Babesiosis
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Babesiosis

Case Definition – https://ndc.services.cdc.gov/case-definitions/babesiosis/

Overview

- ***Agent*** – Babesiosis is caused by protozoan parasites of the genus *Babesia* that infect red blood cells. While more than 100 species of *Babesia* parasites have been reported, only a few have been identified as causing human infections, including *B. microti*, *B. divergens*, *B. duncani*, and an un-named strain designated MO-1. *B. microti* is the most commonly identified agent of babesiosis in the U.S.
- ***Reservoir*** – The primary reservoir for *Babesia* parasites is the white-footed mouse (*Peromyscus leucopus*).
- ***Occurrence*** – Babesiosis most commonly occurs in the Northeast and upper Midwest regions of the U.S. The primary tick vector (the blacklegged or deer tick, *Ixodes scapularis*) for this infection is widely found in these areas.
- ***Risk Factors –*** Individuals residing in or traveling to the Northeast and upper Midwest regions of the U.S. and spending time outdoors and in tick habitat are at an increased risk of infection. Most cases of babesiosis are reported during the late spring, summer, and fall months like many other tick-borne pathogens.
- ***Mode of Transmission*** – Babesiosis is primarily transmitted through the bite of an infected tick (the blacklegged or deer tick, *Ixodes scapularis*). Other possible but less common modes include via blood transfusion; vertical transmission (mother to baby during pregnancy); and transmission via breastfeeding.
- ***Incubation Period*** – Typical incubation can range from approximately 1-5 weeks following a tick bite. Transfusion-associated cases have a median incubation period of about 37 days (range of 11-176 days) but could be longer.
- ***Clinical Illness*** – The majority of people who become infected are asymptomatic. If symptoms develop, they can range from mild febrile illness to severe illness and even death. Severe illness is more likely for individuals who are asplenic, immunocompromised, or elderly. Commonly reported symptoms include fever and hemolytic anemia that may be accompanied by chills, sweats, headache, myalgia, arthralgia, headache, nausea, anorexia, malaise, and fatigue. Severe babesiosis may require hospitalization due to marked anemia, acute respiratory distress syndrome (ARDS), disseminated intravascular coagulation (DIC), renal impairment, shock, or splenic rupture.
- ***Laboratory Testing*** – Microscopic identification of *Babesia* parasites on Giemsa- or Wright-stained blood smears can be used to diagnose acute, symptomatic cases. *Babesia* species can be difficult to distinguish from malaria trophozoites, and confirmation of diagnosis with a reference laboratory may be necessary. Presumptive positive smears can be sent to the Missouri State Public Health Laboratory (MSPHL). MSPHL will coordinate with CDC to determine the species of *Babesia*. If blood smears are negative but clinical suspicion of babesiosis infection remains high, PCR testing can be conducted through a commercial

laboratory. Most available PCR tests will be specific for *B. microti*. Serologic tests are also available through commercial laboratories, but a single serology test cannot reliably distinguish between past exposure or infection and present illness.

- ***Treatment*** – Combination treatment for *B. microti* typically includes atovaquone (oral) plus azithromycin (oral for mild to moderate disease, intravenously for severe disease) for 7-10 days. Alternative combination treatment is available for patients with *B. duncani* or *B. divergens* infections or patients that don't respond to treatment with atovaquone and azithromycin combination. However, the alternative combination treatment may have an increased risk of adverse effects. Extended length of treatment and/or higher dosage may be indicated for patients that are immunocompromised.
- ***Priority*** **–** Routine.

Quick References / Factsheets

- Health Care Providers:
  - Tickborne Diseases of the United States: A Reference Manual for Healthcare Providers (07/25)
  - Clinical Care of Babesiosis (07/25)

Forms

- Disease Case Report (CD-1)
- CDC Babesiosis Case Report Form
- Missouri Outbreak Report Form (MORF)

Notifications

- If babesiosis infection is suspected, the local public health agency (LPHA) should notify the District Epidemiologists or the Missouri Department of Health and Senior Services (MDHSS) Bureau of Communicable Disease Control and Prevention (BCDCP), phone (573) 751-6113, Fax (573) 526-0235.

Reporting Requirements

- Babesiosis is a Category 3 disease and shall be reported to the LPHA or to the Missouri Department of Health and Senior Services (MDHSS) within one (3) calendar days of first knowledge or suspicion by telephone, fax, or other rapid communication.
  1. For confirmed and probable cases, complete a Disease Case Report (CD-1) and a CDC Babesiosis Case Report Form.
  2. Entry of the completed CD-1 into the ShowMe World Care (SMWC) database negates the need for the paper CD-1 to be forwarded to the District Office.
  3. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax, or e-mail) to the District Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Report Form (MORF).
  4. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the District Communicable Disease Coordinator.

Laboratory Testing and Diagnosis

Hospital laboratory staff may be able to conduct microscopic identification of *Babesia* parasites on Giemsa- or Wright-stained blood smears for acute, symptomatic cases. Multiple blood smears may need to be examined to detect *Babesia* parasites. Health care providers should explicitly request a manual (non-automated) review of blood smears for symptomatic patients. Presumptive positive smears can be sent to the Missouri State Public Health Laboratory (MSPHL). Facilities should reach out to MSPHL for detailed instructions prior to submission of smears. MSPHL will coordinate with CDC to determine the species of *Babesia*. Other types of testing for babesiosis are available through commercial laboratories including PCR and serology. Most available PCR tests will be specific for *B. microti*, not *B. duncani* or *B. divergens*. PCR testing may remain positive for several months after successful treatment. Serologic tests are also available through commercial laboratories, but caution should be exercised regarding the interpretation of a single serology test. A single positive serology test cannot reliably distinguish between past exposure or infection and present illness.

Conducting the Investigation

- **Verify the diagnosis**. Obtain demographic, clinical and laboratory information on the case from the health care provider, hospital, and/or laboratory. Does the laboratory test result provide evidence of a recent babesiosis infection? Obtain other epidemiological information necessary to complete the Disease Case Report (CD-1) and the CDC Babesiosis Case Report Form.
- **Establish the extent of illness.** Determine if household, traveling companions or other close contacts that have shared environmental exposures are, or have been, ill by contacting the health care provider, patient, and/or family members. Persons with similar illness may require medical evaluation and should be encouraged to contact their physician to discuss.
- **Establish the source of infection.** For all cases, please obtain the following information from the patient, patient's family, or health care provider:
    - Travel history:
        - Determine the start and end dates of the trip and the location(s) of travel. Start and end dates will be requested for all locations if patient visited multiple locations.
        - If there is no history of foreign travel consistent with exposure to DENV, please contact your District Epidemiology team and/or the Zoonotic Disease Program. Sporadic outbreaks of DENV have occurred in Florida, Texas, California, and Hawaii in recent years. **Cases that are suspected to have been acquired within the U.S. need to be promptly reported.**
    - Outdoor exposures or time spent in tick habitat (including in-state, out-of-state, or out-of-country)
    - Non-tick transmission pathways:
        - Does case work in a laboratory or clinical setting?

- Is the case a neonate, pregnant, or breastfeeding?
- Has the case recently received any blood, blood products, tissues, or organs within the last 30 days?
  - If yes, please notify your District Epidemiologists.
  - Ensure that relevant partners have been notified (blood collection agencies, hospitals, etc.).
  - Determine the patient/donor identification numbers and any other available details regarding blood products/organs donated or received.
  - Assure quarantine of any remaining co-component blood or tissues.
  - If assistance is needed with this tracing process, please reach out to the Zoonotic Disease Program for guidance.

Control Measures

No vaccine is available to protect people against babesiosis. Generally, asymptomatic individuals need not be treated unless *Babesia* is detected on blood smear or PCR for more than three months. Suspected babesiosis should not be treated if reliable blood smear and PCR results are negative. When *Babesia* is detected, symptomatic patients should be treated.

The best way to avoid infection with babesiosis is to avoid tick bites. Key personal prevention methods for avoiding tick bites include:

- Whenever possible, avoid tick habitat during the peak time of year when ticks are most active (generally April through September). Ticks are generally found in areas with tall grass, brush or in heavily wooded areas. However, they can also be present in neighborhoods and backyards.
- Use an insect repellent product with at least 20% DEET, picaridin, or other U.S. Environmental Protection Agency (EPA)-registered active ingredients labeled specifically for ticks on all exposed skin.
  - The American Academy of Pediatrics has recommended that repellents containing up to 30% DEET are safe to use on children over 2 months of age.
  - For other active repellent ingredients, check the product label for minimum age requirements before applying to children.
  - EPA offers an insect repellent search tool that the public can use to identify repellent products that work best for their needs.
- Weather-permitting, wear long sleeves and pants to help reduce the amount of exposed skin. This will make it harder for ticks to find a place to attach.
  - Wearing light-colored clothing can make it easier to spot ticks that may be crawling on clothing when you are outdoors.
- Consider applying permethrin to clothing, boots, and outdoor gear when spending time in tick habitat. Permethrin binds tightly to fabric and will remain effective after multiple washings.

- This product should not be applied directly to the skin. Product directions and labels should be read carefully before use.

Resources

1. American Academy of Pediatrics. [Babesiosis]. In: Kimberlin DW, Barnett, ED, Lynfield, R, Sawyer, MH, eds. *Red Book: 2021 Report of the Committee on Infectious Diseases*. 32nd ed. Itasca, IL: American Academy of Pediatrics; 2021: [217-219].
2. American Public Health Association. [Babesiosis]. In: Heymann DL, ed. *Control of Communicable Diseases Manual*. 21st ed. Washington, DC: American Public Health Association; 2022 [58-61].
3. Centers for Disease Control and Prevention. Babesiosis. https://www.cdc.gov/babesiosis/about/index.html (07/25)
4. Centers for Disease Control and Prevention. Tickborne Diseases of the United States: A Reference Manual for Healthcare Providers. https://www.cdc.gov/ticks/hcp/data-research/tickborne-disease-reference-guide/index.html (07/25)