

Brucellosis

Surveillance Protocol

Brucellosis is an infectious disease caused by *Brucella* bacteria species. People can get the disease when they are in contact with infected animals or animal products contaminated with the bacteria. The most common way to be infected is by eating or drinking unpasteurized/raw dairy products. When sheep, goats, cows, or camels are infected, their milk becomes contaminated with the bacteria. Person-to-person spread of brucellosis is extremely rare. Infected mothers who are breast-feeding may transmit the infection to their infants. Sexual transmission has been rarely reported. While uncommon, transmission may also occur via tissue transplantation or blood transfusions.

Provider Responsibilities

1. Report suspect and confirmed cases of brucellosis (including copies of lab results) to the local health department within 24 hours of diagnosis. Follow up with a faxed copy of the laboratory confirmation and complete demographic and clinical information on the patient as requested by the local health department.
2. Communicate with the laboratory if *Brucella* is in the differential diagnosis so that laboratory personnel can take precautions. *Brucella* can easily cause infections in laboratory personnel.

Laboratory Responsibilities

1. Communicate with the Office of Laboratory Services and your worksite safety coordinator if *Brucella* testing is requested. *Brucella* can easily cause infections in laboratory personnel.
2. If positive laboratory results for brucellosis are identified:
 - a. Move all specimens to a biosafety hood and do not allow additional staff to enter the room. Report the situation to your worksite safety coordinator. If feasible to do so without exposing additional staff, seal all specimens and move to a biosafety level 3 environment.
 - b. Consult the Office of Laboratory Services (304)-558-3530 to arrange confirmatory testing to the local health department within 24 hours.
 - c. Consult the local health department about evaluation and management of potentially exposed employees.
3. Report suspect or confirmed *Brucella* to the local health department within 24 hours.

Local Health Responsibilities

1. Prior to the occurrence of a brucellosis case, protect employee health.
 - a. Educate staff who will investigate *Brucella* cases to use standard precautions. *Brucella* is not transmitted from one person to another under usual circumstances.
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- b. *Brucella* can be transmitted from environmental and animal sources. In particular, aborted fetuses, products of conception, etc. can be highly infective. Environmental investigation such as collection of animal samples should only be undertaken after consultation with an expert about occupational health and safety.
 - i. In farm environments, follow WV Department of Agriculture protocols.
 - ii. Seek expert consultation for field investigation of a laboratory or research facility exposure.
2. When a case of brucellosis is reported,
 - a. Contact the provider to collect clinical data for case ascertainment. Record data on the WVEDSS form.
 - b. Contact the patient for risk factor information.
3. Consult DIDE if:
 - a. There is evidence of occupational exposure; or
 - b. The patient knows other people with a similar illness; or
 - c. The patient appears to be part of an outbreak of brucellosis.
4. For outbreaks of brucellosis, see outbreak investigation protocol. Anticipate that the outbreak investigation will include:
 - b. Interviews of cases to identify risk factors, including:
 - i. Occupation
 - ii. Exposure to animals, especially parturient animals
 - iii. Exposure to birth products (placenta, amniotic fluid, fetuses)
 - iv. Exposure to environments that might be contaminated with *Brucella* species such as: farms, laboratories, research facilities, slaughterhouses, etc.
 - v. Exposure to unpasteurized milk or cheese or other animal products
 - c. Hypothesis testing might include any of the following:
 - i. Evaluation of suspected source animals, including serological testing;
 - ii. Evaluation suspected source of exposure (i.e., site visit and possible environmental sampling or sampling of animal products)
 - iii. Case-control or retrospective cohort studies
 - iv. Trace-back studies

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State Health Responsibilities

1. Protect employee health.
 - a. Educate staff who will investigate *Brucella* cases to use standard precautions.
 - b. *Brucella* can be transmitted from environmental and animal sources. In particular, aborted fetuses, products of conception, etc. can be highly infective. Environmental investigation such as collection of animal samples should only be undertaken after consultation with an expert about occupational health and safety.
2. Review reported cases and submit to CDC (standard notification) after assuring that case ascertainment is correct and an adequate risk factor investigation has been completed. Complete the Brucellosis Case Reporting Form: <http://www.cdc.gov/brucellosis/pdf/case-report-form.pdf>
3. Assist with outbreak and complex investigations, to include:
 - a. Assist or take the lead on evaluation of laboratory exposures;
 - b. Liaison with West Virginia Department of Agriculture, USDA and CDC to assure that animal investigation can be completed safely.
 - c. Serve as primary lead on design of epidemiological studies, if needed.
 - d. Development of questionnaires and line lists.
 - e. Assist with site visits and laboratory testing to evaluate exposure hypotheses.
 - f. For suspected or confirmed deliberate exposure events, liaison with law enforcement and CDC.

Disease Control Objectives

1. In the event of an outbreak, identify the point source of infection and isolate or remove it. Example of possible point sources include: infected herd animals, laboratory contamination, contaminated animal products (e.g. food products, birth matter), etc.

Disease Prevention Objectives

1. Reduce risk through educating the public to:
 - a. Consume only pasteurized dairy products.
 - b. Practice hand hygiene appropriately after contact with animals and animal products.
 - c. Have animal illness evaluated promptly by a veterinarian.

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Disease Surveillance Objectives

1. Rapidly detect cases and outbreaks of brucellosis.
2. Identify demographic characteristics of persons with brucellosis.
3. Characterize and describe risk factors for brucellosis.

Public Health Significance

Four species of *Brucella* cause this zoonotic disease in humans: *Brucella abortus*, principally affecting cattle, bison and cervids; *Brucella suis*, principally affecting swine and reindeer but also cattle and bison; *Brucella melitensis*, principally affecting goats; and *Brucella canis*, principally affecting dogs. Bacteria are shed in milk or via the aborted fetus, afterbirth, or other reproductive tract discharges.

In 1954, an eradication program was approved to remove the brucellosis from the United State. The program depends on the support and participation of livestock producers. The approach is to vaccinate calves (with RB51), test cattle and domestic bison for infection, and send infected animals to slaughter. Depopulation of herds may be considered if herds are severely affected. At the beginning of the program, brucellosis was widespread throughout U.S. livestock, but eradication efforts have had dramatic results. In 1956, there were 124,000 affected herds found by testing in the United States. By 1992, 700 herds were affected and has declined to single digits since then.

From a contaminated animal source, *Brucella* can enter the body through ingestion, inhalation or direct exposure to mucous membranes or open skin. *Brucella* can also be spread through the airborne route from animal bedding contaminated with birth products; or in laboratories through handling of *Brucella* isolates. This propensity for spread through the airborne route has been exploited by bioweapons manufacturers.

Each year, about 100 cases of brucellosis are reported in the US. In 2010, California, Texas, Arizona, and Florida accounted for over 50% of human cases. *Brucella* is an occupational hazard for veterinarians, slaughterhouse workers, animal husbandry workers and laboratory workers.

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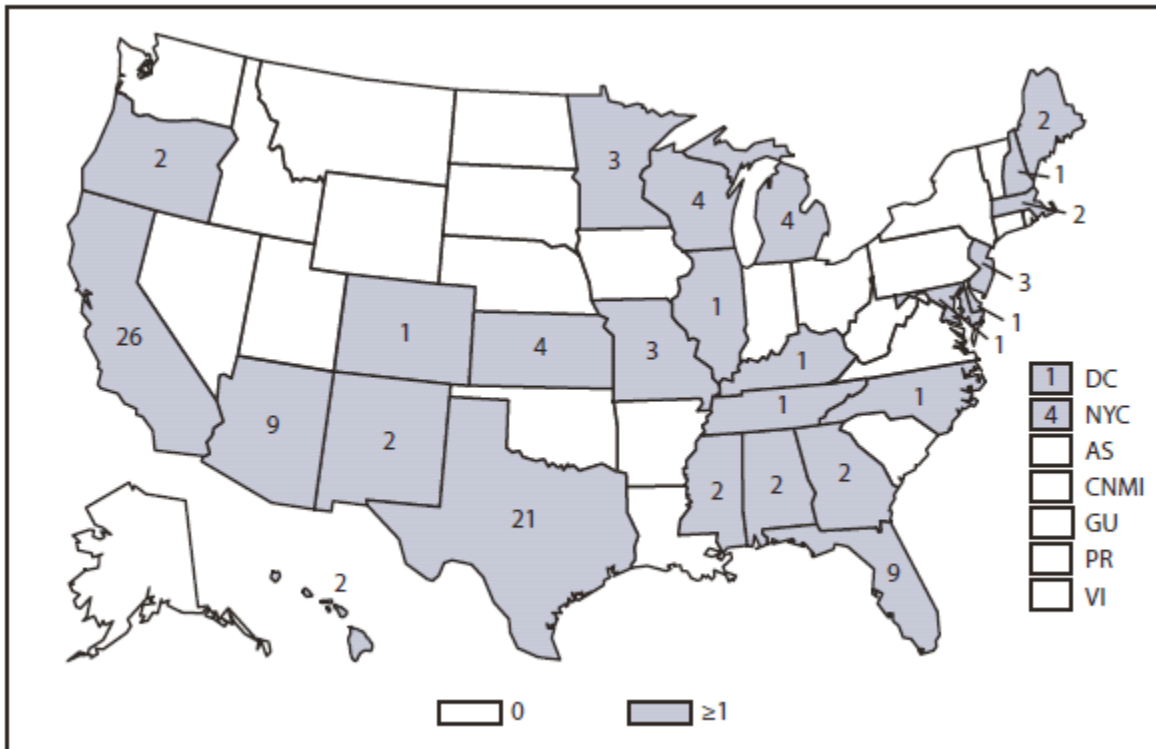
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Number of reported cases of brucellosis – United States and territories, 2010.



Clinical Description

Brucellosis can cause a range of signs and symptoms. Fever is virtually always present. Other symptoms can include: sweats, malaise, anorexia, headache, fatigue, and/or muscle, joint, and back pain. Physical examination is generally non-specific, although patients may have lymphadenopathy, hepatomegaly and splenomegaly.

Brucella is a systemic infection and any organ in the body may become involved. Complications include focal infections of the bones or joints; hepatitis; acute or chronic meningitis or brain abscess; endocarditis; kidney infections; skin and ocular infections; and epididymo-orchitis in men. Women in endemic areas experience higher rates of spontaneous abortion in association with *Brucella* infection. Prompt treatment can prevent fetal loss. *Brucella* is also associated with depression in patients with chronic infection.

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Etiologic Agent

Small gram-negative coccobacillus. *Brucella melitensis*. *Brucella suis*, *Brucella abortus*, and *Brucella canis* are most commonly associated with human infection.

Reservoir

Animal species associated with brucellosis are food-producing animals: cattle, sheep, goats, and pigs. Other animals including bison, buffalo, camels, dogs, horses, reindeer and yaks can become infected and may be significant local sources of infection in some regions of the world. Recently, the infection has also been identified in marine mammals, including dolphins, porpoises and seals, and these may present an emerging hazard to persons occupationally exposed to infected tissues from them.

Mode of Transmission

Humans can become infected with brucellosis by:

- Eating undercooked meat or consuming unpasteurized/raw dairy products.
- Inhalation of *Brucella* bacteria
- Having skin/mucous membrane exposure to the bacteria

Person-to-person spread of brucellosis is very rare; though, infected mothers who are breast-feeding may transmit infection to their infants. Transmission via tissue transplantation or blood transfusion may occur but is rare. Sexual transmission is also rare.

Persons at high occupational risk for infection include: veterinarians, slaughterhouse workers, meat-packing plant employees, and exposed laboratorians.

Incubation Period

The incubation period for brucellosis is variable from less than one week to several months. Most people became ill within 3 to 4 weeks of exposure.

Outbreak Recognition

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Outbreaks would be recognized as an increase in the number of cases clustered in place and time.

Case Definition

This surveillance case definition was developed for national reporting of brucellosis; it is not intended to be used in clinical diagnosis¹¹.

Clinical Description

An illness characterized by acute or insidious onset of fever and one or more of the following: night sweats, arthralgia, headache, fatigue, anorexia, myalgia, weight loss, arthritis/spondylitis, meningitis, or focal organ involvement (endocarditis, orchitis/epididymitis, hepatomegaly, splenomegaly).

Laboratory Criteria for Diagnosis

Definitive

- Culture and identification of *Brucella* spp. from clinical specimens
- Evidence of a fourfold or greater rise in *Brucella* antibody titer between acute- and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart

Presumptive

- *Brucella* total antibody titer of greater than or equal to 160 by standard tube agglutination test (SAT) or *Brucella* micro-agglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms
- Detection of *Brucella* DNA in a clinical specimen by PCR assay

Case Classification

Probable

A clinically compatible illness with at least one of the following:

- Epidemiologically linked to a confirmed human or animal brucellosis case
- Presumptive laboratory evidence, but without definitive laboratory evidence, of *Brucella* infection

Confirmed

A clinically compatible illness with definitive laboratory evidence of *Brucella* infection

Preventive Interventions

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Prevention of occupational exposure

- Workers in biomedical research facilities are at higher risk and should be educated and monitored.
- Laboratorians should use bio-safety level-3 containment when working with *Brucella* species.

Agricultural prevention and control

- Because of the pervasive environmental contamination during a zoonotic, agricultural prevention and control is highly challenging. West Virginia Department of Agriculture should be consulted about management of animal disease
- In some jurisdictions, contaminated bedding and other high risk materials, such as aborted fetuses are buried with lime or incinerated. Areas in which an abortion of infected parturition has occurred should be washed down areas with approved disinfectant (hypochlorite, iodophor, or phenolic disinfection)
- Pasteurization of milk is important for prevention.

Treatment

Antimicrobial therapy is important to achieving a cure and should be prolonged. Relapses can occur if therapy is stopped prematurely. Consult an infectious disease specialist for treatment recommendations. Regimens that have been used include: doxycycline and streptomycin or gentamicin; doxycycline and rifampin; and other combinations. Treatment of persons with bone infections; persons who are pregnant; children under age 8; and persons with endocarditis or meningitis may be especially challenging.

Surveillance Indicators

- Proportion of cases with complete demographic, clinical, and exposure information documented.

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