



# Brucellosis

2025

## **REPORT CONFIRMED OR SUSPECT CASES IMMEDIATELY**

Cases should be reported to the local health department where the patient resides. If patient residence is unknown, report to your own local health department. Contact information is available at: <http://localhealth.nj.gov>.

If the individual does not live in New Jersey, report the case to the New Jersey Department of Health at: (609) 826-5964.

In cases of immediately reportable diseases or other emergencies – if the local health department cannot be reached – the New Jersey Department of Health maintains an emergency after-hours phone number at: (609) 392-2020.

# THE DISEASE AND ITS EPIDEMIOLOGY

## Etiologic Agent

Brucellosis is caused by infection with *Brucella* bacteria. The species of *Brucella* that infect humans are *B. abortus*, *B. melitensis*, *B. suis*, and, rarely, *B. canis*. Infection with *B. melitensis* occurs more frequently than do infections with the other species in general populations and has the highest prevalence in countries with a high incidence of brucellosis in cattle, sheep and goats. Brucellosis is most common in the Africa, Central and South America, Asia, eastern Europe, along the Mediterranean Basin, and the Middle East. In North America, *Brucella* spp. are endemic to the feral swine population and wildlife around the Greater Yellowstone Area.

## Clinical Description

The signs and symptoms of brucellosis may be nonspecific, including sustained or irregular fever of variable duration, headache, weakness, sweats, chills, pain in muscles and joints, malaise, weight loss, depression, and generalized aching. Onset of illness may be acute or insidious. Localized infections of organs (including the liver and spleen) and chronic localized infections can occur. The disease may last for days, months, or occasionally longer if inadequately treated. Relapse is not uncommon. Complications affecting the joints are common, as is genitourinary involvement, including orchitis and epididymitis. The case-fatality ratio of untreated brucellosis is  $\leq 2\%$ . Death often results from endocarditis caused by *B. melitensis*.

## Reservoirs

Cattle, swine, goats, and sheep are the most common reservoirs. The United States and most European countries are free of bovine brucellosis but bison, elk, caribou, and some species of deer may harbor *Brucella* species. *B. canis* is an occasional problem in laboratory dog colonies and kennels and a small percentage of pet dogs. Coyotes have also been found to be infected with *B. canis*. Marine animals can be infected with *B. ceti* (whales, porpoises, and dolphins) and *B. pinnipedialis* (seals, sea lions, and walrus).

## Modes of Transmission

Brucellosis is spread through direct contact of mucosal surfaces and cuts and abrasions of the skin with secretions of living or dead infected animals, including their tissues, blood, urine, vaginal discharges, aborted fetuses, and placentas. The most common mode of transmission is ingestion of raw milk and unpasteurized dairy products (e.g., cheese and yogurt) from infected animals. Airborne transmission may occur through inhalation of contaminated aerosols in animal enclosures and in laboratory settings. Persons who hunt or handle feral swine in the U.S. are at risk of exposure to *B. suis*. Persons may also be infected through accidental self-inoculation with live *Brucella* vaccine strain used for livestock (strain 19). Person-to-person spread is extremely rare, although it may transmit through breast-feeding, sexual transmission and contaminated tissue transplantation and blood transfusions.

## Incubation Period

The incubation for brucellosis can range from five days to six months, but most people develop symptoms two to four weeks after exposure.

## Period of Communicability or Infectious Period

Person-to-person transmission of brucellosis is extremely rare.

## Epidemiology

Each year over 500,000 new cases of brucellosis occur in humans are reported worldwide. This number is likely an underestimate, as brucellosis is underreported and often misdiagnosed because clinical symptoms are nonspecific, physicians might lack awareness, and laboratory capacity for diagnosis is limited. Humans are accidental hosts. The infection in animal reservoirs provides a key to its occurrence in humans. Brucellosis is most common in the Africa, Central and South America, Asia, eastern Europe, along the Mediterranean Basin, and the Middle East. In North America, *Brucella* spp. are endemic to the feral swine population and wildlife around the Greater Yellowstone Area. *B. abortus* and *B. suis* infections usually affect occupational groups and hunters; while *B. melitensis* infections occur more frequently than do other types in the general population. The greatest prevalence of brucellosis is found in countries with a high incidence of *B. melitensis* infection among cattle, sheep and goats, where it is commonly seen as an occupational disease in farmers, ranchers, veterinarians, and other people who work directly with animals. It may also be found in people who work in laboratories and slaughterhouses (e.g., meat inspectors). Sporadic cases and outbreaks may occur among consumers of raw (unpasteurized) milk and milk products, especially soft cheeses and yogurt.

Forty-eight cases of brucellosis in the United States were reported to CDC in 2022, a fraction of the 6,400 cases reported in 1947. Annually, approximately 100 cases of brucellosis in humans are reported to the CDC, most from non-US residents.

## CASE DEFINITION

### A. New Jersey Department of Health (NJDOH) Case Definition

The NJDOH Zoonotic Disease Program follows the most current case definition as published on the CDC National Notifiable Disease Surveillance System (NNDSS) website.

Brucellosis Case Definition: <https://ndc.services.cdc.gov/conditions/brucellosis/>

Case definitions enable public health to classify and count cases consistently across reporting jurisdictions and should not be used by healthcare providers to determine how to meet an individual patient's health needs.

## Clinical Criteria

Acute onset or insidious onset of fever **AND** two or more of the following signs and symptoms: night sweats, arthralgia, headache, fatigue, anorexia, myalgia, weight loss, arthritis, spondylitis, meningitis, encephalitis or other neurologic abnormalities, discitis or osteomyelitis, abscesses, focal organ involvement (including, but not limited to: endocarditis, orchitis/epididymitis, hepatomegaly, splenomegaly)

## Laboratory Criteria for Diagnosis

### Confirmatory Laboratory Evidence

- *Category 1*
  - Identification of a *Brucella* isolate as a brucellosis-causing *Brucella* species (BBS) by methods specific for BBS (i.e., PCR assay with documented specificity for BBS and/or biochemical tests and/or whole genome sequencing of *Brucella* isolate)
- *Category 2*
  - Evidence of fourfold or greater rise in *Brucella* antibody titer between acute and convalescent serum specimens obtained at least 2 weeks apart.\*

\* *To ensure consistency with laboratory methodologies, it is recommended that paired sera testing for the purposes of confirmatory classification be conducted within the same laboratory.*

### Presumptive Laboratory Evidence

- *Brucella* total antibody titer  $\geq 1:160$  by standard tube agglutination (SAT) or *Brucella* microagglutination test in one or more serum samples obtained after onset of symptoms.

### Supportive Laboratory Evidence

- Detection of *Brucella* IgG antibodies by ELISA in a sample collected at least 2 weeks after onset of symptoms.

### Epidemiologic Linkage

- Direct contact with body fluids or tissue from a confirmed human case of brucellosis, OR
- Veterinary occupational exposure to *Brucella* vaccine (i.e., needle stick, mucous membrane exposure), OR
- Laboratory exposure to brucellosis-causing *Brucella* species (BBS), OR
- Direct contact to an animal diagnosed with a *Brucella* infection (or their fluids), as determined by a state or federal animal health official, including potential aerosol exposure, OR
- Shared one of the following exposures with a confirmed human case of brucellosis:
  - Consumption of dairy products from a common source that were unpasteurized or of unknown pasteurization, particularly from countries lacking domestic animal health programs, OR
  - Consumption of handling of undercooked meat or carcass of an animal from a head or of a species with a known or suspected history of *Brucella*, OR
  - Slaughtering, dressing, butchering, or having other direct contact with animals or animal tissues possibly infected with *Brucella*.

### **Other Criteria: Vitals Records**

Death certificate lists brucellosis as a cause of death or a significant condition contributing to death.

### **Criteria to Distinguish a New case from an Existing Case**

Public health authorities should enumerate new cases of brucellosis in the following instances:

- A person should be enumerated as a case if not previously enumerated as a case, **OR**
- A person who was previously enumerated as a confirmed or probable case that meets confirmatory laboratory evidence category 1, **AND** has an event date at least twelve months after completion of adequate antimicrobial therapy, **AND** has new or ongoing risk factors for brucellosis exposure, **OR**
- A person who was previously enumerated as a confirmed or probable case that meets confirmatory laboratory evidence category 1 **AND** determined to be infected with a different brucellosis-causing *Brucella* species (BBS) or strain than prior infection.

A person should not be enumerated as new case if previously enumerated as a case **AND** there is evidence the new report is due to one or the following: brucellosis relapse, chronic infection, or delayed convalescence.

### **Case Classification**

#### **Suspect (Possible)**

- Meets confirmatory laboratory evidence category 2, **OR**
- Meets presumptive laboratory evidence, **OR**
- Meets supportive laboratory evidence, **OR**
- Meets vital records criteria.

#### **Probable**

- Meets clinical criteria **AND** presumptive laboratory evidence, **OR**
- Meets clinical criteria **AND** meets epidemiologic linkage criteria.

#### **Confirmed**

- Meets confirmatory laboratory evidence category 1, **OR**
- Meets clinical criteria **AND** confirmatory laboratory evidence category 2.

## **LABORATORY TESTING AVAILABLE**

Two types of tests are primarily performed to diagnosis brucellosis: serology (ELISA or agglutination) or isolation by bacterial culture.

### **Agglutination Assay**

The Centers for Disease Control and Prevention (CDC) recommends that serologic testing for clinically suspected brucellosis, with an exposure history, be done using the agglutination assay. This assay is available at select commercial laboratories. If necessary, the NJDOH Public Health and Environmental Laboratories (PHEL) can forward serum to CDC for agglutination testing for *Brucella* species. Please contact the NJDOH Infectious and Zoonotic Disease Program (IZDP) to approve submission of serum for agglutination testing to PHEL by calling 609-826-5964 or 4872.

### **Bacterial Isolation**

The isolation and identification of *Brucella* can confirm a diagnosis of brucellosis. *Brucella* is most commonly isolated from blood cultures but can also be isolated from bone marrow, cerebral spinal fluid, wounds, purulent discharge and joint fluid. Suspected *Brucella* cultures shall be handled under strict bio-safety precautions as the organism can aerosolize easily and potentially infect laboratory workers. Clinical laboratories are required to immediately report all bacterial cultures resembling *Brucella* species to the NJDOH, which will arrange for confirmatory testing.

PHEL will provide testing services for referred isolates of suspected *Brucella* spp. from appropriate clinical specimens. Referred isolates of suspected *Brucella* spp. must be approved prior to submission to PHEL. All samples must be accompanied by a PHEL Lab-5 form.

## **PURPOSE OF SURVEILLANCE AND REPORTING REQUIREMENTS**

- To help identify the source of infection and prevent further transmission from this source (e.g., an infected animal, a contaminated unpasteurized dairy product).
- To identify cases and clusters of human illness that may be associated with laboratory exposure, an accidental release or a purposeful release/ bioterrorist event.

### **Laboratory Reporting Requirements**

The New Jersey Administrative Code (NJAC 8:57-1.7) stipulates that laboratories **immediately report** by telephone any positive culture, test or assay result for *Brucella* to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider or healthcare facility requesting the laboratory examination is located. If the health officer is unavailable, call IZDP at 609-826-5964 or 4872 during business hours or 609-392-2020 after business hours or on weekends and holidays.

The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the name, age, date of birth, gender, race, ethnicity, home address and telephone number of the person tested; the test performed; the source or type of specimen tested, the date the specimen was collected, and the date of testing; the test results; and the health care provider's name, address, and telephone number.

## Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.4) stipulates that healthcare providers **immediately report** by telephone any suspect or confirmed case of brucellosis to the local health officer having jurisdiction over the locality in which the ill or infected person lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. If the health officer is unavailable, call IZDP. The report shall contain, at a minimum, the age, date of birth, gender, race, ethnicity, home address, and telephone number of the ill or infected person; date of onset of illness; clinical laboratory data (e.g., date of testing, test results, reporting laboratory's name, address, and telephone number); and the healthcare provider's name, address and phone number.

## Local Department of Health Reporting Requirements

N.J.A.C. 8:57-1.9 stipulates that the local health officer must report the occurrence of any case of brucellosis. Current requirements are that confirmed or probable cases be **immediately reported** to IZDP. A report can be filed electronically using CDRSS.

## CASE INVESTIGATION

### A. Investigation

1. It is the health officer's responsibility to investigate the case by interviewing the patient, physician and others who may be able to provide pertinent information. The [NJDOH Brucellosis Investigation Worksheet](#) may be used to help guide the patient or physician interview. Upon learning of a suspected bioterrorist event or report of a suspected *Brucella* culture, call the IZDP immediately. If a bioterrorist event is suspected, NJDOH in conjunction with CDC and other response authorities will work closely with local health officer(s) and provide instructions/information on how to proceed.
2. An epidemiologic investigation to identify the source of infection should be immediately initiated by the local health officer, focusing on the period 6 months prior to onset of symptoms. The following exposures should be investigated:
  - Travel: Ask the patient about travel outside of the state. Collect locations and dates of travel.
  - Contact with animals: Ask patient about recent animal contact. Collect information on species, type of contact, and dates of contact.
  - Food consumption: Ask the patient if they have consumed unpasteurized dairy products or undercooked meat. Collect information regarding quantity and dates of consumption. If raw milk, please collect any remaining product for testing. Collect detailed information on product source and packaging.
  - Laboratory exposure: Ask the patient if they are employed at a laboratory that may receive *Brucella* spp. specimens.
3. If the patient has compatible signs and symptoms of brucellosis and the patient has a positive Brucella ELISA assay test result, please recommend the physician order a standard tube agglutination test (SAT) or Brucella microagglutination test (BMAT). The ELISA assay is not an acceptable assay for case definition.
4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the local health officer to understand and, if necessary, institute the control guidelines.

**B. CDRSS**

Investigation worksheets DO NOT need to be sent to IZDP as long as the information is entered into the appropriate fields and notes sections in CDRSS.

<b>CDRSS Screen</b>	<b>Required Information</b>
<b>Disease Information</b>	Enter date reported to LHD, and illness onset date.
<b>Patient Personal Information</b>	Enter demographic information. If patient is under the age of 18, enter parent or guardian information under Patient Relation Information. Other required information include: country of birth.
<b>Clinical Status</b>	Enter date of illness onset, date of initial health care evaluation, initial diagnosis, as part of this investigation, was patient hospitalized, pre-existing conditions, and mortality information.
<b>Pregnancy Information</b>	Enter pregnancy status of patient.
<b>Signs and Symptoms</b>	Select appropriate responses for signs and symptoms and indicate their onset/resolution dates. Complete clinical symptoms are important for ensuring appropriate case classification. Enter additional symptoms by using the Add/Edit Signs and Symptoms.
<b>Laboratory and Diagnostic Information</b>	The ELISA assay is not an acceptable assay for probable/confirmed case definition. If the positive test result is a IgM ELISA, recommend the physician order a standard tube agglutination test (SAT) or <i>Brucella</i> microagglutination test (BMAT). This assay is available at many commercial laboratories.
<b>Medical Facility and Provider Information</b>	Enter contact information for healthcare provider. If hospitalized, enter medical facility, admission and discharge dates, and medical record number.
<b>Risk Factors and Additional Requirements</b>	Complete this section in its entirety.
<b>Industry &amp; Occupation Information</b>	Enter employment information including industry and occupation
<b>Epidemiology Information</b>	Select route of transmission, setting, and method of import.
<b>Patient Relation Information</b>	If patient is under the age of 18, enter parent or guardian information.



CDRSS Screen	Required Information
Treatment information	Enter all treatment provided to patient for brucellosis. Enter name, dates and dosage.
Case Comments	Enter any additional information from the Investigational Worksheet that does not have a specific entry field in CDRSS

**C. Other Reporting/Investigation Issues**

Brucellosis is an immediately reportable disease. Initial case information should be entered within 2 hours of notification with all criteria details entered within 6 hours. Investigational worksheets DO NOT need to be mailed to IZDP if mandatory fields in CDRSS are completed and exposure notes are entered. Once an LHD completes its investigation and assigns a report status of “LHD CLOSED,” NJDOH will review the case, and when it is complete will change the report status to “DHSS APPROVED.” At this time, the case will be locked for editing. If additional information is received after a case has been placed in “DHSS APPROVED,” an LHD will need to contact NJDOH to reopen the case. This should be done only if the additional information changes the case status of the report.

**CONTROLLING FURTHER SPREAD**

**A. Isolation and Quarantine Requirements**

None. Person-to-person transmission of brucellosis is extremely rare.

**B. Protection of Contacts of a Case**

There is no immunization or prophylaxis for contacts of brucellosis cases. Proper personal protective equipment (PPE) should be utilized to prevent contact with drainage or secretions if the case has draining lesions. Contaminated surfaces shall be immediately disinfected.

**C. Managing Special Situations**

**Exposure of a Laboratory Worker**

Brucellosis is one of the most common laboratory-acquired infections, primarily because aerosolization of the specimen is a mechanism of transmission in this setting. Consult with IZDP at 609-826-5964 or 4872 if laboratory workers may have been exposed to brucellosis (e.g., did not use the protection of a currently certified laminar air flow/biosafety hood). Laboratory workers in the room with the *Brucella* isolate will be assessed for exposure. IZDP staff will assist in identification and evaluation of laboratory workers of exposures.

**All workers in the laboratory while the specimen was handled** will be evaluated and categorized as not at risk, low risk or high risk for exposure.

Low and high risk individuals may be serologically monitored, monitored for development of disease, and/or receive post exposure prophylaxis.

**All *Brucella*-exposed workers** will be evaluated and categorized as not at risk, low risk or high risk for exposure.

Low and high risk individuals may be serologically monitored, monitored for development of disease, and/or receive post exposure prophylaxis

## D. Preventive Measures

### Contaminated Food or Milk

If a patient is suspected to have been infected through the consumption of milk or other food products, the NJDOH Food and Drug Safety Program will work with IZDP to identify the implicated food item(s) and remove it from the environment.

### Preventive Measures/Education

To prevent *Brucella* exposures,:

- Do not consume milk products made from raw (unpasteurized) milk (e.g., cheeses and yogurt imported from countries with a high incident of brucellosis).
- Workers at occupational risk (such as farmers, slaughterhouse workers, meat processors, or butchers) should reduce exposure to *Brucella*, by using proper PPE (e.g., gloves, clothing, eye protection), ventilating slaughterhouses and handling carcasses carefully. Placentas, fetuses, and/or discharges from animals should be carefully handled and be disposed of properly. Contaminated areas should be properly disinfected. For more information, refer to the United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) website at <http://www.aphis.usda.gov/>.
- Hunters should use proper PPE (e.g., gloves, clothing, eye protection), when dressing wild pigs and burying the remains.
- If domestic livestock are implicated as a source of exposure, IZDP will consult with the New Jersey Department of Agriculture to identify and control exposure to any potentially infected animals.

## OUTBREAK SITUATIONS

If the number of reported cases in an institutional setting or jurisdiction is higher than usual for the time of year, an outbreak might be occurring. In accordance with N.J.A.C. 8:57, IZDP should be contacted immediately at 609-826-4872. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases.

If more than one case of brucellosis is reported or suspected in a city or town, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle, such as unpasteurized milk products or infected animals, should be sought, and applicable preventive or control measures should be instituted (e.g., removing an implicated food item from the environment).

**NOTE: If a bioterrorist event is suspected, NJDOH and other response authorities will work closely with local health officers and provide instructions/information on how to proceed.**

## Additional Information

A Brucellosis Fact Sheet and Brucellosis Investigation Worksheet is available at the NJDOH Web site at <http://www.nj.gov/health/cd/topics/brucellosis.shtml>.

## References

American Academy of Pediatrics. *2012 Red Book: Report of the Committee on Infectious Diseases*. Pickering LK, ed. 25th ed. Elk Grove City, IL: American Academy of Pediatrics; 2012.

Centers for Disease Control and Prevention. *Brucellosis*. Updated May 2, 2024. Available at: <https://www.cdc.gov/brucellosis/>. Accessed March 2025.

Centers for Disease Control and Prevention. Case definitions for infectious conditions under public health surveillance. *MMWR Morb Mortal Wkly Rep*. 1997;46:RR-10.

Centers for Disease Control and Prevention. *CDC Yellow Book 2024. Brucellosis*. Updated May 2023. Available at: <https://wwwnc.cdc.gov/travel/yellowbook/2024/infections-diseases/brucellosis>. Accessed July 2024.

Pan American Health Organization. *Zoonoses and Communicable Diseases Common to Man and Animals: Bacterioses and Mycoses* 3<sup>rd</sup> ed. Washington, D.C.:PAHO, 2001.