# Brucellosis Investigation Guideline

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Attachments can be accessed through the Adobe Reader’s navigation panel for attachments. Throughout this document attachment links are indicated by this symbol: when the link is activated in Adobe Reader it will open the attachments navigation panel. The link may not work when using PDF readers other than Standard Adobe Reader.
## Revision History:

<table>
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<tr>
<th>Date</th>
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<tr>
<td>07/2012</td>
<td>01/2010</td>
<td>Removed references to KS-EDSS. Added notification section. Updated web-links.</td>
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<td>05/2018</td>
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<td>Notification section modified with the requirements of revised regulations. Updated contact information for the Kansas Division of Animal Health. Updated Laboratory Exposure guidance and web links.</td>
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<td>06/10/2021</td>
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<td>Updated Laboratory Analysis with more information on services through KHEL, description of commercially available tests, and additional notes on safe lab practices, select agents, and exposures. Added additional information on notifications to Kansas Division of Animal Health.</td>
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CASE DEFINITION (CDC 2010)

Clinical Description for Public Health Surveillance:
• 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 Case Classification:
• Definitive:
  o Culture and identification of Brucella spp. from clinical specimens
  o 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:
  o 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
  o 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:
  o Epidemiologically linked to a confirmed human or animal brucellosis case
  o Presumptive laboratory evidence, but without definitive laboratory evidence, of *Brucella* infection
• **Suspect** (Internal KDHE Definition for Data Management Purposes): Lab results only without clinical information. [Follow-up required by local health department or record reason for no clinical information in notes]
LABORATORY ANALYSIS

The State Public Health Laboratory (KHEL) will assist with the identification presumptive *Brucella* isolates.

- Must notify KHEL prior to submission at kdhe.SelectAgent@ks.gov.
- Submission requirement: pure colonies (<48 hours old) and in appropriate tubed media. Seal tubed media with parafilm or another barrier film.
- Contact the KHEL for further instructions at kdhe.SelectAgent@ks.gov.

Diagnostic tests for *Brucella* are available commercially; but, if testing is needed through CDC, contact the KDHE Epidemiology program (1-877-427-7317).

- Submissions to CDC are handled by the Zoonoses and Select Agent Laboratory (ZSAL) in the Bacterial Special Pathogens Branch (BSPB).

A brief description of brucellosis testing follows; for additional information on laboratory diagnosis of human Brucellosis refer to: Clinicians | Brucellosis | CDC and Laboratory Diagnosis of Human Brucellosis (nih.gov)

1) **Culture Testing:** confirms a brucellosis diagnosis.

   a. **IMPORTANT:** Notify the testing laboratory that sample may contain *Brucella* spp. to allow appropriate precautions and special culture techniques to be used
   
   b. Appropriate specimens: blood, bone marrow, CSF, spleen, liver, body fluids, and abscess aspirates.
   
   c. Automated blood culture systems can enable detection of acute case in 5- to 7- days, but longer incubation and blind sub cultures may be needed for patients who have been experiencing prolonged disease or a focal infection.
   
   d. Culture from specimens not tested in blood culture systems may require up to 21 days of incubation.

2) **Serological testing:**

   ![Image of antibody response](https://www.cdc.gov/brucellosis/pdf/brucellosis-reference-guide.pdf)

   a. Acute and convalescent serologies collected 2-4 weeks apart demonstrating a fourfold rise in antibodies to *Brucella* are diagnostic.
   
   b. Single antibody results lack specificity and are difficult to interpret in persons repeatedly exposed to *Brucella* organisms.
   
   c. Refer to Laboratory Diagnosis of Human Brucellosis (nih.gov) Table 3 for a listing and the uses of various serodiagnostic tests.
3) **PCR**: Limited availability commercially
   a. Primarily for environmental samples and suspect bioterrorism agents.
   b. While specific, sensitive, safe and rapid, there can be a long-term persistence of positive PCR results in apparently fully recovered patients resulting in unclear clinical significance.
   c. Also, additional interlaboratory reproducibility of different PCR tests needs to be demonstrated with this methodology.

**Additional Notes on Brucellosis Testing:**

1) **Alert** the laboratory personnel when Brucella is suspected; the laboratory needs to follow specific biosafety level (BSL) precautions.
   a. When brucellosis is suspected in a patient, clinicians should note “suspect or rule out brucellosis” on the laboratory submission.
   b. Cultures in which *Brucella Sp.* is suspected should be examined in a biological safety cabinet using BSL-3 or BSL-2 with BSL-3 precautions.
   c. Do not use automated or kit-based systems for identification or susceptibility testing.
   d. Because this organism may be detected in blood cultures, the same precautions should be used when working up positive blood cultures.

2) **Select Agents**:
   a. *B. suis*, *B. melitensis*, and *B. abortus* isolates are considered select agents and require a report to the CDC’s Division of Select Agents and Toxins (DSAT).
   b. Any laboratory handling any specimens or isolates must use appropriate forms to report the identification of the select agent and of the final disposition of that agent and specimens, as well as any seizure of the select agents or toxins by federal law enforcement agencies.
   c. Refer to: [www.selectagents.gov/Forms.html](http://www.selectagents.gov/Forms.html)

3) **Laboratory Exposure** or the release of Brucellosis agent outside of the primary biocontainment areas will require the following actions:
   a. **Laboratory exposure investigation** with the assessment of exposure risk, use of PEP, and monitoring.
   b. For *B. suis*, *B. melitensis*, and *B. abortus*, reporting the CDC’s Division of Select Agents and Toxins (Form 3): [www.selectagents.gov/Forms.html](http://www.selectagents.gov/Forms.html)

4) No serological monitoring is available for exposure to RB51 (vaccine strain of *Brucella abortus*) or to *B. canis*. The monitoring of serum specimens in individuals exposed to RB51 or *B. canis* will not provide a useful indicator of infection.
EPIDEMIOLOGY

Brucellosis is a zoonotic disease; humans are accidental hosts. It is most often seen in farmers, ranchers, veterinarians, and others who work directly with animals. Employees in certain types of laboratories, slaughterhouses and meat inspectors may also be infected. Sporadic cases and outbreaks occur among consumers of unpasteurized milk and milk products, especially soft cheeses. Brucellosis is not common in the United States; 100 to 200 cases occur each year, but brucellosis can be very common in countries where animal disease control programs have not reduced the amount of disease among animals. Kansas is considered a Brucellosis Class Free State (B. abortus in livestock) since July 1, 1999. For the brucellosis status of other states, refer to the USDA-APHIS monthly reports at USDA APHIS | TB Brucellosis Monthly Summary Reports and Affected Herd Maps.

DISEASE OVERVIEW

A. Agent:
Brucellosis is caused by the small, nonmotile, gram-negative coccobacillus. Several Brucella species infect humans; usually B. abortus (cattle, bison, elk), B. melitensis, B. ovis (sheep, and goats) and B. suis (pigs); rarely B. canis (dogs).

B. Clinical Description:
Acute or insidious onset with fever, headache, weakness, sweating, chills, arthralgia, depression, weight loss and generalized aching. Relapses are common in untreated persons. Lympademia, splenomegaly and hepatomegaly are common but jaundice is rare. Symptoms may last from weeks to years and diagnosis is often difficult. Fatalities are rare.

C. Reservoirs:
Reservoirs include sheep, cattle, swine, and goats. Bison, elk, caribou, and deer may also harbor Brucella spp. B. canis is an occasional problem associated with laboratories and dog kennels.

D. Mode(s) of Transmission:
Transmission occurs through direct contact with infected animals and/or tissues including: blood, urine, vaginal discharges, aborted fetuses, and placentas. It may also be transmitted through consumption of unpasteurized milk and/or dairy products from infected animals. Airborne transmission may occur through inhalation of aerosols in lab settings and may also occur through accidental self-inoculation of brucellosis vaccine. Human-to-human transmission is rare, but congenital brucellosis has been reported, and infected mothers may transmit to infants through breastfeeding.

E. Incubation Period:
Variable incubation period, ranging from 5-60 days but may be several months; illness most commonly occurs about 1 month after exposure.

F. Period of Communicability:
Person-to-person transmission is rare. Animals may be infectious for years.

G. Susceptibility and Resistance:
Most people are susceptible; duration of acquired immunity is uncertain.
H. Treatment:
Generally, for non-pregnant adults, the antibiotics doxycycline (or tetracycline) and rifampin are recommended in combination for a minimum of 6-8 weeks. Refer to the Red book for treatment recommendations or the CDC Brucellosis Reference Guide. For infections or exposures involving RB51: RB51 is resistant to rifampin in vitro, and therefore this drug should not be used for PEP or treatment courses.

I. Vaccine:
No human vaccine is available. Vaccines are available for cattle and bison.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES
Suspected cases of Brucellosis shall be reported within 24 hours, except if the reporting period ends on a weekend or state-approved holiday, the report shall be made by 5:00 p.m. on the next business day after the 24-hour period:
1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below) and, when suspect Brucella sp. are isolated in bacterial culture, laboratories should follow their select agent protocols, including proper notifications to the appropriate agencies.

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

The suspicion or identification of brucellosis in any domestic animal in Kansas should be immediately reported to the Kansas livestock commissioner (K.S.A. 47-622; K.A.R. 9-27-1) via the Kansas Department of Agriculture (KDA) Division of Animal Health.

Kansas Division of Animal Health
Phone: 785-564-6601

Further responsibilities of state and local health departments to the CDC:
As a nationally notifiable condition, a confirmed brucellosis cases require a STANDARD report to the Center of Disease Control and Prevention (CDC).
But multiple brucellosis cases that are temporally/spatially clustered require an IMMEDIATE, URGENT report to the Center of Disease Control and Prevention (CDC).
- Local public health jurisdiction will report information requested on the disease reporting forms within 3 days of receiving a notification on a report.
- KDHE-BEPHI will file an electronic case report the next regularly scheduled electronic transmission for single brucellosis cases.
- If multiple, probable or confirmed brucellosis cases are identified that are temporally/spatially clustered the KDHE epidemiologist will call the CDC EOC at 770-488-7100 within 24 hours of identifying the cluster.
- Laboratories must remember B. suis, B. melitensis, and B. abortus isolates are considered select agents and require a report to the CDC’s Division of Select Agents and Toxins (DSAT).
INVESTIGATOR RESPONSIBILITIES

1) **Report** all confirmed, probable and suspect cases to the KDHE-BEPHI.
2) Contact medical provider to collect additional information and confirm diagnosis using current case definition.
   - Collect all information requested in Step 1) of case investigation.
   - Ensure that case/proxy is aware of the diagnosis.
3) Continue **case investigation** to identify potential source of infection.
   - Initiate the case investigation within 1 day of notification of a report.
   - Complete the investigation within 3 days of the notification.
4) Conduct **contact investigation** to identify additional cases.
5) Identify whether the source of infection is major public health concern.
6) **Educate** on the **Environmental** measures to prevent disease.
7) **Record** data, collected during the investigation, in the KS EpiTrax system under the data’s associated [tab] in the case morbidity report (CMR).
   - If needed, assist with the completion of any additional questionnaires.
8) Use the notification letter(s) and the disease **fact sheet**, as appropriate.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

**Case Investigation**

1) Contact the medical provider who ordered testing of the case and obtain the following information. (This includes medical records for hospitalized patients.)
   - Collect case’s demographics and contacting information (address, birth date, gender, race/ethnicity, primary language, and phone number(s))
   - Record onset date (approximate if exact date is not known)
   - Record hospitalizations: location and duration of stay
   - Record outcomes: survived or date of death
     – With death investigation, identify if autopsy was performed.
   - Obtain clinical information on symptoms and signs.
   - Examine the laboratory testing that was done: fax any results that have not been reported to the state; determine with BEPHI staff if additional testing should occur at a reference laboratory. If needed, assist in the coordination for additional testing.

2) Interview the case or proxy to determine source and risk factors; focus on incubation period 6-month incubation period prior to illness onset.
   - Occupation and job duties; especially occupations involving Laboratory worker, farmer, dairymen, slaughterhouse worker, butcher, persons handling animals and animal by-products
   - Travel history, dates and places during the incubation period.
     – Include travel history to other counties, states or countries.
     – Record places and dates the case visited.
     – Make note of any travel to brucellosis endemic areas (i.e., the Mediterranean Basin, South and Central America, Eastern Europe, Asia, Africa, Caribbean and Middle East).
• Use of unpasteurized milk, other dairy or imported foods, especially cheese.
• Contact with potentially infected animals or their tissues, particularly postpartum fluid or tissues;
  – Potential contact with cattle, swine, goats, sheep, horses, and dogs
  – Hunting or other outdoor activities.
  – Parenteral or mucous membrane Brucella vaccine exposure.

3) Examining the epidemiological data, record where the infection was most likely imported from. (Indigenous or out-of-county, state, or U.S.)

4) Investigate epi-links among cases (clusters, household, co-workers, etc).
• For suspected Outbreak to Managing Special Situations section.

Contact Investigation

1) If a likely source is found, identify other persons who may have had similar exposures (e.g., family members, co-workers).
2) If the likely source could be a domestic animal located in Kansas, immediate notification must occur to the Kansas Livestock Commissioner.
3) Examine all potential exposures based on possible source and potential modes of transmission, including inoculations, sprays into eyes, nose or mouth, or direct skin contact with substances containing Brucella spp.
4) Identify persons who participated with the case in any of the at-risk activities and contact them to identify if they are experiencing any symptoms.
5) All laboratories handling specimens with confirmed Brucella are investigated to identify possible contacts to Brucella isolates.
• Classify all exposures based on exposure risk:
  o High-risk exposure: Performing a specifically implicated practice such as sniffing bacteriological cultures, manipulating cultures while on an open bench, or mouth pipetting; being within 5 feet of work with cultures on an open bench, or being present in the lab during an aerosol-generating event.
  o Low-risk exposure: In lab at time of manipulation on an open bench but no other high-risk exposures.
  o Refer to the CDC Brucellosis Reference Guide Table 4 for additional instructions on classifying exposure risks.
• Additional guidance for laboratory exposure is in Managing Special Situations.
6) ONLY if a risk of transmission exists because of high risk of exposure, create a line listing of contacts at-risk of developing disease. [Contact]

Isolation, Work and Daycare Restrictions

1) Hospitals: In addition to standard precautions, contact precautions for patients with draining wounds.
2) No restrictions are indicated for outpatient management.

Case Management

1) Follow-up if case had not yet recovered, since last contact.
2) Report any changes in case status (i.e. death, recovered).
Contact Management

1) Symptomatic acquaintances, household members, associates, or co-workers should be strongly urged to contact their physician for a medical evaluation.

2) Persons who are not ill but who were potentially exposed should begin a fever watch. From their last exposure, temperature should be actively monitored for fever for four weeks.

3) Broader symptoms of brucellosis should be passively monitored for six months from the last exposure. Broader symptoms include:
   - Acute: fever, chills, headache, low back pain, joint pain, malaise, diarrhea
   - Sub-Acute: malaise, muscle pain, headache, neck pain, fever, sweats
   - Chronic: anorexia, weight loss, abdominal pain, joint pain, depression, constipation

4) Recommend PEP to those contacts with high-risk exposures to *Brucella*:
   - For vaccine exposure refer to managing special situations.
   - For other exposures, the recommendation is for Doxycycline 100 mg twice daily and rifampin 600 mg once daily for 3 weeks.
     - Trimethoprim-sulfamethoxazole (TMP-SMZ) or another antimicrobial agent effective against *Brucella* can be selected if doxycycline or rifampin is contraindicated.
     - For alternative regimens, two antimicrobials effective against *Brucella* should still be given for at least 21 days.
   - All PEP regimen and dosing decisions should be made in consultation with the worker’s health care provider
   - Persons who are pregnant, less than 8 years old, or have contraindications to these antimicrobial agents, should consult with their health care provider for alternative PEP.
   - PEP can be initiated up to 24 weeks after exposure.

5) If clinical symptoms develop and brucellosis infection is confirmed by culture and isolation or serology, PEP is no longer appropriate, and treatment and monitoring is required.

6) A symptomatic contact is considered a suspect case requiring investigation and reporting to KDHE-BEPHI
   - On the [Contact] Tab of the CMR, click ‘Show’ beside the symptomatic contact on the listing. When View Contact Event opens in show mode, select ‘Promote to CMR’
   - Investigate symptomatic contacts with respiratory illness as suspect cases.

7) For laboratory personnel, additional guidance is available under managing special situations.
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.

Environmental inspection may be necessary through the Kansas Department of Agriculture in the following situations:
1) If a commercial dairy is implicated through the distribution of unpasteurized milk or dairy products.
2) If a meat packing or distributor is implicated as a source of infection.
3) If a restaurant or food distributor is implicated through the distribution of unpasteurized milk or dairy products.

It is very important to verify the location or previous location of the source of the infection (i.e., from what state or country was the meat or dairy was obtained). If any domestic animal or animals that resides in the state of Kansas is believed to be affected by brucellosis, the Kansas Department of Agriculture’s Division of Animal Health should be notified immediately (785-564-6601).

Education
1) Educate on potential hazards of drinking or eating unpasteurized milk products.
2) Educate high-risk workers (i.e., farmers, slaughterhouse workers, etc.) about the risk of brucellosis and stress methods to reduce occupational exposure such as proper ventilation, appropriate carcass disposal and barrier precautions.

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. Exposure to Brucella containing Vaccine:
   • Exposure is a needle stick or vaccine contact on broken skin or in the eyes.
   • Determine strain of vaccine (RB51; strain 19; REV-1).
   • Instruct contact to seek care of medical provider.
   • Recommend the collection of a baseline blood sample to test for antibodies; recheck a second blood sample at 2-3 weeks.
     – Note: Exposure to RB51 (vaccine strain of B. abortus) does not induce a measurable antibody response. Monitoring serum specimens in those exposed to RB51 will not provide a useful indicator of infection.
   • Recommend PEP based on type of vaccine and exposure.
     – RB51 requires PEP with doxycycline only.
     – Splashes in the eyes may require 6-week treatment.
C. Laboratory Exposure to *Brucella* isolates:

- The responsibilities of the affected laboratory include:
  - To compile information on the exposed workers in a line list format or other summary and share it with KDHE-BEPHI and CDC, include:
    - Workers with high and low risk exposures
    - How many in each group took PEP (and completed 3 weeks of PEP)
    - Pregnancy status
    - Specific activities performed in the lab
  - Complete CDC Form 3 for select agents, as directed by CDC or KHEL.
  - Report to KDHE if any worker seroconverts or develops symptoms
- The initial steps include identifying the following:
  - First: What activities were performed that may have led to exposure.
  - Then: who was in the lab during the suspected time(s) of exposure, where they were in relation to the exposure, and any activity with the isolates?
- For each person in the laboratory during the time(s) of exposure, collect the information requested on page 1 of Appendix 2: Post-Exposure Monitoring and have base-line serum sample collected.
  - Classifying workers’ risk as high, low, or none based on CDC guidelines.
    - For workers with high-risk exposures to *Brucella*:
      - Recommend PEP, and
      - Complete page 2 of the Appendix 2: Post Exposure Monitoring worksheet and arrange for symptom monitoring
    - For low-risk exposure workers:
      - PEP is not recommended; refer the individual to their physician to answer individual health concerns, and
      - Arrange for symptom monitoring.
- Symptom Surveillance should occur for all workers regardless of risk status:
  - Arrange for regular symptom monitoring (at least weekly) to watch for febrile illness or symptoms consistent with brucellosis and for daily self-fever checks through 24 weeks post-exposure.
  - Individuals should be informed of the common brucellosis symptoms and to seek immediate medical attention and notify the medical provider of the exposure if they develop anytime within 24 weeks of exposure.
- Serological Monitoring:
  - Obtain baseline serum samples from all workers as soon as possible after potential *Brucella* exposure is recognized.
  - Continue serologic testing at 0 (baseline), 6, 12, 18, and 24 weeks post exposure using agglutination test to quantify seroconversion.
  - CDC’s Zoonotic Select Agent Laboratory (ZSAL) will perform serial serological monitoring at no cost.
    - For testing at CDC, serologic specimens should be collected and sent to KHEL according to the specimen collection guidelines. KHEL will forward specimens to the CDC laboratory for testing.
  - *B. canis* and *B. abortus* RB51: Currently, no serological monitoring available for RB51 and *B. canis* exposure; collect a baseline serum sample in order to rule out infection with other *Brucella* spp.
D. Intentional Contamination

Brucellosis is a potential bioterrorism weapon. If the case has no known exposures or is not in an occupation that is prone to exposure, consider an intentional event. Any epidemiological, clinical, and microbiological findings suggesting an intentional release should result in the issue of a health alert.

If suspected:
- Notify local law enforcement, the local Health Officer, the on-call epidemiologist (local) and KDHE (1-877-427-7317) immediately.
- 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:
- No significant risk to public health, health care and emergency response.

Diagnosis:
- Physicians who suspect brucellosis should promptly collect blood or bone marrow for culture. Liver, spleen, joint fluid and abscesses can also be cultured. Serum collected for serologic diagnosis, requires an acute specimen collected as soon as possible after onset and a convalescent-phase specimen should be collected > 14 days after the acute specimen.
- Alert the laboratory to the possibility of Brucella and need for special safety procedures. Level A laboratories should consult with state public health laboratory director (or designate) prior to or concurrent with testing if Brucella species is suspected by the physician.
- Serology: The standard laboratory test for Brucella antibody is the tube agglutination test, but the more rapid simple slide agglutination test is commonly used in commercial and hospital laboratories. The slide agglutination test is 97%--100% sensitive and may be as low as 88% specific. In a population with a low prevalence of disease, the risk for a false-positive result is high. Therefore, use the epidemiologic investigation to rule out false-positive laboratory findings when assessing potential covert biological terrorism events. PCR and ELISA testing may also be available.
- Biopsy specimens: Brucella spp. can be identified through direct examination of biopsy specimens using direct fluorescent antibody stains.
• Cultures: *Brucella spp.* will grow only in aerobic blood culture bottles after 2-4 days; followed by isolation as typical colonies on BAP and CHOC within 48 hours. Presumptively identified as a small, gram-negative coccobacilli that is oxidase, catalase and urea positive. Confirmatory identification is made by agglutination with specific antiserum in a reference laboratory.

**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 brucellosis in a bioterrorist event are included in the national pharmaceutical stockpile maintained by CDC.

**Postexposure prophylaxis (PEP):**

• In most brucellosis threat situations post exposure prophylaxis is not recommended. However, if the level of suspicion is high, exposed individuals may begin antimicrobial therapy if a definitive determination cannot be made.

• PEP of close contacts of brucellosis patients is not recommended because person-to-person transmission is not known to occur.

**Surveillance:**

• Arrange for active surveillance for 4 weeks for the development of febrile illness and 6 months of passive monitoring for other signs and symptoms.
DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Accept the case assigned to the LHD and record the date the LHD investigation was started on the [Administrative] tab.

B. Organize and collect data, using appropriate data collection tools including:
   - Investigators can collect and enter all required information directly into EpiTrax [Investigation], [Clinical], [Demographics], [Epidemiological] tabs.
   - CDC case investigation form can be used to collect additional information.
   - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.

C. Report data collected during the course of the investigation via EpiTrax.
   - Verify that all data requested has been recorded on an appropriate EpiTrax [tab], or that notes are recorded for a case lost to follow-up
   - Some data that cannot be reported on an EpiTrax [tab] may need to be recorded in [Notes] or scanned and attached to the record.
   - Paper report forms do not need to be sent to KDHE after the information is recorded and/or attached in EpiTrax. The forms should be handled as directed by local administrative practices.

D. If a case is lost to follow-up, after the appropriate attempts to contact the case have been made:
   - Indicate ‘lost to follow-up’ on the [Administrative] tab with the attempts to contact the case recorded.
   - Record at least the information that was collected from the medical records.
   - Record a reason for ‘lost to follow-up’ in [Notes].

E. After the steps listed under Case Investigation have been completed, record the “Date LHD investigation completed” field located on the [Administrative] tab.
   - Record the date even if the local investigator’s Case or Contact Management for the contact is not “Complete”.

F. Once the entire investigation is completed, the LHD investigator will click the “Complete” button on the [Administrative] tab. This will trigger an alert to the LHD Administrator, so they can review the case before sending to the state.
   - The LHD Administrator will then “Approve” or “Reject” the CMR.
   - Once a case is “Approved” by the LHD Administrator, BEPHI staff will review and close the case after ensuring it is complete and that the case is assigned to the correct event (DF/DHF), based on the reported symptoms reported.
ADDITIONAL INFORMATION / REFERENCES


C. Case Definitions: CDC Division of Public Health Surveillance and Informatics, Available at: https://www.cdc.gov/nndss/

D. Kansas Regulations/Statutes Related to Infectious Disease: www.kdheks.gov/epi/regulations.htm

E. Laboratory Exposures to Brucella:
   • CDC. Laboratory-Acquired Brucellosis --- Indiana and Minnesota, 2006. MMWR 2008 / 57(02); 39-42. Available from www.cdc.gov/mmwr/preview/mmwrhtml/mm5702a3.htm

F. Laboratory Diagnosis of Human Brucellosis. Clinical Microbiology Reviews, January 2020: www.ncbi.nlm.nih.gov/pmc/articles/PMC6860005/


ATTACHMENTS

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.
APPENDIX 1: SPECIMEN SUBMISSION

Submission of Serum for Brucella Serology
Zoonotic and Select Agent Laboratory, Bacterial Special Pathogens Branch

1. Acute- and convalescent-phase serum specimens that are shipped together are preferred.
2. Please send serum, not whole blood.
3. Serum should be sent in Sarstedt 2 ml micro tube with an O-ring in the lid (ref #72.694.006). The O-ring helps to prevent leaking or drying of sample.
4. Refrigeration during shipment is preferred. If the sample was previously frozen please ship frozen.
   A. If this is a large-scale exposure (~15 samples), please ship thawed.
5. Specimens are supposed to go first to the physician’s state health laboratory (SHL), and if the SHL does not perform the test requested, the SHL will forward the specimens to CDC. If the physician knows that the SHL cannot perform the test and the SHL has given the physician permission to by-pass it, specimens can be sent directly to CDC (to DASH) at the following address:

   Centers for Disease Control & Prevention
   Data & Specimen Handling Section (DASH)
   Mailstop G12
   1600 Clifton Rd NE
   Atlanta, GA 30329-4027

6. CDC Form 50.34 should accompany the specimens; the form is included.
7. When filling out the form, the more complete the form the better. The minimal information should include the following: test requested (Brucella serology), submitter’s name and address, patient’s name/sex/DOB, type of specimen, collection dates, date of onset of symptoms, and history of travel, water, animal, or other suspected exposures.

Please contact if you have additional questions regarding Brucella serology:

Dr. Robyn Stoddard
Tel: (404) 639-2053
Fax: (404) 639-3022
RAStoddard@cdc.gov

Renee Galloway
Tel: (404) 639-5461
Fax: (404) 639-3022
RGalloway@cdc.gov
Submission of Brucella Isolate(s) Zoonotic and Select Agent Laboratory,  
Bacterial Special Pathogens Branch

AS A DIAGNOSTIC SAMPLE: Any suspected Brucella isolate that requires confirmatory testing in our lab:

1. Fill out the CDC 50.34 DASH form
   • When filling out the CDC 50.34 form, the more complete the form, the better.
   • The minimal information should include the following: suspected Brucella species, submitter’s name and address, patient’s name/sex/DOB, type of specimen, collection dates, date of onset of symptoms, and history of travel, water, animal, or other suspected exposures (and any other pertinent epidemiological data).

2. Send the culture on an agar slant (not a plate) directly to CDC via DASH to:
   Centers for Disease Control & Prevention
   Data & Specimen Handling Section (DASH)
   Mailstop G12
   1600 Clifton Rd NE
   Atlanta, GA 30329-4027
   ATTN: Rebekah Tiller or Elke Saile

AS A SELECT AGENT: Any B. melitensis, B. suis or B. abortus isolate that has been previously identified/confirmed by another lab that has prepared and submitted a “Form 4: Identification of a Select Agent or Toxin.”

1. Because CDC is the recipient lab, we will request certain information from the sending lab, so that we can complete the “Form 2: Request to Transfer Select Agents and Toxins” and submit to DSAT for approval to transfer.

2. We will both be notified by DSAT of the approval, upon which we have 30 days to complete the transfer. At this time, we will send you an e-mail with detailed information on the shipping of the strain(s) to our lab.

3. We do not receive shipments after business hours or on the weekends so it is best to ensure your shipment arrives Monday-Thursday.

4. Please send the culture on an agar slant (not a plate).

5. The shipment may be addressed to:
   Rebekah Tiller or Elke Saile
   1600 Clifton Rd, NE
   Bldg 17 Room 2021
   Atlanta, GA 30329-4027

6. Brucella canis is NOT a select agent. Therefore, you can send a slant culture directly to CDC via DASH using the CDC 50.34 DASH form only.

Please contact us if you have additional questions regarding isolate submission or Brucella molecular detection:

<table>
<thead>
<tr>
<th>Rebekah Tiller</th>
<th>Elke Saile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tel: (404) 639–4507</td>
<td>Tel: (404) 639–0716</td>
</tr>
<tr>
<td>Fax: (404) 639–3023</td>
<td>Fax: (404) 639–3023</td>
</tr>
<tr>
<td><a href="mailto:RVaughnTiller@cdc.gov">RVaughnTiller@cdc.gov</a></td>
<td><a href="mailto:ESaile@cdc.gov">ESaile@cdc.gov</a></td>
</tr>
</tbody>
</table>
APPENDIX 2: POST-EXPOSURE MONITORING

Follow-up of Brucella occupational exposure
(The following should only be used as a guide by healthcare professionals who are assessing an exposure.)

Name: _______________________________  Title/Occupation: __________________________

Exposure Date(s): ____/____/_______ -- ____/____/_______

Years of experience (as a clinician/veterinarian/lab technician): __________

Years working in this facility: __________

Sex: ___M ___F   Pregnant? __Yes __No __Unknown

Based on CDC risk assessment guidelines, what risk level applies to this employee?
   ___ High         ___ Low         ___ None

Serologic Monitoring

Note: Individuals should be monitored for an antibody response to Brucella sp. depending on their level of risk of exposure. Serological testing is not available for B. canis or B. abortus RB51; it is available for S19 and Rev-1 exposures.

The Week 0 specimen should be drawn as close to the last date of exposure as possible. A banked serum sample may substitute for the Week 0 sample. The following samples in the series should be drawn at the specified week after the exposure, not from the time the exposure was identified. For example, if a baseline sample is drawn at Week 2 following the exposure incident, the second draw should take place at Week 6 and not Week 8 (six weeks from the baseline draw).

If an exposed worker seroconverts, please contact your state health department immediately. Brucellosis is a reportable disease, and the individual will need to undergo brucellosis treatment and confirmatory testing.

<table>
<thead>
<tr>
<th>Week Collection Date</th>
<th>Agglutination Test Used</th>
<th>Titer Complete (Total antibody)</th>
<th>Titer Reduced (IgG)</th>
<th>Positive?</th>
<th>Name of Testing Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  <strong><strong>/</strong></strong>/____</td>
<td>☐ BMAT</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ IND</td>
<td></td>
</tr>
<tr>
<td>6  <strong><strong>/</strong></strong>/____</td>
<td>☐ BMAT</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ IND</td>
<td></td>
</tr>
<tr>
<td>12 <strong><strong>/</strong></strong>/____</td>
<td>☐ BMAT</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ IND</td>
<td></td>
</tr>
<tr>
<td>18 <strong><strong>/</strong></strong>/____</td>
<td>☐ BMAT</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ IND</td>
<td></td>
</tr>
<tr>
<td>24 <strong><strong>/</strong></strong>/____</td>
<td>☐ BMAT</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ IND</td>
<td></td>
</tr>
</tbody>
</table>
**Post-Exposure Prophylaxis Regimen**

If the worker was recommended to take PEP, please ask the individual the following questions:

1. **Which antibiotics were recommended to you? Please mark all that apply.**
   - [ ] Unsure/Don’t Know
   - [ ] Doxycycline
   - [ ] Rifampin
   - [ ] TMP-SMZ/Bactrim
   - [ ] Other (Antibiotic Name): ____________________________

2A. **Did you start taking the medication?**
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/Don’t Know

2B. **If yes, when?**
   - [ ] ____/____/____
   - [ ] Unsure/Don’t Know

2C. **If no, why didn’t you start?** *Complete, then skip to Section H*
   - [ ] Did not feel that I was at risk for becoming sick
   - [ ] Pregnancy
   - [ ] Side effects of antibiotics
   - [ ] Other: ____________________________

3A. **Did you miss any doses of the antibiotics?** *Note this indicates doses not days missed.*
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/Don’t Know

3B. **Which antibiotics did you miss doses for and how many total doses do you think you missed?**
   - [ ] Unsure/Don’t Know
   - [ ] Doxycycline (Doses): ________________
   - [ ] Rifampin (Doses): ________________
   - [ ] TMP-SMZ/Bactrim (Doses): ____________
   - [ ] Other (Antibiotic Name): ____________________________

3C. **Why did you miss doses of the antibiotics?**
   - [ ] Side effects (adverse events)
   - [ ] Forgot to take
   - [ ] Other: _______________________________________________________________________

4A. **Did you complete the full 3-week course of antibiotics, as recommended?**
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/Don’t Know

4B. **If no, why didn’t you finish?**
   - [ ] Did not feel that I was at risk
   - [ ] Side effects
   - [ ] Switched antibiotics
   - [ ] Pregnancy
   - [ ] Other: _______________________________________________________________________

5A. **Did you have any side effects that were caused by the medication?**
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/Don’t Know

*If “Yes,” please fill out the table below. Rate the severity of each reaction on a scale of 1 to 5, with 5 being most severe.*

<table>
<thead>
<tr>
<th>Sign/symptom</th>
<th>If Yes, check 1 (least)</th>
<th>5 (most)</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea/ upset stomach</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Vomiting</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Headache</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Dizziness</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Unusual bruising or bleeding</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Yellow skin or eyes</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
<tr>
<td>Other:</td>
<td>[ ] 1 [ ] 2 [ ] 3</td>
<td>[ ] 4 [ ] 5</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
5B. If yes, did any of these reactions cause you to miss work?

☐ Yes  How much work did you miss? _______  ☐ Hours  ☐ Days

☐ No

**Symptom Monitoring**

All exposed individuals, regardless of risk status, should be monitored for the development of symptoms. Arrange for regular (e.g., weekly) active surveillance for febrile illness among all workers exposed to *Brucella* isolates for six months after last exposure. Broader symptoms of brucellosis should be passively monitored for six months from the last exposure.

At each regular appointment, ask the worker if he/she has experienced any of the following signs or symptoms. Mark if the worker has had any of the following signs or symptoms **not attributed to a pre-existing medical condition**. If the worker has experienced any of these, please indicate the date the sign or symptom started.

If you choose to use this table, enter the date the worker is seen by Occupational Health (OH). It is up to the OH personnel to decide the frequency of surveillance, whether it is daily, weekly, or a combination for six months following the exposure. Place a check mark in the box if a worker has experienced a specific symptom since the last time he or she was seen by the OH.

**Use of the Symptom Monitoring table on the following page is optional.**
### Signs and Symptoms of Brucellosis

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Date Worker Seen at Occupational Health (daily or weekly symptom watch)</th>
<th>Symptom Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (&gt; 100.4 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More tired/less energy than usual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe/persistent headache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle pains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint pains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintended weight loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of appetite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>