

09-ID-14

Committee: Infectious

Title: Public Health Reporting and National Notification for Brucellosis

I. Statement of the Problem

CSTE position statement 07-EC-02 recognized the need to develop an official list of nationally notifiable conditions and a standardized reporting definition for each condition on the official list. The position statement also specified that each definition had to comply with American Health Information Community recommended standards to support “automated case reporting from electronic health records or other clinical care information systems.” In July 2008, CSTE identified sixty-eight conditions warranting inclusion on the official list, each of which now requires a standardized reporting definition.

II. Background and Justification

*Background*¹

Brucellosis is an infectious disease caused by bacteria of the genus *Brucella*. These bacteria are primarily pathogens of animals. Various *Brucella* species cause disease in sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. Persons become infected by coming in contact with animals or animal products that are contaminated with these bacteria. Infection usually occurs in one of three ways: ingestion of food products contaminated with *Brucella*, direct or indirect exposure of the organism to broken skin or mucous membranes, or inhalation of the organism. The most frequent source of brucellosis for humans is believed to be the consumption of unpasteurized dairy products. Contamination of skin wounds may be a route of infection for persons working in slaughterhouses or meat packing plants or for veterinarians. Hunters may be infected through skin wounds or by accidentally ingesting the bacteria after butchering deer, elk, moose, or wild pigs. Inhalation of *Brucella* organisms is not a common route of infection, but it can be a significant hazard for people in certain occupations, such as those working in laboratories where the organism is cultured. *Brucella* species are highly infectious via aerosols in laboratory environments, and biosafety level 3 precautions are recommended. Rarely, transmission has occurred via organ transplantation, sexual contact, breastfeeding, or transplacentally.

In humans, acute brucellosis can cause a range of influenza-like signs and symptoms that may include fever, night sweats, arthralgia, headache, fatigue, anorexia, myalgia, and weight loss. Backache, abdomen pain, and anorexia are reported less frequently. Later manifestations can include focal organ involvement (endocarditis, orchitis/epididymitis, hepatomegaly,

¹ Much of the material in the background is directly quoted from the CDC’s brucellosis website. See the References for further information on this source.

splenomegaly) as well as arthritis/spondylitis, meningitis, continued recurrent fevers, and fatigue. Brucellosis may rarely cause death, which is usually associated with endocarditis.

Human brucellosis is not very common in the United States, where 100 to 150 cases occur each year. However, brucellosis can be quite common in countries where animal disease control programs have not reduced the prevalence of brucellosis among host species. Areas currently recognized as high risk are the Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), the Middle East, Mexico, South and Central America, the Caribbean, Eastern Europe, Asia, and Africa. Unpasteurized cheeses, sometimes called "village cheeses," from these areas may represent a particular risk for tourists.

There are multiple species of *Brucella* (listed with preferred host): *B. abortus* (cattle), *B. melitensis* (sheep, goats), *B. ovis* (sheep), *B. suis* (feral swine), *B. canis* (dogs), and *B. neotomae* (desert wood rat). *B. abortus*, *melitensis*, and *suis* are known to infect humans. Although *B. canis* can be transmitted to humans from infected dogs, human infection is uncommon.

B. abortus has been almost completely eradicated in the domestic cattle population of the United States. However, wild animal reservoirs remain a potential source of infection for domestic livestock and humans. Bison and elk in Yellowstone National Park and Grand Teton National Park have had documented *B. abortus* infections. *B. suis* is endemic in feral swine in the southeast U.S. and California.

B. melitensis, *B. suis*, and *B. abortus* are classified as Category B select agents due to their potential for large-scale dissemination with resultant illness and death. In the event of potential bioterrorism using *Brucella* species, the respiratory route of exposure will be most likely, although food-borne exposure is also possible.

Justification

Brucellosis meets the following criteria for a nationally notifiable condition, as specified in CSTE position statement 08-EC-02. Depending on circumstances, brucellosis may be **standard** or **urgently** notifiable:

- A majority of state and territorial jurisdictions—or jurisdictions comprising a majority of the US population—have laws or regulations requiring **routine (standard)** reporting of brucellosis to public health authorities.
- CDC requests **immediate (urgent)** notification of brucellosis to federal authorities when multiple cases occur which are temporally or spatially clustered.
- CDC requests **standard** notification of brucellosis to federal authorities for cases that do not meet the above criteria.
- CDC has condition-specific policies and practices concerning the agency's response to, and use of, notifications.

III. Statement of the desired action(s) to be taken

CSTE requests that CDC adopt this standardized reporting definition for brucellosis to facilitate more timely, complete, and standardized local and national reporting of this condition.

IV. Goals of Surveillance

To provide information on the temporal, geographic, and demographic occurrence of brucellosis to facilitate its prevention and control.

V. Methods for Surveillance

Surveillance for brucellosis should use the sources of data and the extent of coverage listed in Table V below.

Table V. Recommended sources of data and extent of coverage for ascertaining cases of brucellosis.

Source of data for case ascertainment	Coverage	
	Population-wide	Sentinel sites
clinician reporting	x	
laboratory reporting	x	
reporting by other entities (e.g., hospitals, veterinarians, pharmacies)	x	
death certificates	x	
hospital discharge or outpatient records	x	
extracts from electronic medical records	x	
telephone survey		
school-based survey		
other _____		

VI. Criteria for Reporting

Reporting refers to the process of healthcare providers or institutions (e.g., clinical laboratories, hospitals) submitting basic information to governmental public health agencies about cases of illness that meet certain reporting requirements or criteria. The purpose of this section is to provide those criteria that should be used by persons or computer algorithms to determine whether a specific illness should be reported.²

² “Person-based” criteria (described below under “A. Narrative”) can be applied by medical care providers and laboratory staff based on clinical judgment and clinical diagnosis. Computer-based criteria (described below under

A. Narrative description of criteria to determine whether a case should be reported to public health authorities

Report any illness to public health authorities that meets any of the following criteria:

1. A person with one or more of the following laboratory findings:
 - 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
2. A person with fever and one or more of the clinical findings listed in Table VI-B; AND the following laboratory finding:
 - *Brucella* total antibody titer of greater than or equal to 160 by standard tube agglutination test (SAT) or *Brucella* microagglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms
 - Detection of *Brucella* DNA in a clinical specimen by PCR assay
3. A person with fever and two or more of the clinical findings listed in Table VI-B AND one or more of the epidemiological risk factors listed in Table VI-B
4. A person whose healthcare record contains a diagnosis of brucellosis
5. A person whose death certificate lists brucellosis as a cause of death or a significant condition contributing to death

Other recommended reporting procedures

- All cases of brucellosis should be reported.
- Reporting should be on-going and routine.
- Timeliness of reporting should follow the state health department's routine schedule.

B. Table of criteria to determine whether a case should be reported to public health authorities

Table VI-B. Proposed Table of criteria to determine whether a case should be reported to public health authorities. Note: The following criteria are proposed for evaluation before general implementation. For purposes of currently implementing reporting the narrative description in VI-A, should be used.

“B. Table”) can be applied using computerized algorithms that operate in electronic health record systems, including computerized records of laboratory test orders and laboratory test results.

Criterion	Reporting			
<i>Clinical Presentation</i>	1	2	3	4/5
Fever		N	N	
night sweats		O	O	
Arthralgia		O	O	
Headache		O	O	
Fatigue		O	O	
Anorexia		O	O	
Myalgia		O	O	
weight loss		O	O	
Endocarditis		O	O	
Orchitis		O	O	
Epididymitis		O	O	
Hepatomegaly		O	O	
Splenomegaly		O	O	
Arthritis		O	O	
Meningitis		O	O	
Spondylitis		O	O	
healthcare record contains a diagnosis of brucellosis				O
death certificate lists brucellosis as a cause of death or a significant condition contributing to death				O
<i>Laboratory findings</i>				
culture and identification of <i>Brucella</i> spp. from clinical specimens	O			
evidence of a fourfold or greater rise in <i>Brucella</i> antibody titer between acute- and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart	O			
<i>Brucella</i> total antibody titer of greater than or equal to 160 by standard tube agglutination test (SAT) or <i>Brucella</i> microagglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms		O		
detection of <i>Brucella</i> DNA in a clinical specimen by PCR assay		O		
<i>Epidemiological risk factors</i>				
working in a clinical or microbiological laboratory processing samples that could potentially contain <i>Brucella</i>			O	
consumption of unpasteurized dairy products or undercooked meat contaminated with <i>Brucella</i>			O	
involvement with slaughtering, dressing, or butchering of potentially infected animals			O	

Criterion	Reporting		
Epidemiologic link to a confirmed human or animal case of brucellosis			O
direct or indirect exposure to an environment or food products that were linked to a confirmed case of brucellosis			O
travel to a <i>Brucella</i> -endemic country			O

Notes:

N =All “N” criteria in the same column—in conjunction with at least one of any “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—are required to report a case.

O =At least one of any “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—in conjunction with all other “N” criteria in the same column—is required to report a case.

C. Disease Specific Data Elements:

Disease-specific data elements to be included in the initial report are listed below.

Risk Factors

Contact with animal or animal products

- Animal species
- Exposure type (hunting, skinning, contact with birthing animal)
- Product type
- Exposure date

Consumption of unpasteurized dairy (milk or milk products)

- Animal species
- Product type
- Exposure date
- Exposure location

Travel Information

- Date(s) of Travel
- Location(s) of travel

Occupational Risk Factors

Veterinarian/animal technician

Brucella vaccine exposure

- Vaccine type (S19, RB51, Rev1)

- PEP received ; with what antimicrobials

Microbiological laboratory work

- Exposure source (specimen, isolate)
-
- PEP received ; with what antimicrobials
-

VII. Case Definition for Case Classification

A. Narrative description of criteria to determine whether a case should be classified as confirmed or probable (presumptive) is provided:

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* microagglutination 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

Confirmed:

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

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

B. Classification Tables

Table VII-B lists the criteria that must be met for a case to be classified as confirmed or probable (presumptive).

Table VII-B. Proposed table of criteria to determine whether a case is classified. Note: The following criteria are proposed for evaluation before general implementation. For purposes of current notification, the narrative description in VII-A, should be used.

Criterion	Case Definition		
	Confirmed	Probable	
<i>Clinical Presentation</i>			
fever	N	N	N
night sweats	O	O	O
arthralgia	O	O	O
headache	O	O	O
fatigue	O	O	O
anorexia	O	O	O
myalgia	O	O	O
weight loss	O	O	O
endocarditis	O	O	O
orchitis	O	O	O
epididymitis	O	O	O
hepatomegaly	O	O	O
splenomegaly	O	O	O
arthritis	O	O	O
meningitis	O	O	O
spondylitis	O	O	O
<i>Laboratory findings</i>			
culture and identification of <i>Brucella</i> spp. from clinical specimens	O		
evidence of a fourfold or greater rise in <i>Brucella</i> antibody titer between acute- and convalescent-phase serum specimens obtained greater than or equal to 2 weeks apart	O		
<i>Brucella</i> total antibody titer of greater than or equal to 160 by standard tube agglutination test (SAT) or <i>Brucella</i> microagglutination test (BMAT) in one or more serum specimens obtained after onset of symptoms			O
Detection of <i>Brucella</i> DNA in a clinical specimen by PCR assay			O

Criterion	Case Definition		
	Confirmed	Probable	
<i>Epidemiological risk factors</i>			
epidemiologically linked to a confirmed human or animal brucellosis case		O	

Notes:

N = All “N” criteria in the same column—in conjunction with at least one of any “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—are required to classify a case.

O = At least one of any “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—in conjunction with all other “N” criteria in the same column—is required to classify a case.

VIII. Period of Surveillance

Surveillance should be ongoing.

IX. Data sharing/release and print criteria

Expectations for sharing case data

- CDC will submit aggregate national counts of reports of cases of brucellosis to WHO **annually**.
- Notification to CDC of probable and confirmed cases of brucellosis is recommended.

Limitations on releasing case data

- Release of any identifying data to any entity other than to another state’s or territory’s health agency or to the CDC requires a signed data sharing agreement using a format pre-approved by the state or territorial health agency. (Refer to the *CDC-CSTE Intergovernmental Data Release Guidelines Working Group Report: CDC-ATSDR Data Release Guidelines and Procedures for Re-release of State-Provided Data* for further information.)

Restrictions on publishing case data

- CDC will only publish data on **probable** and **confirmed** cases of brucellosis. Provisional data will not be used until verification procedures are complete.

Data reported through the National Notifiable Diseases Surveillance System (NNDSS) is summarized weekly in the MMWR Tables and yearly in the Summary of Notifiable Diseases. Cumulative data will be compared to reports received by DFBMD through multiple mechanisms, including phone call inquiries and reports from other groups internal to CDC, to evaluate the completeness of notification.

Data are published in weekly and annual MWMR Summary Reports. Data reviewed over multiple years may be presented, if it is of public health significance. In addition to these reports, the frequency of information distributed to states and territories depends on the current

epidemiologic situation. Unusual situations may increase the need for communication. For example, an MMWR was prepared in 2008 to disseminate information regarding laboratory exposures to *Brucella*.

Summary de-identified case data is reported nationally in weekly reports and the annual MMWR Surveillance Summary report for all confirmed cases. Cases are verified at the state before notification. Some personal identifying and state information (e.g. FIPS code, age, sex, date of report, and date of diagnosis) are necessary to differentiate cases. Confidentiality and security precautions are maintained for all potential identifiers.

Evidence will be synthesized by informal stakeholder input and peer-reviewed before dissemination. Different scenarios may result in different releases of data. Aggregate data may potentially be shared with Health and Human Services (HHS) partners, the World Organization of Animal Health (OIE), and the World Health Organization (WHO), with all necessary precautions taken to protect patient confidentiality.

X. References

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XI. Coordination:

Agencies for Response:

- (1) Thomas R. Frieden, MD, MPH
Director
Centers for Disease Control and Prevention
1600 Clifton Road, NE
Atlanta GA 30333
(404) 639-7000
txf2@cdc.gov

XII. Submitting Author:

- (1) James Kazmierczak, State Public Health Veterinarian
Wisconsin Division of Public Health
1 W. Wilson Street, Room 318
Madison, WI 53703
(608)266-2154
james.kazmierczak@wi.gov

Co-Authors:

- (1) Christina T. Egan, Director
Biodefense Laboratory
Wadsworth Center
New York State Department of Health
120 New Scotland Ave.
Albany, NY 12208
(518)473-6908
eganc@wadsworth.org
- (2) Associate Member
Harry F. Hull, Medical Epidemiologist
HF Hull & Associates, LLC

1140 St. Dennis Court
Saint Paul, MN 55116
(651) 695-8114
hullhf@msn.com

- (3) Associate Member
Cecil Lynch, Medical Informaticist
OntoReason
7292 Shady Woods Circle
Midvale, UT 84047
(916) 412.5504
clynch@ontoreason.com

- (4) Associate Member
R. Gibson Parrish, Medical Epidemiologist
P.O. Box 197
480 Bayley Hazen Road
Peacham, VT 05862
(802) 592-3357
gib.parrish@gmail.com