

Brucellosis

REPORT IMMEDIATELY

(Also known as Bangs Disease, Undulant Fever,
Malta Fever, and Mediterranean Fever)



Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

Brucellosis is caused by bacteria of the genus *Brucella*. The species of *Brucella* that may infect humans are *B. abortus*, *B. melitensis*, *B. suis*, and rarely, *B. canis*.

B. Clinical Description

Brucellosis is a systemic disease with acute or insidious onset characterized by sustained, intermittent, or irregular fever of variable duration. Symptoms include headache, weakness, chills, profuse sweating, joint aches, depression, weight loss, and generalized aching. Localized and chronic localized infections of organs (including the liver and spleen) can occur. Complications affecting the bones and joints are common (they occur in 20–60% of cases), with sacroiliitis occurring most frequently. Involvement of the genitourinary system, including orchitis and epididymitis, occurs in up to 20% of cases in males. Neurologic symptoms can occur in up to 5% of cases. The disease may last for days, months, or occasionally longer, if inadequately treated. Most cases recover, but some individuals develop significant disabilities. Relapses, involving part of or all of the original syndrome, are not uncommon. Asymptomatic infections can occur. The case-fatality rate of untreated brucellosis is <2%; however, death may result from endocarditis caused by *B. melitensis*.

C. Vectors and Reservoirs

Cattle, swine, goats, and sheep are the most common reservoirs. However, brucellosis eradication programs have greatly reduced the prevalence of the disease in livestock in the U.S. Brucellosis was last identified in cattle in Massachusetts in the mid-1980s. Bison, elk, caribou, and some species of deer may also harbor *Brucella* sp. *B. canis* is an occasional problem in laboratory dog colonies and kennels; a small percentage of pet dogs and a higher proportion of stray dogs have *B. canis* antibody titers, and coyotes have been found to be infected as well.

D. Modes of Transmission

Brucellosis is spread to humans by direct contact with living or dead infected animals and their carcasses or secretions (including their tissues, blood, urine, vaginal discharges, aborted fetuses, and especially, placentas). Infection is transmitted by inoculation through non-intact skin or through direct contact with mucosal surfaces. It may also be spread through ingestion of raw milk and dairy products (e.g., unpasteurized cheese) from infected animals. Airborne transmission may occur through inhalation of contaminated aerosols (e.g., in laboratory settings). Persons may also be infected through accidental inoculation with live vaccine-strain *Brucella* used for livestock. Person-to-person spread is extremely rare, although it has been reported to occur through bone marrow transplantation.

E. Incubation period

The incubation period for brucellosis is highly variable, ranging from 5–60 days; illness most commonly occurs about 1 month after exposure.

F. Period of Communicability or Infectious Period

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

G. Epidemiology

There is worldwide distribution of brucellosis. It is more common in farmers, ranchers, veterinarians, and other people who work directly with animals. It can also be found in people who work in laboratories and slaughterhouses, or as meat inspectors. Sporadic cases and outbreaks may occur among consumers of raw (unpasteurized) milk and milk products, especially soft cheeses. Less than 10% of reported cases occur in children under 19 years of age. Fewer than 120 cases per year are reported in the U.S. Most cases worldwide may be unrecognized and underreported.

H. Bioterrorist Potential

Brucella species are listed by the Centers for Disease Control and Prevention (CDC) as Category B bioterrorist agents. If acquired and properly disseminated, *Brucella* could cause a serious public health challenge.



Section 2:

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any of the following:

- ◆ Any suspicion of brucellosis called to your attention by a health care provider;
- ◆ Any positive laboratory result pertaining to brucellosis; and
- ◆ Any suspected exposure to *Brucella* that may be bioterrorist in nature.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Bioterrorism Response Laboratory (BRL) provides testing services for clinical specimens of *Brucella*. Specimens are tested by serology (using serum samples) and/or culture. Acceptable culture specimens include blood cultures, bone marrow, spleen, liver, abscess aspirates, and swabs taken from lesions. Laboratories can also submit isolates for identification, confirmatory testing, and speciation. In addition, the BRL requests submission of all *Brucella* isolates for further testing for disease surveillance purposes.

For more information on testing, call the BRL anytime at (617) 590-6390. The laboratory must be notified prior to specimen submission.



Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION**A. Purpose of Surveillance and Reporting**

- ◆ To help identify the source of infection (e.g., an infected animal, a contaminated unpasteurized dairy product), and to prevent further transmission from the source.
- ◆ To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Health Care Provider Reporting Requirements

Brucellosis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of brucellosis, as defined by the reporting criteria in Section 2A, or any suspected exposure to *Brucella* that may be bioterrorist in nature. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Brucella* sp. infection shall immediately report such evidence of infection, directly by phone, to the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

For questions related to brucellosis in animals or to report a suspect case of brucellosis in an animal, contact the Massachusetts Department of Agricultural Resources (MDAR), Division of Animal Health, Dairy Services, and Biosecurity (DAH) at (617) 626-1795 or fax the information to the DAH at (617) 626-1850.

C. Local Board of Health (LBOH) Reporting and Follow-up Responsibilities*Reporting Requirements*

MDPH regulations (*105 CMR 300.000*) stipulate that brucellosis is reportable to the LBOH and that each LBOH must report any case of brucellosis or suspect case of brucellosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Brucellosis Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Under *105 CMR 300.140, Reporting of Animal Diseases with Zoonotic Potential by Veterinarians*, any veterinarian or LBOH with knowledge of an animal disease potentially transmissible to humans must also report the disease to the DAH.

Case Investigation

If a LBOH learns of a suspect or confirmed case of brucellosis or any suspected exposure that may be the result of bioterrorism, it should call the MDPH Division of Epidemiology and Immunization immediately, any time of the day or night, at (617) 983-6800 or (888) 658-2850.

1. Case investigation of brucellosis in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization. If bioterrorism is suspected, the MDPH and other response agencies will work closely with the LBOH and will provide instructions/information on how to proceed.
2. Following immediate notification of the MDPH, a LBOH may be asked to assist in investigating cases that live within their community, including gathering the following:
 - a. The case's name, age, address, phone number, status (e.g., hospitalized, at home, deceased), and parent/guardian information, if applicable.
 - b. The name and phone number of the hospital where the case is or was hospitalized.
 - c. The name and phone number of the case's attending physician.
 - d. The name and phone number of the infection control official at the hospital.
 - e. If the patient was seen by a health care provider before hospitalization or was seen at more than one hospital, these names and phone numbers.
3. The LBOH may be asked to assist with contacting health care providers to obtain serum samples from cases for submission to the SLI for confirmatory testing. In order to confirm the diagnosis of acute brucellosis, it may be necessary to ask the health care provider to also submit a convalescent serum sample taken at least two weeks after the initial sample.
4. Following immediate notification of the MDPH, LBOH may be asked to assist in completing a MDPH *Brucellosis Case Report Form* (found at the end of this chapter). Most of the information required on the form can be obtained from the health care provider or from the medical record. Use the following guidelines to assist in completing the form:
 - a. Be sure to record the patient's demographic and clinical information accurately.
 - b. Complete diagnostic test information as requested on the form.
 - c. Exposure history: Use the incubation period range for *Brucella* infection (up to 60 days). Specifically, focus on the period during the 60 days prior to the case's onset date for the following exposures:
 - i. Animal contact.
 - ii. Occupation (e.g., farmer, laboratory worker).
 - iii. Exposure to the *Brucella* vaccine (especially for farmers and veterinarians).
 - iv. Food consumption history (use of raw milk or milk products). Use the second side of the form to record this information.
 - v. Travel history.

5. If you suspect that the case became infected through the consumption of milk (or other food) purchased in the U.S., use the MDPH *Foodborne Illness Complaint Worksheet* (found at the end of this chapter) to facilitate recording additional information. It is requested that the LBOH fax or mail this worksheet to the MDPH Center for Environmental Health, Food Protection Program (FPP); see top of worksheet for fax number and address. This information is entered into a database to help link complaints from neighboring towns, thus helping to identify a foodborne illness outbreak. *Note: This worksheet does not replace the MDPH Brucellosis Case Report Form.*
6. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the case report form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
7. After completing the case report form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

8. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



Section 4:

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Follow standard precautions and contact precautions if the case has draining lesions, with disinfection of purulent discharges. Licensed *Brucella* vaccines are currently available only for livestock.

C. Managing Special Situations

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If more than one case of brucellosis is reported or suspected in your city/town or if you suspect an outbreak, investigate to determine the source of infection and the 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 consumption). Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

Note: Refer to the MDPH Foodborne Illness Investigation and Control Reference Manual for comprehensive information on investigating foodborne illness complaints and outbreaks. Copies of this manual have been made available to the LBOH. It can also be located on the MDPH website in PDF format at www.mass.gov/dph/fpp/refman.htm. For the most recent changes to the Massachusetts Food Code, contact the FPP at (617) 983-6712 or through the MDPH website at www.mass.gov/dph/fpp.

If bioterrorism is suspected, the MDPH and other response agencies will work closely with LBOH and will provide instructions and information on how to proceed.

Exposure of a Laboratory Worker

Laboratory workers exposed to *Brucella* (e.g., workers who did not use an appropriate level of biosafety) should consult with their health care providers and the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 regarding appropriate follow-up.

D. Preventive Measures

Environmental Measures

Implicated food items must be removed from the environment. Decisions about removing food can be made in consultation with the FPP by calling (617) 983-6712, or the MDPH Division of Epidemiology and Immunization by calling (617) 983-6800 or (888) 658-2850.

Note: The role of the FPP is to establish policy and to provide technical assistance with the environmental investigation, such as interpreting the Massachusetts Food Code, conducting a Hazard Analysis and Critical Control Point (HACCP) risk assessment, initiating enforcement actions, and collecting food samples.

Preventive Measures/Education

To prevent future exposures, advise the following:

- ◆ Do not consume raw (unpasteurized) milk or milk products (including imported cheeses).
- ◆ Workers at occupational risk (e.g., farmers, slaughterhouse workers, meat processors, or butchers) should know the symptoms of the disease, the modes of transmission, and the risks of handling infected animal carcasses and products. They should know the proper way to reduce exposure, such as ventilating slaughterhouses and handling carcasses carefully.
- ◆ Hunters should use barrier protection (e.g., gloves or clothing) when dressing wild pigs and burying the remains.
- ◆ Anyone who handles or disposes of placentas, fetuses, and/or discharges from an animal should use care and should disinfect contaminated areas.

Local officials and farmers should search for infection among livestock and should eliminate infected animals. In areas of high prevalence, immunization of livestock may be appropriate. Ultimate control of human brucellosis relies on eliminating the disease in domestic animal populations.

A Brucellosis Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the “Publications and Statistics” link, and select the “Public Health Fact Sheets” section under “Communicable Disease Control.”



ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for brucellosis. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Clinical Description

An illness characterized by acute or insidious onset of fever, night sweats, undue fatigue, anorexia, weight loss, headache, and arthralgia.

Laboratory Criteria For Diagnosis

- ◆ Isolation of *Brucella* sp. from a clinical specimen;
- ◆ Four-fold or greater rise in *Brucella* agglutination titer between acute- and convalescent-phase serum specimens obtained more than two weeks apart and studied at the same laboratory; or
- ◆ Demonstration by immunofluorescence of *Brucella* sp. in a clinical specimen.

Clinical Description

Probable	A clinically compatible case that is epidemiologically-linked to a confirmed case or that has supportive serology (i.e., <i>Brucella</i> agglutination titer of ≥ 160 in 1 or more serum specimens obtained after onset of symptoms).
Confirmed	A clinically compatible case that is laboratory-confirmed.



REFERENCES

- American Academy of Pediatrics. [Brucellosis.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition*. Elk Grove Village, IL, American Academy of Pediatrics; 2003: 222–224.
- “Brucellosis.” Centers for Disease Control and Prevention. October 6, 2005.
<www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_g.htm>.
- “Brucellosis.” United States Department of Agriculture, Animal and Plant Health Inspection Services.
<www.aphis.usda.gov/vs/nahps/brucellosis/#top>.
- CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. May 2, 1997; 46(RR-10).
- Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington, DC, American Public Health Association, 2004.
- MDPH. *Foodborne Illness Investigation and Control Reference Manual*. Massachusetts Department of Public Health. 1997.
<www.mass.gov/dph/fpp/refman.htm>.
- MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated November 4, 2005.



FORMS & WORKSHEETS

Brucellosis

*(Also known as Bangs Disease, Undulant Fever,
Malta Fever, and Mediterranean Fever)*

Brucellosis

REPORT IMMEDIATELY

(Also known as Bangs Disease, Undulant Fever, Malta Fever,
and Mediterranean Fever)



LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to brucellosis case investigation activities.

LBOH staff should follow these steps when brucellosis is suspected or confirmed in the community. In addition, report any exposure to *Brucella* that may be bioterrorist in nature. For more detailed information, including disease epidemiology, reporting, case investigation and follow-up, refer to the preceding chapter.

- Immediately notify the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any suspect or confirmed case(s) of brucellosis.
- To report a case or suspect case of brucellosis in an animal, contact the Massachusetts Department of Agricultural Resources (MDAR), Division of Animal Health, Dairy Services, and Biosecurity (DAH) at (617) 626-1795, or fax the information to the DAH at (617)626-1850.
- Obtain laboratory confirmation.
- For brucellosis suspected to be the result of milk (or other food) consumption, complete a MDPH *Foodborne Illness Complaint Worksheet* (found at the end of this chapter) and forward to the MDPH Center for Environmental Health, Food Protection Program (FPP) at (617) 983-6712 (phone) or (617) 983-6770 (fax).
- Identify other potentially exposed persons.
- Fill out the case report form (attach laboratory results).
- Send the completed case report form, with attached laboratory reports, to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).