Anaplasmosis

3/10/2025

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Cases should be reported to the local health department where the patient resides. If patient residence is unknown, report to your own local health department. Contact information is available at: http://localhealth.nj.gov.

If the individual does not live in New Jersey, report the case to the New Jersey Department of Health at: (609) 826-5964.

1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Anaplasmosis is a tickborne rickettsial (intracellular bacterial) disease that share similar clinical features yet are epidemiologically and etiologically distinct from ehrlichiosis (described separately). Spotted Fever Group Rickettsiosis (including Rocky Mountain Spotted Fever) are another group of tickborne rickettsial disease and are described separately.

Anaplasmosis is caused by the bacterium *Anaplasma phagocytophilum* and is also known as human granulocytic anaplasmosis (HGA), *formerly* human granulocytic ehrlichiosis (HGE).

B. Clinical Description

Anaplasmosis is characterized by an acute onset of illness typically presenting 1-2 weeks after a tick bite with a combination of nonspecific symptoms, such as fever, chills/sweats, headache, myalgia or fatigue/malaise. Common laboratory findings include anemia, leukopenia, thrombocytopenia, increased hepatic transaminase levels or elevated C-reactive protein, and anemia.

Risk factors for severe anaplasmosis include delayed treatment, advanced age and other causes of impaired immune function (e.g., HIV, prior organ transplants, malignancy, corticosteroid therapy). Severe cases can be associated with acute respiratory distress syndrome, disseminated intravascular coagulation, organ failure and death.

The tick vector for *A. phagocytophilum* may also carry the organisms that cause Lyme disease and babesiosis. In persons with anaplasmosis, rash is rarely reported and the presence of a rash may signify that the patient has a coinfection with another pathogen, such as the agents of Lyme disease and babesiosis.

Treatment

CDC recommends doxycycline as the drug of choice for treatment of all tickborne rickettsial diseases in patients of all ages, including children aged <8 years. Doxycycline is most effective at preventing severe complications if it is started within the first week of illness.

Clinical Care of Anaplasmosis: https://www.cdc.gov/anaplasmosis/hcp/clinical-care/index.html

C. Vectors and Reservoirs

In New Jersey, the primary vector for anaplasmosis is the blacklegged or deer tick (*Ixodes scapularis*). This is the same tick associated with Lyme disease, babesiosis, and Powassan virus. The natural animal reservoir for anaplasmosis is not known but are most likely small rodents.

D. Modes of Transmission

A. phagocytophilum is primarily spread to people by the bite of an infected tick. The duration of time the tick must remain attached before the transmission of infectious organisms occurs is unclear. Because tick bites may be painless and may occur on parts of the body that are difficult to observe, unrecognized tick bites are common in patients who are later confirmed to have a tickborne rickettsial disease.

Transmission of *A. phagocytophilum* via blood transfusion and organ transplantation has been reported infrequently.

E. Incubation Period

Symptoms generally appear 1-2 weeks after a tick bite. While data after blood transfusion or organ transplant is lacking, persons who develop ehrlichiosis within 30 days should be reported to public health for investigation.

F. Period of Communicability or Infectious Period

Because these bacteria infect the white blood cells and circulate in the blood stream, there is a risk of transmission via blood transfusion and organ transplantation. Infected donors who are asymptomatic or in the pre-symptomatic period pose the greatest risk to the blood supply.

G. Epidemiology

The epidemiology of anaplasmosis reflects the geographic distribution and seasonal activities of the blacklegged or deer tick (*I. scapularis*), as well as the human behaviors that place persons at risk for tick exposure, tick attachment, and subsequent infection. In the United States, cases have been reported in each month of the year, although most cases are reported during the summer months and a peak in cases typically occurs in June and July with a second smaller peak occurring in October and November when adult blacklegged ticks are most active. The number of anaplasmosis cases reported to CDC has increased steadily since the disease became reportable, from 348 cases in 2000, to a peak or 5,762 in 2017. Cases reported in 2018 were substantially lower but increased to near 2017 numbers in 2019 with 5,655 cases. The case fatality rate has remained low, at less than 1%.

Between 2019-2023, an average of 156 cases per year were reported in New Jersey (ranging from 115 to 202), with the highest incidence rates in the northwestern counties (refer to the NJDOH Vector-borne Disease Dashboard). Over half of all reported cases (2019-2023) were male and 52% were between 50-79 years of age. Approximately 10% of reported cases were in children.

2 CASE DEFINITION

NJDOH follows the current case definition as published on the CDC National Notifiable Disease Surveillance System (NNDSS) website.
Anaplasmosis Case Definition: https://ndc.services.cdc.gov/conditions/anaplasmosis/

Case definitions enable public health to classify and count cases consistently across reporting jurisdictions and should not be used by healthcare providers to determine how to meet an individual patient's health needs.

A. NEW! 2024 Case Definition

The anaplasmosis case definition is now distinct from the ehrlichiosis case definition. However, as with the prior case definition, cases should not be classified as cases for both anaplasmosis and ehrlichiosis based on serologic evidence alone. Public health agencies should use a combination of titer levels, information about the location of possible exposures, clinical manifestations, and the incidence of a particular disease in the geographic areas of exposure to help determine the appropriate disease type for individual patients.

Updates to the case definition include:

- IgM and ELISA test results are no longer laboratory evidence for case classification.
- Antibody titer results <1:128 do not require investigation.
- Flexibility in the timing of a convalescent sample has been increased from 2-4 weeks to 2-10 weeks from onset.
- To count as laboratory evidence for case classification, samples for serologic and smear testing (presumptive laboratory evidence) must be collected within 60 days of illness onset.
- Clinical evidence is stratified into objective and subjective categories. Reports with only presumptive laboratory evidence require stronger clinical evidence to be classified as a case, while reports with confirmatory lab evidence have less strict requirements.
- Fever is no longer required for confirmed cases.
- Fatigue/malaise has been added as subjective clinical evidence.
- A person previously reported as a probable or confirmed case-patient may be counted as a new case when there is an episode of new clinically compatible illness with confirmatory laboratory evidence.

B. Clinical Description (for the purpose of surveillance)

- Objective clinical evidence: fever as reported by patient or healthcare provider, anemia, leukopenia, thrombocytopenia, any hepatic transaminase elevation, or elevated C-reactive protein
- Subjective clinical evidence: chills/sweats, headache, myalgia, or fatigue/malaise

C. Laboratory Criteria

Confirmatory:

- Detection of *A. phagocytophilum* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, nucleic acid amplification tests (NAAT), or other molecular testing, **OR**
- Serological evidence of a four-fold change[1] in IgG-specific antibody titer to *A. phagocytophilum* antigen by indirect immunofluorescence assay (IFA) in paired serum samples (one taken in the first two weeks after illness onset and a second taken two to ten weeks after acute specimen collection)[2], **OR**
- Demonstration of anaplasmal antigen in a biopsy or autopsy sample by immunohistochemical methods, **OR**
- Isolation of *A. phagocytophilum* from a clinical specimen in cell culture with molecular confirmation (e.g., PCR or sequencing)

Notes: [1]A four-fold change in titer is equivalent to a change of two dilutions (e.g., 1:64 to 1:256). [2]A four-fold rise in titer should not be excluded as confirmatory laboratory criteria if the acute and convalescent specimens are collected within two weeks of one another.

Presumptive:

- Serological evidence of elevated IgG antibody reactive with *A. phagocytophilum* antigen by IFA at a titer ≥1:128 in a sample taken within 60 days of illness onset, **OR**

- Microscopic identification of intracytoplasmic morulae in leukocytes in a sample taken within 60 days of illness onset.

D. Case Classification

CONFIRMED

Meets confirmatory laboratory evidence AND at least one of the objective or subjective clinical evidence criteria

PROBABLE

- Meets presumptive laboratory evidence with fever as reported by patient or healthcare provider **AND** at least one other objective or subjective clinical evidence criterion (excluding chills/sweats), **OR**

- Meets presumptive laboratory evidence without a reported fever but with chills/sweats **AND**

    - at least one objective clinical evidence criterion, **OR**

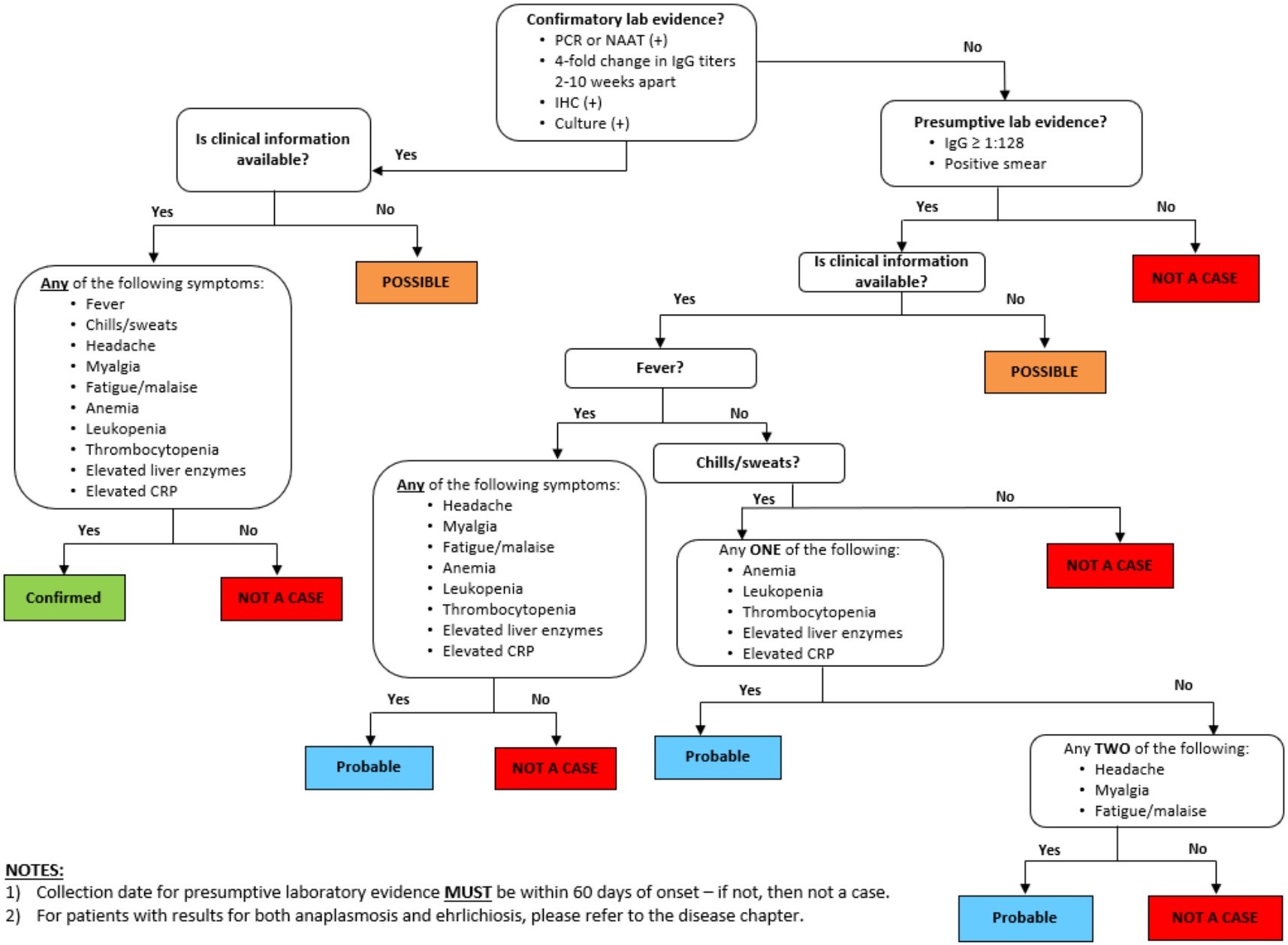
- two other subjective clinical evidence criteria.

POSSIBLE

Meets confirmatory or presumptive laboratory evidence with no or insufficient clinical information to classify as a confirmed or probable case (e.g., a laboratory report only)

Anaplasmosis

Anaplasmosis National Surveillance Case Definition - 2024



NOTES:

1) Collection date for presumptive laboratory evidence **MUST** be within 60 days of onset – if not, then not a case.
2) For patients with results for both anaplasmosis and ehrlichiosis, please refer to the disease chapter.

Criteria to Distinguish a New Case of Anaplasmosis from a Prior Case

A person previously reported as a probable or confirmed case-patient may be counted as a new case when there is an episode of new clinically compatible illness with confirmatory laboratory evidence.

3 LABORATORY TESTING

Laboratory confirmation of anaplasmosis requires molecular or culture-based methods. Organisms may also be observed in blood smears, but microscopic identification can't definitively distinguish between ehrlichiosis and anaplasmosis.

Microscopic identification: The bacteria responsible for anaplasmosis is intracellular (*A. phagocytophilum)* and is found primarily in granulocytes. They tend to multiply and form clusters of bacteria called morulae that can be identified through microscopic identification (blood smear) during the first week of illness. However, blood smear examination is relatively insensitive and should not be relied upon solely to diagnose anaplasmosis. The observance of morulae in a particular cell type cannot conclusively differentiate between *Anaplasma* and *Ehrlichia* species.

Nucleic acid testing: During the acute phase of illness, whole blood can be tested by PCR methods. PCR is most sensitive in the first week of illness and quickly decreases in sensitivity after the administration of appropriate antibiotics (within 24-48 hours). PCR might also be used to amplify DNA in solid tissue and bone marrow specimens.

Serology: It usually takes 7-10 days after symptom onset to develop detectable antibody titers, so a negative test during this time does not rule out infection. Indirect immunofluorescence assay (IFA) performed on paired serum samples can be used to demonstrate a significant (four-fold) rise in antibody titers. The first sample should be taken as early in the disease as possible, preferably in the first two weeks of symptoms, and the second sample should be taken 2 to 10 weeks later. In most cases, the first IgG IFA titer is typically low, or "negative," and the second typically shows a significant (four-fold) increase in IgG antibody levels. IgM antibodies usually rise at the same time as IgG near the end of the first week of illness and remain elevated for months or longer. Also, IgM antibodies are less specific than IgG antibodies and more likely to result in a false positive. For these reasons, physicians requesting IgM serologic titers should also request a concurrent IgG titer.

Serologic tests based on enzyme immunoassay (EIA) technology are available, but are qualitative rather than quantitative, meaning they only provide a positive/negative result, and are less useful to measure changes in antibody titers between paired specimens. Furthermore, some EIA assays rely

on the evaluation of IgM antibody alone, which may have a higher frequency of false positive results. EIA test results do not meet public health case definition.

Antibodies may remain elevated for months or longer after the disease has resolved or may be detected in persons who were previously exposed to antigenically related organisms. Therefore, if only one sample is tested it can be difficult to interpret, while paired samples taken weeks apart demonstrating a significant (four-fold) rise in antibody titer provides the best evidence for a correct diagnosis.

Culture: Culture is only available at specialized laboratories and is not widely used.

The Division of Public Health and Environmental Laboratories (PHEL) does not provide testing for anaplasmosis, but testing is available at commercial laboratories.

4 PURPOSE OF SURVEILLANCE AND REPORTING

- To better understand the local epidemiology of infection with *A. phagocytophilum*
- To recognize areas in New Jersey where incidence of disease has changed (increased or decreased)
- To focus preventive education

5 CASE INVESTIGATION

A. Investigation

Local health departments are asked to investigate anaplasmosis reports and close cases in CDRSS within 2 weeks of case creation. The NJDOH Anaplasmosis Investigation Worksheet may be used to help guide the patient or physician interview. If there is only a single serological test result, ask healthcare provider if an acute (or convalescent) test was ordered; request that negative test results be sent to LHD, and then enter into CDRSS. Information collected using the worksheet should be documented in CDRSS. Worksheets should not be sent to NJDOH unless requested.

A minimum of 3 attempts should be made to obtain information. Attempts to both the healthcare provider/infection preventionist and patient should be made before closing the case. After 3 attempts, enter what is known into CDRSS, including attempts to obtain information (dates and results of the attempts), and classify/close the case according to the case definition.

Beginning in 2024, a person previously reported as a probable or confirmed case-patient may be counted as a new case when there is an episode of new clinically compatible illness with confirmatory laboratory evidence. Local health departments should check for prior cases for all investigations without confirmatory test results. Also, to count as laboratory evidence for case classification, samples for serologic and smear testing (presumptive laboratory evidence) must be collected within 60 days of illness onset.

B. Key CDRSS Fields Specific for Anaplasmosis

CDRSS Screen	Required Information
Disease Information	• Ensure correct subgroup is selected.
Patient Personal Information	• Ensure name, sex, date of birth, race and ethnicity are entered.
Laboratory and Diagnostic Test Information	• Review test result to determine if it meets laboratory criteria for case definition. To count as laboratory evidence for case classification, samples for serologic and smear testing (presumptive laboratory evidence) must be collected within 60 days of illness onset.
Additional Requirements	• Enter information on severe clinical complications, immunocompromising conditions and blood donation. • If the patient donated blood in the 30 days prior to illness onset/diagnosis, document the date and location of donation. Notify the CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email. • NJDOH CDS Vector-borne Disease staff will complete questions related to transfusion-associated infections.
Clinical Status	• Enter illness onset date, hospitalization (as part of this investigation), pre-existing conditions and mortality information.
Contact Tracing	• In transfusion transmitted infection investigations, the donor and recipient information will be linked by CDS Vector-borne Disease staff.
Industry and Occupation Information	• Indicate the patient's occupation and industry/work setting
Medical Facility and Provider Information	• For admitted/hospitalized patients, ensure patient status is marked as INPATIENT and admission and discharge dates are entered.

CDRSS Screen	Required Information
Risk Factors	• Answer all risk factors questions (i.e., known tick exposures). Focus on two weeks prior to illness onset and note tick bite and travel history (exposure history). • Ask about receipt of blood transfusion or solid organ transplant in the year prior to symptom onset. Include dates and hospital where blood/organ products were received. Notify the REP and CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email. • Ask about organ donation in the 30 days prior to illness onset. Include dates and hospital where organ was donated. Notify the REP and CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email.
Signs/Symptoms	• Inquire if the patient had each sign/symptom and update the response to Yes, No or Unknown accordingly. Not Asked should not be left as a default response. Enter onset and resolution dates, if known. • In addition to asking about clinical symptoms, ask healthcare provider about other lab work, specifically anemia, leukopenia, thrombocytopenia, and elevated liver enzymes and enter values in attribute fields when possible.
Treatment	• Document all medications received with duration/dates of treatment. This should include treatment that will be continued in an outpatient setting.
Comments	• If requested information was not provided by the patient's healthcare provider, list the dates attempts were made to obtain information and the outcomes. For example, 1/12/24 faxed form to provider; 1/31/24, spoke with office manager and re-sent form; 2/15/24, refaxed form to provider. • Missing information should be obtained by interviewing the patient. If the patient is non-responsive, document attempts and call outcomes in Comments section as well. • If a confirmed or probable case of ehrlichiosis was reported in CDRSS on or after January 1, 2024 and a subsequent case is created that only meets presumptive lab evidence, document this, referencing the prior case ID# in comments when closing current case as Not a Case.

6 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements/Protection of Contacts of a Case

There are no isolation or quarantine restrictions.

B. Managing Special Situations

Transfusion-Associated Cases

If the patient received one or more blood transfusions in the 12 months prior to illness onset, contact the infection preventionist at the facility(s) where the transfusion(s) took place and request a list of the transfusions, including:

1. Date transfused
2. Healthcare facility where transfused
3. Type of blood product (red blood cells, platelets, plasma, other)
4. Source of blood product (blood center name)

Enter this information into the Comments and Risk Factors section of CDRSS. Notify the CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email with the information above. CDS will reach out to the blood center for further investigation.

Transplant Transmitted Cases

If the patient received one or more organ transplants in the year prior to illness onset, contact the infection preventionist at the facility(s) where the transplant took place and request a list of the transplanted organs, including:

1. Date of transplant
2. Healthcare facility where transplant occurred
3. Organ(s) received
4. Source of organ (donation center/foundation)

Enter this information into the Comments and Risk Factors section of CDRSS. Notify the CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email with the information above. CDS will reach out to the healthcare facility for further investigation.

C. Preventive Measures

Removing a Tick

1. Remove the tick as soon as possible.
2. Use fine-tipped tweezers to grasp the tick as close to the skin as you can.
3. Pull upward with steady, even pressure. Don't twist or jerk the tick.
4. After removing the tick, clean the bite area and your hands with rubbing alcohol or soap and water.
5. Dispose of the tick by putting it in alcohol, placing it in a sealed container (e.g. plastic bag), wrapping it tightly in tape, or flushing it down the toilet. Never crush a tick with fingers. Petroleum jelly, a hot match, nail polish, or other products should not be used to remove a tick.

For more information and CDC Tick Bite Bot: cdc.gov/ticks/after-a-tick-bite/

Tick Prevention

- **Know where ticks are:** ticks live in or near wooded or grassy areas. Always walk in the center of trails to avoid contact with ticks.
- **Keep your yard clean:** mow lawns, clear brush and remove leaf litter.
- **Apply insecticides:** use EPA-registered repellent with DEET on skin and permethrin on clothing, boots and camping gear. Always follow product instructions.
- **Cover up:** wear long sleeves and light-colored pants tucked into socks to prevent ticks from getting under clothes.
- **Shower:** showering (preferably within 2 hours) can help find and wash off unattached ticks.
- **Check your body for ticks:** use a hand-held or full-length mirror to view all parts of your body upon return from tick-infested areas. Parents should check their children for ticks under the arms, in and around the ears, inside the belly button, behind the knees, between the legs, around the waist and especially in their hair.
- **Examine gear and pets:** ticks can ride into the home on clothing and pets, then attach to a person later, so carefully examine pets, coats, and day packs.
- **Dry clothing:** tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors.
- **Protect pets:** talk to your veterinarian about the best tick prevention products for your dog and tickborne diseases in your area.

For more information: https://www.cdc.gov/ticks/prevention/

Tick Testing and Identification

Tick testing of individual ticks is not useful because:

- If the test shows that the tick contained disease-causing organisms, that does not necessarily mean that the person has been infected.

- If someone has been infected, they will probably develop symptoms before results of the tick testing are available. Treatment should not be delayed while waiting for tick testing results.

- Negative results can lead to false assurance. For example, the person concerned may have been unknowingly bitten by a different tick that was infected.

Tick identification may be of value when discussing tick bite exposures with a healthcare provider. County mosquito control agencies or agricultural extension offices may offer tick identification services. Online identification resources include: the TickEncounter Resource Center at the University of Rhode Island.

Tick Bite Prophylaxis

Post-tick bite antibiotic prophylaxis is not recommended to prevent anaplasmosis. People who have been bitten by a tick should watch for signs and symptoms of infection. They should see their healthcare provider if fever or other symptoms develop within two weeks of the tick bite.

The tick that transmits anaplasmosis in N.J. also transmits Lyme disease and there are recommendations for antibiotics to prevent Lyme disease after a tick bite if certain conditions are met (refer to cdc.gov/lyme/hcp/communication-resources).

Additional Information

An Anaplasmosis Fact Sheet, Investigation Worksheet and additional information can be obtained from the NJDOH website: https://www.nj.gov/health/cd/topics/anaplasmosis.shtml

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