

Babesiosis

Babesia spp

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per N.J.A.C. 8:57, healthcare providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of babesiosis to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at <http://www.state.nj.us/health/lh/directory/lhdselectcounty.shtml>.

If the health officer is unavailable, the healthcare provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.



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1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Babesiosis is caused by protozoan parasites of the genus *Babesia*, which infect red blood cells. Of the 73 species that have been described as parasitic for mammals, only a few infect humans. Of these, *Babesia microti* is the species causing illness in the eastern and midwestern United States, with a new strain of *Babesia* called WA1 seen in the western United States. *Babesia* organisms are primarily tick-borne and are maintained in nature in ecologic cycles involving animals (see section 1C below); humans are infected only incidentally and do not play a role in the ongoing transmission cycle of the organism.

B. Clinical Description and Laboratory Diagnosis

Infection is often asymptomatic; if illness occurs, it is usually one to four weeks after the infecting tick bite. Onset may be acute or gradual, with nonspecific initial symptoms such as malaise, fatigue, anorexia, headache, and weakness. Usually within a week, the patient develops fever (possibly intermittent) that may reach 40°C, often accompanied by shaking chills, drenching sweats, myalgias and arthralgias, and sometimes nausea and vomiting. Clinical laboratory findings include hemolytic anemia, which may be accompanied by splenomegaly and hepatomegaly. Lymphadenopathy is not present. White cell counts are normal or mildly decreased and thrombocytopenia is common. Parasitemia levels in red blood cells usually range from 1% to 10% in patients with an intact spleen, and may be as high as 85% in asplenic patients. The clinical course may be more severe in asplenic patients, those with a dysfunctional spleen, and those who are immunocompromised or over the age of 60. Babesiosis may occasionally be associated with severe complications and be fatal, most commonly in patients with comorbidities. The tick vector for *Babesia* may also carry the organisms that cause Lyme disease and anaplasmosis (formerly granulocytic ehrlichiosis), and co-infections between *Babesia* and these organisms have been found to occur, complicating the clinical picture.

Identification of intraerythrocytic *Babesia* parasites by light microscopic examination of thick or thin smears of peripheral blood by a laboratory experienced in blood parasite identification is the recommended method of diagnosis. The organisms resemble *Plasmodium falciparum* (which causes malaria) but present several distinguishing features,

including more variability in shape and size, being non-pigment producing, and dividing in a characteristic tetrad formation. Diagnosis can also be made by isolation of the parasite from a whole blood specimen by animal inoculation. Serologic diagnosis is by the demonstration of a *Babesia*-specific antibody titer. For *B. microti*, the requirements are a titer of at least 1:256 by indirect fluorescent antibody (IFA) testing for total immunoglobulin (Ig) or IgG, or an IgG-positive immunoblot.

NOTE: The results of IgM antibody testing are not considered to be confirmatory in the absence of positive results for total Ig or IgG, because of the possibility of false-positive IgM results. Polymerase chain reaction (PCR) testing for *Babesia* is still considered investigational at this time and is not considered to be sufficient in itself for confirmation of infection.

C. Vectors and Reservoirs

The primary vectors for *Babesia* are *Ixodes* ticks, a genus distinct from the larger and better-known American dog tick (*Dermacentor variabilis*). In New Jersey, the prominent vector is *I. scapularis*, the black-legged or deer tick. Ticks acquire the protozoa that cause babesiosis during their larval stage by feeding on infected animals, particularly the white-footed mouse. During its next (nymphal) stage, the tick poses the greatest threat of transmitting infectious *Babesia* organisms to animals and humans. Nymphs are most abundant between May and July, and they are typically found in wooded or brush edge environments. Toward the end of summer through fall, nymphs mature to the adult stage. Only nymphal ticks primarily transmit *Babesia*, however.

D. Modes of Transmission

Babesiosis is most often acquired from a tick bite. However, bites from *I. scapularis* are often painless and may occur on parts of the body that are difficult to observe, so patients may not have a known history of tick bite. *Babesia* is occasionally transmitted by blood transfusion and, very rarely, in utero.

E. Incubation Period

The incubation period is usually between one and eight weeks (commonly four weeks); in transfusion cases, the incubation period is on the longer side.

F. Period of Communicability or Infectious Period

With the exception of direct blood transfusion, babesiosis is not communicable from person to person. Any person with history of babesiosis should be permanently excluded from blood donation. Asymptomatic blood donors have been shown to be infectious for as long as 12 months after initial infection.

G. Epidemiology

The incidence of babesiosis is associated with the density of infected tick vectors and their animal hosts. As with Lyme disease, most cases of babesiosis occur during the summer and early fall. In the northeastern United States, cases have been reported from New Jersey, Massachusetts, Rhode Island, Connecticut, and New York. There is also a focus of the disease with a new species of *Babesia* (called WA1) in the lakes region of the upper midwest and in the coastal regions of northern California and Washington State. There is incidence of the disease with other species of *Babesia* in Europe and Africa. In New Jersey, 45 confirmed and probable cases of babesiosis were reported in 2004, and 60 in 2005 (please note that different case definitions were used in both 2004 and 2005; the 2006 revised case definition has been developed with the assistance of Centers for Disease Control and Prevention [CDC] experts and will be used from now on). The majority of New Jersey cases are reported from Atlantic, Monmouth, and Ocean Counties.

2 CASE DEFINITION

A. New Jersey Department of Health and Senior Services (NJDHSS) Surveillance Case Definition

1. Clinical description

A tick-borne illness caused by various *Babesia* species and associated with nonrespiratory influenza-like symptoms (e.g., fever, chills, sweating, myalgias, and fatigue) and hemolytic anemia. Many infections are asymptomatic; infection may be more severe in the immunosuppressed, splenectomized, and/or the elderly. Although the primary route of transmission is through a tick bite, the organism may also be spread by blood transfusion and in utero. *Babesia microti* is the species common to the northeastern United States.

2. Laboratory criteria for diagnosis

- Identification of intraerythrocytic *Babesia* parasites by light microscopic examination of thick or thin smears of peripheral blood. The organisms resemble *Plasmodium falciparum* but present several distinguishing features; organisms display more variability in shape and size, are non-pigment producing, and divide in a characteristic tetrad formation.
- Isolation of the parasite from a whole blood specimen by animal inoculation.
- Demonstration of a *Babesia*-specific antibody titer. For *B. microti*, the requirements are a titer of at least 1:256 by IFA testing for total Ig or IgG, or an IgG-positive immunoblot.

NOTE: The results of IgM antibody testing are NOT considered confirmatory in the absence of positive results for total Ig or IgG (see above), because of the possibility of false-positive IgM results. PCR testing for *Babesia* is considered investigational and is NOT sufficient for confirmation of infection.

3. Case classification

CONFIRMED

A clinically compatible case, with identification of the parasite in a blood smear or by animal inoculation.

NOTE: In cases with positive blood smears and a history of blood transfusion, or travel/previous residence in a malaria-endemic country, the blood smear should be examined at the New Jersey Public Health and Environmental Laboratories (NJPHL) to confirm infection with *Babesia* and exclude malaria.

PROBABLE

A clinically compatible case with documented anemia and fever with demonstration of *Babesia*-specific antibody as noted above.

POSSIBLE

A clinically compatible case without evidence or documentation of anemia and fever, with demonstration of *Babesia*-specific antibody as noted above.

Comments:

People can be asymptotically infected with *Babesia* organisms but will be considered a case of illness for surveillance purposes only if they have clinically compatible illness. Asymptotically infected persons identified through various means (e.g., presurgical screening) should NOT be submitted as cases unless they develop a clinically compatible illness and have the requisite test results as noted above.

B. Differences from CDC Case Definition

There is no official CDC case definition for babesiosis. It is not a nationally reportable disease. CDC experts assisted Infectious and Zoonotic Diseases Program (IZDP) epidemiologists in the development of the New Jersey case definition in 2006.

3 LABORATORY TESTING AVAILABLE

NJPHL will perform examination of Giemsa- or Wright's-stained blood smears for *Babesia*. Multiple thick and thin smears may be necessary to identify the parasite. Laboratories not having experience in diagnosing blood parasites on smears are encouraged to send suspect *Babesia*-positive slides to NJPHL for confirmation. *Babesia*-positive slides from cases in which the person has originated from a malaria-endemic area, or has had recent travel to such an area, should also always be examined at NJPHL to determine whether the parasite is *Babesia* or malaria. For information on submitting blood smear samples, please call PHEL at 609.292.7724.

Serological testing for babesiosis is not available at NJPHEL, but is available through or at various commercial laboratories. Please make sure to request testing for total Ig or IgG, as opposed to IgM alone (see section 2A above).

4 PURPOSE OF SURVEILLANCE AND REPORTING AND REPORTING REQUIREMENTS

A. Purpose of Surveillance and Reporting

- Identify the prevalence of babesiosis in New Jersey.
- Identify where babesiosis occurs in New Jersey.
- Recognize areas in New Jersey where babesiosis incidence has increased or decreased.
- Focus preventive education.
- Target tick control measures.

B. Laboratory Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.8) stipulates that laboratories report (by telephone, confidential fax, over the Internet using the confidential and secure Communicable Disease Reporting and Surveillance System [CDRSS], or in writing) all cases of babesiosis to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located.

C. Healthcare Provider Reporting Requirements

The healthcare provider must report all cases of babesiosis to the local health officer having jurisdiction over the locality in which the patient lives on the CDS-1 form, available from the NJDHSS Web site or the local health department, along with copies of laboratory test results. Please refer to the lists of reportable diseases (at the end of this Manual's Introductory Section) for further information.

D. Health Officer's Reporting and Follow-up Responsibilities

NJAC 8:57-1.8 stipulates that each local health officer report the occurrence of any case of babesiosis, as defined by the reporting criteria in section 2A above. Current requirements are that cases be reported to the NJDHSS Infectious and Zoonotic Diseases Program (IZDP). The case report should be entered electronically over the Internet using CDRSS; alternatively, a case report on a CDC-1 form can be forwarded to IZDP by fax or mail.

5 CASE INVESTIGATION

It is the local health officer or his/her designee's responsibility to investigate suspect cases of babesiosis to determine whether or not the NJDHSS surveillance case definition is met. This will usually require contact with the hospital or physician's office to find out about additional laboratory testing performed for *Babesia*, features of the clinical illness, onset date, the results of clinical laboratory testing for anemia, and so on.

Please note that we use the term surveillance case definition and not clinical case definition for our investigations. A physician may diagnose babesiosis in a patient and consider it confirmed (i.e., as a clinical diagnosis) for his/her purposes although it may not meet the NJDHSS surveillance case definition. For surveillance purposes, we count those cases that meet the highest criteria for confirmation, and as a result, not all true cases of the disease will end up being counted. It is not our role to critique physicians on their diagnostic criteria; however, many physicians are not familiar with our surveillance case definition and may find it helpful as an aid in their diagnostic efforts.

Use the following guidelines for babesiosis surveillance case investigation:

1. Cases with IgM results only and/or IgG or Ig results lower than 1:256: Determine if additional laboratory tests were done, such as Ig or IgG and/or a blood smear. Results with only a positive IgM, no matter how high the value, are not confirmatory for our surveillance case definition. If the patient is still under doctor's care and the symptoms (influenza-like) and clinical/laboratory findings (fever, anemia, thrombocytopenia) support a diagnosis of babesiosis, encourage the physician to order additional tests so that we may ascertain if the case can be confirmed for our surveillance system. If no other tests will be performed, change the CDRSS status to Not a Case, LDH Closed.
2. Suspect cases with IgG or total Ig greater than or equal to 1:256 and/or positive blood smear: These are the cases most likely to be confirmed. Investigate to obtain information on additional testing for *Babesia* that may have been performed, as well as on the patient's symptoms and clinical laboratory findings. A case is considered confirmed or probable for surveillance purposes only if there is compatible symptomology and laboratory findings (see section 2).
3. If case is determined to be confirmed or probable obtain:
 - The onset date of illness, if this is not already in your records (often missing)
 - Information on whether or not the patient received a blood transfusion with three months of onset; or if the patient donated blood within that period
 - Information on a history of tick bite within six weeks prior to onset
 - Information on travel history if from a low-incidence county for *Babesia*; ask if patient was visiting the New Jersey shore or other endemic area (such as New England) within the incubation time frame
 - Ask if the patient recently visited or grew up in a country endemic for malaria.

NOTE: If the answer to the last question is yes and a positive blood smear is the sole diagnostic test performed, the blood smear slide will need to be sent to NJPHEL to ensure that the patient does not have malaria.

4. If there have been several unsuccessful attempts to obtain the needed information to determine case status (e.g., the healthcare provider does not return calls or respond to a letter) please fill out the CDRSS report with as much information as possible. Please note why you could not obtain further information.

NOTE: In cases where a strong likelihood of confirmed or probable babesiosis exists (positive blood smear and/or Ig or IgG greater than or equal to 1:256), extra measures should be taken to ascertain the needed information, such as a call to the hospital infection control practitioner to request that he/she review the medical chart.

6 ENTRY INTO CDRSS

The mandatory fields in CDRSS include: disease, last name, county, municipality, gender, race, ethnicity, case status and report status.

The following table can be used as a reference guide to determine which CDRSS fields need to be completed for accurate and complete reporting of babesiosis surveillance cases. The “CDRSS Screen” column includes the tabs which appear along the top of the of the CDRSS screen. The “Required Information” column provides detailed explanations of what data should be entered.

CDRSS Screen	Required Information
Patient Info	Enter the disease name (“BABESIOSIS”), patient demographic information, illness onset date, and the date the case was reported to the local health department (LHD). There are no subgroups for this disease.
Addresses	Enter any alternate address (e.g., a second residence outside of the U.S.). Use the Comments section in this screen to record any pertinent information about the alternate address. Entering an alternate address will allow other disease investigators access to the case if the alternate address falls within their jurisdiction.

CDRSS Screen	Required Information
Clinical Status	Enter any treatment that the patient received and record the names of the medical facilities and physician(s) involved in the patient's care. If the patient received care from two or more hospitals, be sure that all are entered so the case can be accessed by all infection control professionals (ICPs) covering these facilities. If the patient died, date of death should be recorded under the Mortality section.
Signs/Symptoms	IMPORTANT: Check appropriate boxes for signs and symptoms and indicate the date of onset. Make every effort to interview the physician, ICP, or others who can provide information on the patient's illness. It is especially important to get information regarding anemia or thrombocytopenia, as these will be important in determining if the case meets the surveillance case definition.
Risk Factors	Enter information concerning tick bite history, as well as travel history if patient is from a non-endemic county. Also ask about travel overseas to see if malaria might be a consideration.
Laboratory Eval	See laboratory requirements in case definition. Low IgG or IgM values are not considered reactive or positive for our case definition. Please list specific antibody test performed (IgG and/or IgM) as well as the numeric titer value. Organism may also be identified on a blood smear – please note if organism was identified and any comments made by the laboratorian, such as percent parasitemia, etc.
Contact Tracing	None
Case Comments	Enter general comments (i.e., information that is not discretely captured by a specific topic screen or drop-down menu) in the Comments section. NOTE: Select pieces of information entered in the Comments section CANNOT be automatically exported when generating reports. Therefore, whenever possible, record information about the case in the fields that have been designated to capture this information; information included in these fields CAN be automatically exported when generating reports.
Epidemiology	Not communicable person to person. Can counsel patient and family on tick bite prevention methods.

CDRSS Screen	Required Information
<p>Case Classification Report Status</p>	<p>Case status options are: “REPORT UNDER INVESTIGATION (RUI),” “CONFIRMED,” “PROBABLE,” “POSSIBLE,” and “NOT A CASE.”</p> <ul style="list-style-type: none"> • All cases entered by laboratories (including LabCorp electronic submissions) should be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).” • Cases still under investigation by the LHD should be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).” • Upon completion of the investigation, the LHD should assign a case status on the basis of the case definition. “CONFIRMED,” “PROBABLE,” “POSSIBLE,” and “NOT A CASE”. <p>Report status options are: “PENDING,” “LHD OPEN,” “LHD REVIEW,” “LHD CLOSED,” “DELETE,” “REOPENED,” “DHSS OPEN,” “DHSS REVIEW,” and “DHSS APPROVED.”</p> <ul style="list-style-type: none"> • Cases reported by laboratories (including LabCorp electronic submissions) should be assigned a report status of “PENDING.” • Once the LHD begins investigating a case, the report status should be changed to “LHD OPEN.” • The “LHD REVIEW” option can be used if the LHD has a person who reviews the case before it is closed (e.g., health officer or director of nursing). • Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to “LHD CLOSED.” • “LHD CLOSED” cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to “REOPENED” and the LHD will be notified by e-mail. Cases that are “DHSS APPROVED” cannot be edited by LHD staff. <p>If a case is inappropriately entered, the case should be assigned a report status of “DELETE.” A report status of “DELETE” should NOT be used if a reported case of babesiosis simply does not meet case definition. Rather, it should be assigned a “NOT A CASE” status.</p>

If you have any questions on case definitions or investigations on babesiosis, please call Dr. Faye Sorhage at IZDP at 609.588.3121 or e-mail her at Faye.Sorhage@doh.state.nj.us.

7 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (NJAC 8:57-1.10)

1. Minimum Period of Isolation of Patient

No restrictions except permanent exclusion from blood donation.

2. Minimum Period of Quarantine of Contacts

No restrictions.

B. Protection of Contacts of a Case

None, except testing of neonates born during maternal infection with *Babesia* should be performed to ascertain if there has been in-utero transmission.

C. Managing Special Situations

8 OUTBREAK SITUATIONS

Not applicable.

9 PREVENTIVE MEASURES

A. Immunization

Not available.

B. Environmental Measures

To prevent babesiosis, advise residents to make their yard less attractive to ticks and small rodents through

- Removal of leaf litter and brush from around the home.
- Pruning low-lying bushes to let in more sunlight.
- Mowing lawns regularly.
- Keeping woodpiles in sunny areas and off the ground.
- Cleaning up the ground around bird feeders.

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- If using acaricides, always following label directions closely.

C. Personal Preventive Measures/Education

The best preventive measure is to avoid tick-infested areas. In areas where contact with ticks may occur, individuals should be advised to

- Wear long-sleeved shirts and long, light-colored pants tucked into socks or boots.
- Stay on trails when walking or hiking and try to avoid high grass areas.
- Use insect repellents properly. Repellants that contain DEET (diethyltoluamide) should be used in concentrations no higher than 15% for children and 30% for adults. Remember that repellents should NEVER be used on infants. Permethrin is a repellent that can be applied only on clothing, NOT on exposed skin.
- Perform tick checks on themselves and family members (including pets) after any day spent in a tick-infested area. Parts of the body ticks like most include the back of the knee, armpit, scalp, groin, and back of the neck. Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out with steady pressure.

Additional Information

A Babesiosis Fact Sheet can be obtained at the NJDHSS Web site at:
http://nj.gov/health/cd/f_babesios.htm.

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