigors (febrile shivering), severe retrobulbar headache, acute hepatitis, pneumonia, or elevated liver enzyme levels. Chronic Q fever: Newly recognized, culture-negative endocarditis - particularly in patients with previous valvulopathies or compromised immune systems, suspected infections of vascular aneurysms or vascular prostheses, or chronic hepatitis in the absence of other known etiology.

16. Any pre-existing medical conditions? (check all that apply)  immunocompromised (115)  pregnancy (116)  valvular heart disease or vascular graft (117)  Other (118) 17. Was patient hospitalized because of this illness? (119)  Yes  No  Unk 18. Did patient die from complications of this illness? (120) (If yes, date) (mm/dd/yyyy)  Yes  No  Unk (121-22) (123-24) (125-28)

19. Laboratory Name: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

20. Serology (Check only if specific assay was performed)	Phase I Antigen		Phase II Antigen		22. Other Diagnostic Tests?* (Use #20, S1 to indicate collection date.)
	Serology 1 (mm/dd/yyyy) (129-30) (131-32) (133-36) Titer or OD* Positive?	Serology 2 (mm/dd/yyyy) (141-42) (143-44) (145-48) Titer or OD* Positive?	Serology 1 (mm/dd/yyyy) (153-54) (155-56) (157-60) Titer or OD* Positive?	Serology 2 (mm/dd/yyyy) (165-66) (167-68) (169-72) Titer or OD* Positive?	
IFA - IgG	<input type="checkbox"/> Yes <input type="checkbox"/> No (137)	<input type="checkbox"/> Yes <input type="checkbox"/> No (149)	<input type="checkbox"/> Yes <input type="checkbox"/> No (161)	<input type="checkbox"/> Yes <input type="checkbox"/> No (173)	* Check only if specific assay was performed. PCR <input type="checkbox"/> Yes <input type="checkbox"/> No (178) Immunostain <input type="checkbox"/> Yes <input type="checkbox"/> No (179) Culture <input type="checkbox"/> Yes <input type="checkbox"/> No (180) Sample(s) tested: ..... ..... .....
IFA - IgM	<input type="checkbox"/> Yes <input type="checkbox"/> No (138)	<input type="checkbox"/> Yes <input type="checkbox"/> No (150)	<input type="checkbox"/> Yes <input type="checkbox"/> No (162)	<input type="checkbox"/> Yes <input type="checkbox"/> No (174)	
Other test: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No (140)	<input type="checkbox"/> Yes <input type="checkbox"/> No (152)	<input type="checkbox"/> Yes <input type="checkbox"/> No (164)	<input type="checkbox"/> Yes <input type="checkbox"/> No (176)	

\*IFA "Titer" or Other test: if CF, "Titer", if ELISA (EIA), Optical Density "OD" value.

21. Was there a fourfold change in antibody titer between the two serum specimens?  Yes  No (177)

23. Classify case based on the CSTE/CDC case definition (see 15 above and criteria below):  Confirmed acute Q Fever  Probable acute Q Fever  Confirmed chronic Q Fever  Probable chronic Q Fever (181)

State Health Department Official who reviewed this report:  
 Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_ (mm/dd/yyyy)

See CSTE/CDC Q Fever Case Definition effective 1/1/2008 for details of the following categories:  
 Confirmed acute Q Fever: A laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to lab confirmed case.  
 Probable acute Q Fever: A clinically compatible case of acute illness that is not laboratory confirmed but has lab supportive evidence (antibody to Phase II higher than Phase I [if latter present]).  
 Confirmed chronic Q Fever: A clinically compatible case of chronic illness that is laboratory confirmed.  
 Probable chronic Q Fever: A clinically compatible case of chronic illness that is not laboratory confirmed but has lab supportive evidence (antibody to Phase I higher than Phase II [if latter present]).

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 II) are not quantitative and thus can, at best, indicate a probable infection. IgM tests may be unreliable because they lack specificity. IgM antibody may persist for lengthy periods of time. Older test methods are neither readily available nor commonly used. 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. Interpret serologic test results with caution, because antibodies acquired as a result of historical exposure to Q fever may exist, especially in rural and farming areas.