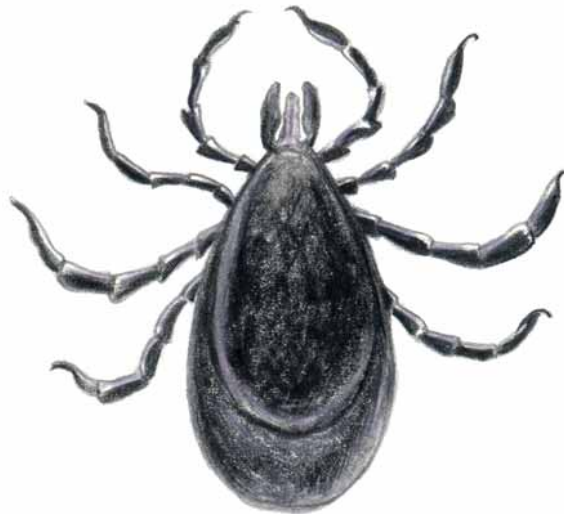


DIVISION OF
Environmental Health



**Surveillance and Control of Selected
Tick-borne Diseases in Florida**

**2009 Guidebook
DRAFT**



Purpose

This publication establishes guidelines for detecting and monitoring tick-borne and other arthropod-borne diseases and minimizing the risk of human infection. This manual identifies functions and prescribes responsibilities which will assure that appropriate prevention and control methods are initiated promptly and effectively. Please address comments to Elizabeth Radke, Division of Environmental Health, 4052 Bald Cypress Way, Bin A-08, Tallahassee, Florida 32399-1720, (850) 245-4444 x2437, FAX (850) 922-8473.

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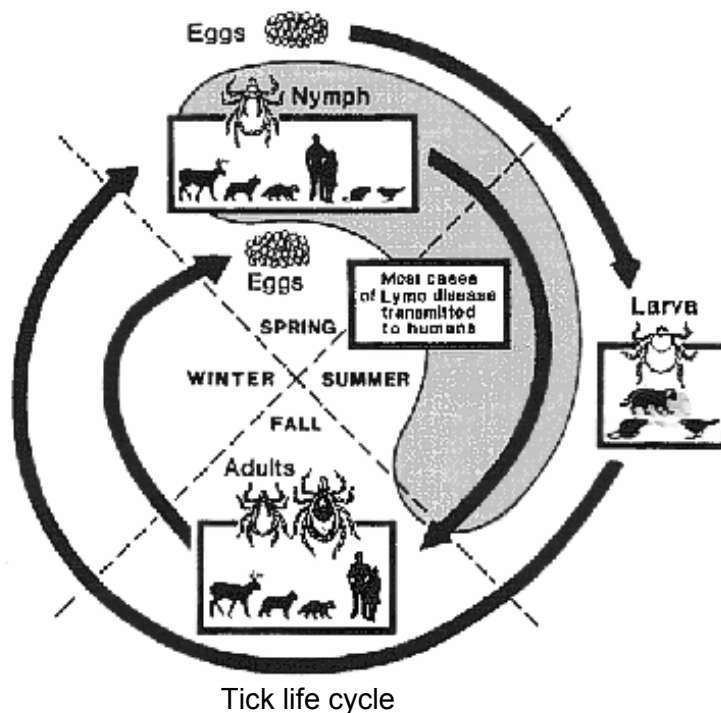
Section 1

General Information -- Selected Tick-borne Diseases

I. Overview

Ticks are an important disease vector in the United States. They are obligate blood-feeders that require an animal host to survive and reproduce. They feed on a wide variety of mammals, birds, reptiles, and amphibians. In Florida, a number of tick-borne disease cases are reported each year, including Lyme disease, Rocky Mountain Spotted Fever, Ehrlichiosis (HME), and Anaplasmosis (HGA). Most people become infected with these diseases through tick bites during the spring and summer months. Treatment is effective in most cases if the infection is detected early in the course of the disease. However, many of these diseases can be difficult to diagnose because many of the symptoms are non-specific so it is important to identify any possible tick exposure.

The life cycle of most ticks that transmit disease in the United States requires two years for completion and includes the egg, the six-legged larva, the eight-legged immature nymph, and the eight-legged mature adult. At each stage, a blood meal is required for morphogenesis to the next stage. During feeding, they typically remain attached to the host for hours or days at a time. Most human disease is transmitted in the second year during the nymph stage.



There is no evidence that tick-borne diseases can be transmitted directly from person to person or from animal to person without a tick vector. Studies have shown that the Lyme disease bacteria can live in blood that is stored for donation, so individuals being treated for these diseases should not donate blood until treatment is completed. During pregnancy, Lyme disease can infect the placenta, however, with appropriate antibiotic therapy for the mother, no negative effects on the fetus have been found.

I. Lyme Disease

Lyme disease (LD) is caused by a spirochete bacterium known as *Borrelia burgdorferi*. The disease derives its name from Lyme, Connecticut, where cases of unusual juvenile arthritis were first studied in the early 1970s, and the agent later identified as being transmitted through infected ticks. Other *Borrelia* spp. have been found to cause Lyme borreliosis in Europe and Asia. The black-legged tick, *Ixodes scapularis*, is the suspected vector in the southeast U.S. Ticks acquire the spirochete by feeding on wild mice and other rodents that serve as the primary reservoir of infection. The spirochete thrives and multiplies within certain species of ticks and during subsequent feeding is transmitted to other hosts. The presence of larger animals, such as deer, is known to be important in maintaining large tick populations in an endemic area. Recent research has suggested that *I. scapularis* prefer feeding on reptile hosts in Florida, which are inefficient reservoirs for *B. burgdorferi*. This may contribute to the relatively low prevalence of Lyme disease in Florida compared with other states.



Male and female *Ixodes scapularis*

Studies have shown that both nymph and adult ticks need to be attached for more than 24 hours to effectively transmit the infection, so it is ideal to regularly check for ticks and remove them immediately before transmission occurs. If bitten by an infected tick (often nymphal stages), many people (60-80%) will experience a red, “bull’s eye” rash (erythema migrans or EM) three to 32 (median=11) days later. The rash does not always occur at the site of the bite, but may appear at the armpit, groin or back of the knee. Other symptoms of LD include fatigue, neck stiffness, muscle aches, meningitis, conjunctivitis, and flu-like symptoms such as headaches, chills, fever or dizziness. Later stage symptoms may not appear until weeks, months, or years after the tick bite and can include neurologic and musculoskeletal problems. Most commonly, recurrent arthritis occurs affecting large joints, particularly the knees. Rarely, children experience cardiac involvement such as heart block caused by carditis. Unless treated with antibiotics within the first few months of infection, LD can become a highly debilitating, but rarely fatal illness capable of producing symptoms in both humans and domestic animals (i.e., dogs, cats, horses and cattle). A few patients, especially those diagnosed in the later stages of disease, may have persistent or recurrent symptoms. These patients may benefit from a second course of antibiotic therapy. However, longer courses of antibiotic therapy have not been shown to be beneficial and have been linked to serious complications. The recommended maximum duration of a single course of therapy is four weeks.



Erythema migrans associated with Lyme Disease

Serologic tests available for LD diagnostics include IFA, EIA, and immunoblotting. Poorly standardized tests must be interpreted cautiously. False-positive reactions may result from cross-reacting IFA and EIA antibodies in patients with syphilis, leptospirosis, Rocky Mountain spotted fever, infectious mononucleosis, lupus or rheumatoid arthritis. Antibiotic treatment during the early stages of the disease may limit the antibody response; however serum samples from persons with disseminated or late-stage LD almost always have a strong IgG reactivity with a typical banding pattern to *B. burgdorferi* antigens by Western immunoblotting. Skin biopsies of the EM lesion may yield *Borrelia* organisms.

LD occurs throughout the continental US with highest incidence in foci in the northeastern, north central, mid-Atlantic and northern Pacific regions. Most cases of human illness occur in the late spring and summer when nymphs are active and humans participate in more outdoor activity. LD case reporting has risen substantially over the last decade, at least in part because of greater awareness of the illness. There are concerns LD is over-diagnosed, resulting in inappropriate treatment in some cases.

Reported Cases of Lyme Disease -- United States, 2007



1 dot placed randomly within county of residence for each reported case

Map from CDC

LD occurs only sporadically in the southern states. 466 cases were reported as confirmed or probable in Florida from 1999-2007. 88 were reported in 2008. From 1999-2008, 168 (30%)

were reported as having been acquired in Florida (35 unknown). Most people with LD acquired their infection in the northeast U.S.

It is rare to recover *B. burgdorferi* organisms from skin biopsies of EM lesions from individuals bitten by ticks in the southeastern U.S. However, tick-bite associated EM lesions do occur. Studies are under way to determine if a related spirochete, *Borrelia lonestari*, isolated from *Amblyomma americanum*, the Lone Star tick, is the cause.

II. Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) was first recorded in 1896 when human cases were described in Idaho. The disease is caused by the bacterium *Rickettsia rickettsii* and in Florida is transmitted primarily by the American Dog Tick (*Dermacentor variabilis*). Ticks become infected either by feeding on rickettsemic small mammals that amplify the bacteria or transovarially (from infected female to progeny). The tick can then infect a human or animal during a subsequent feeding. Humans are considered accidental hosts and are not part of the natural transmission cycle. Dogs are also susceptible to infection. A tick bite may or may not be apparent as small nymphal stages can often go unnoticed.



Male and female *Dermacentor variabilis*

In most cases a mild febrile illness develops after an incubation period of a 2 -14 days, including stomach pain, joint pain, and diarrhea. About 60-70% of cases also develop a maculopapular rash that appears first on the extremities and spreads to the trunk. Illness can last as long as three weeks and can be severe, with possible central nervous system, cardiac, pulmonary, gastrointestinal tract, and renal involvement. Laboratory findings include thrombocytopenia and hyponatremia. RMSF is considered the most severe tick-borne disease in the U.S. with a 20% fatality rate among untreated cases. Even in cases treated with the appropriate antibiotic therapy, fatality rates can range from 5-10%, though this can vary by geographic location. Significant long-term sequelae are common in patients with severe disease.



Rash associated with RMSF

RMSF can be difficult to diagnose because many of the symptoms are non-specific. It is important to identify any tick bites that have occurred. Cases detected early in the course of disease can be easily treated with antibiotics. If a physician thinks that a person has RMSF, it is recommended that treatment begin right away, without waiting for laboratory results. Cases detected later in the course of illness are more likely to be severe and require hospitalization. In the past, the disease would kill up to 87% of those infected. With current treatment, approximately 3% to 5% of the people who become ill with RMSF die from the disease. The elderly, African-Americans (particularly men), and chronic alcohol abusers may be at increased risk for severe disease.

RMSF is only found in the western hemisphere. In the United States, the areas of greatest incidence are the southeastern and south central regions of the country. Nationwide, the average annual incidence was 2.2 cases per million people, with large variability between years. It is likely that many more cases go unreported. In Florida, the reported incidence has increased markedly in recent years, possibly to increased disease awareness and reporting. 154 cases of RMSF were reported from 1999 through 2008 (19 in 2008). Of these, 70% were acquired in Florida and the rest were acquired while the person was traveling in another state or country. Over half (71%) the cases were male, and most of the cases were also white (81%). Of the infections acquired in Florida, the majority were reported from counties in the northern and central regions of the state. The number of cases increased during the summer months from April through September, though cases are reported in Florida year-round.

III. *Rickettsia parkeri*

Serologic tests for *R. rickettsii* are known to cross-react with other rickettsial species, including *Rickettsia parkeri*. This has led to speculation that some of the less severe RMSF cases reported in recent years may actually be due to *R. parkeri*. In Tennessee, where there has been increasing reports of RMSF, tick surveys did not identify any ticks that were positive for *R. rickettsii*. Ticks were positive for four other rickettsial species, including *R. parkeri* and *R. amblyommii*, causing further speculation that some reported cases of RMSF may be caused by other species.

R. parkeri is transmitted by the Gulf Coast tick (*Amblyomma maculatum*). It has been identified in many of the southern states, including Florida. Cases have been reported throughout the range of the Gulf Coast tick, one probable case was reported in Florida in 2007. Lone star ticks may also be a potential vector.

In the limited number of confirmed cases, symptoms appeared 2-10 days after a tick bite. Unlike Rocky Mountain spotted fever (RMSF), *R. parkeri* cases may have an inoculation eschar resembling a sore or pimple at the site of infection, which is often the first symptom. Symptoms also included fever, fatigue, headache, muscle pain, and generalized rash.

IV. Ehrlichiosis and Anaplasmosis

Bacteria in the genera Ehrlichia and Anaplasma can also cause fever illnesses in humans with a potentially fatal outcome. *E. chaffeensis*, discovered in 1987, causes what is sometimes referred to as human monocytic ehrlichiosis (HME). What was originally thought to be a second species of *Ehrlichia* causing human granulocytic ehrlichiosis was recently reclassified as *Anaplasma phagocytophilum*. Nonspecific clinical findings make both diseases difficult to diagnose. These pathogens may account for many cases of unexplained tick-associated fevers of unknown origin, and could contribute to the misdiagnosis of some illnesses as Lyme disease.

Ehrlichia ewingii is a recently recognized human pathogen that has caused disease particularly in the immunosuppressed. Investigation into the range and vector of this pathogen is currently underway.

HME has been identified in over 1,000 patients in the United States, Europe, and Africa. Most cases in the U.S. occur in adults from rural areas of southern states between April and September. The most likely tick vector is *A. americanum*. Symptoms of HME typically appear 5 to 10 days after a tick bite (median=9 days). The spectrum of illness ranges from asymptomatic to fatal. Most cases have a nonspecific febrile illness without rash (rash occurs in approximately 60% of children and 25% of adults), with about half requiring hospitalization. About 15% have severe infections, including renal failure, disseminated intravascular coagulopathy, seizures, and coma, and 2-3% of cases are fatal. Laboratory findings often include leukopenia, thrombocytopenia, and elevated serum hepatic enzymes. Morulae of *E. chaffeensis* are occasionally found in peripheral blood. Seroconversion does not occur until convalescence and in vitro cultivation has been accomplished only twice. HME is easily treated with doxycycline; delayed therapy increases the risk of severe disease and *E. chaffeensis* is not susceptible to chloramphenicol in vitro.

Since becoming a nationally notifiable disease in 1999, nearly 3,000 cases of *A. phagocytophilum* infection have been confirmed in the United States. Infected *Ixodes scapularis* have been found in regions where this disease occurs. Disease caused by infection with *A. phagocytophilum* is clinically similar to that caused by *E. chaffeensis*, and usually presents as an undifferentiated fever without rash. Leukopenia, thrombocytopenia and mildly elevated liver function tests are frequent. Disease can be mild to severe, with elderly patients more likely to have severe disease. The case fatality rate is 2-3%. Cultivation of the causative agent has not yet been achieved, and seroconversion does not occur until convalescence. Serologic tests for *E. chaffeensis* can cross-react with tests for *A. phagocytophilum* and *E. ewingii*. Therapy with doxycycline results in defervescence within 48 hours. Also, recent reports indicate that LD patients with prolonged illness that are unresponsive to antibiotics, especially amoxicillin, may have concurrent infections with *Ehrlichia* or *Anaplasma sp.* Florida added ehrlichiosis to its list of notifiable diseases in 1996.

Most *E. chaffeensis* infections occur in people from the southeastern and south central United States. Cases of *A. phagocytophilum* more commonly occur in the north central and northeastern United States. In Florida, 71 cases of *E. chaffeensis* infection and 16 cases of *A. phagocytophilum* infection were reported from 2000-2008. Most *E. chaffeensis* infections are acquired in Florida and report exposure in northeastern or panhandle counties. Most *A. phagocytophilum* infections are acquired out-of-state.

V. Babesiosis

Babesiosis is caused by parasites of the genus *Babesia*. Only a few of the over 100 identified species are known to infect humans. *B. microti* is responsible for most human infections in the United States. Human babesiosis is endemic in the Pacific northwest, the Midwest, and northeastern coastal areas of the U.S., with cases also reported in Mexico. The tick vector, *I. scapularis*, is the same species involved in the transmission of Lyme disease. The primary reservoir host in the U.S. is the white-footed mouse.

After exposure, the incubation period ranges from 1 to 4 weeks or longer. Clinical manifestations include fever, headache, chills, and muscle weakness, with more severe disease often seen in the immunosuppressed or elderly. Seroprevalence studies have indicated that most

infections are asymptomatic. In diagnosed cases, treatment with clindamycin and quinine is recommended. If untreated, illness can last for a few weeks to several months with a prolonged recovery.

It is important to be aware of babesiosis as human cases continue to be diagnosed in other areas of the U. S., especially since blood transfusion-associated infections have been documented. However, Babesia transmitted by a tick vector is not currently considered a significant human health issue in Florida.

VI. Southern Tick-Associated Rash Illness

Southern Tick-Associated Rash Illness (STARI) or Masters disease is a Lyme-like illness that seems to be transmitted by the Lone star tick (*Amblyomma americanum*), which is the most common human-biting tick in Florida. It was identified in people with a rash and other symptoms similar to those in Lyme disease that did not have evidence of infection with *Borrelia burgdorferi* and had been bitten by a different type of tick. A related bacterium, *Borrelia lonestari* has been identified and may be the cause of the illness but is not confirmed. STARI has been discovered in Florida and research on the occurrence of the disease is underway. However, it may take some time before all the necessary information can be collected since much is still unknown about STARI.

The most obvious sign of a STARI infection is a rash called erythema migrans (EM), which has the shape of a "bull's eye". This symptom is often confused with Lyme disease, which has a similar or identical rash. The rash can be seen about seven days after the tick bite, and expands outward from the site of the bite. There may be a central area of clear skin. Other signs can include tiredness, fever, headaches, muscle and joint pain. STARI differs from Lyme disease in that chronic symptoms, such as arthritis and neurological symptoms are not likely to occur. According to past and recent studies on STARI, patients recover quickly from the rash and other symptoms after treatment with oral antibiotics.

VII. Other Arthropod-borne Diseases

In other parts of the United States, tick-borne diseases include tick paralysis, tularemia, Powassan Encephalitis, Tick borne relapsing fever, Colorado tick fever, and Bartonella species

In addition to the tick-borne diseases discussed above, there are other diseases of public health significance that are transmitted by arthropods. Mosquito-borne diseases are addressed in the 2009 Surveillance and Control of Selected Mosquito-borne Diseases in Florida Guidebook.

A. Chagas Disease (Trypanosoma cruzi infection)

The parasite *Trypanosoma cruzi* is transmitted to animals and people by blood-sucking triatomine bugs (kissing bugs). Infection can also occur from mother-to-baby, or through contaminated blood and organ donations. Chagas disease is endemic throughout much of Mexico, Central America, and South America. In the United States, most people with Chagas disease acquired their infections in endemic countries. Screening is performed by blood banks and should be confirmed with a second test (RIPA). People with positive results should be notified to pursue treatment, available to their health care provider from the CDC.

Acute Chagas disease occurs immediately after infection and is generally asymptomatic or mild with fever or swelling around site of inoculation. This phase may last up to a few weeks or

months. If untreated, infection progresses to a chronic phase, which is life-long. An estimated 30% of infected people will develop debilitating and sometimes life-threatening symptoms over the course of their lives, including heart rhythm abnormalities, a dilated heart, or a dilated esophagus or colon.

B. Leishmaniasis

Leishmaniasis is a parasitic disease caused by a type of protozoa known as trypanosomes, which are spread by the bite of infected sand flies. There are a few forms that infect humans. Cutaneous leishmaniasis is the most common form and produces large numbers of skin lesions that self heal. Mucocutaneous form begins with skin ulcers and progresses to lesions which cause massive tissue destruction of the mouth, nose, and throat cavities. Visceral form is the most serious and is often fatal if not treated. Symptoms include swelling of the spleen and liver, fever episodes, weight loss, and anemia.

Leishmaniasis is found in many parts of the world, and a few cutaneous cases have been reported from southern Texas. No locally-acquired visceral cases have been reported in the United States, but in 2000, public health authorities in the United States discovered that hunting dogs in 21 states were infected with *Leishmania infantum*, a species that can cause visceral leishmaniasis. The infection appears to be widespread in foxhounds, but so far transmission appears to be limited to dog-to-dog. However, if the local form of *L. infantum* becomes adapted for transmission by indigenous sandflies, the chances of human infection will be greatly increased.

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Section 2

Arthropod-borne Disease Control Coordination

Control of arthropod-borne diseases in Florida is coordinated through interagency cooperation at the state and local levels. Intensification of surveillance and initiation of control measures occur in response to evidence of increased transmission in nature. Different agencies become involved at various times during routine surveillance. Therefore, a crucial part of a good surveillance program is to disseminate information to the proper agencies and persons.

Roles and Responsibilities:

I. Department of Health (DOH) County Health Department (CHD)

Contact: local county health departments

- Conduct epidemiologic investigation to search for new, undetected cases and classify cases as to time (chronological distribution of cases), place (geographic distribution of residence and place of likely exposure) and person (demographics of cases).
- Facilitate submission of diagnostic specimens from physicians and hospitals as required.
- Collect reports of suspected, probable, and confirmed human cases of LD, RMSF, ehrlichiosis and other reportable arthropod-borne diseases. Confirmed and probable cases are reportable under Chapter 381, Florida Statutes.
- Provide community information and education as required.
- Coordinate with the DOH Division of Environmental Health to issue health alerts to the media or to the public.
- Report human cases in Merlin.

II. DOH Bureau of Laboratories

Contact: Department of Health Bureau of Laboratories, Tampa, (813) 974-8000; Jacksonville, (904) 791-1500.

- Conduct appropriate tests for detection of arthropod-borne diseases in humans and animals.
- Conduct appropriate tests as part of surveillance for arthropod-borne disease agents in animals and ticks.
- Report the results of all probable and confirmed human serologic tests to the CHD, the Division of Environmental Health, and to the attending physician.

III. DOH Division of Environmental Health

Contact: Division of Environmental Health, (850) 245-4299.

- Direct statewide surveillance, prevention and control programs for human arthropod-borne diseases.
- Conduct epidemiologic analyses of data from CHDs and laboratories.
- Conduct or participate in epidemiologic investigations.
- Distribute epidemiologic reports to CHDs, physicians and veterinarians, CDC and other interested parties.

- Maintain information connectivity among agencies via appropriate media including monthly electronic *EpiUpdate*, website development, and as-needed conference calls.
- Recommend health alerts to the State Health Officer.
- Coordinate prevention and control activities with DACS, DEP, Florida Tourism Board, and other key organizations.
- Coordinate with CDC in interstate and national research, prevention and control efforts.

IV. DOH State Health Office

Contact: Public Information Office, (850) 245-4111

- Review press releases as appropriate.
- Issue medical alerts.
- Coordinate media response to medical alerts.

V. Department of Agriculture and Consumer Services (DACS) Bureau of Entomology and Pest Control

Contact: Bureau of Entomology and Pest Control, (850) 921-4177 or (850) 922-7011.

- Coordinate with the Division of Environmental Health and with local CHDs before releasing vector data to the media or to the public.
- Provide technical support and other services as needed to local CHDs.

VI. DACS Division of Animal Industry and Bureau of Diagnostic Laboratory

Contact: State Agriculture Veterinarian, (850) 410-0900; State Diagnostic Laboratory (veterinary), (321) 697-1400.

- Direct statewide surveillance for animal arthropod-borne diseases.
- Conduct appropriate tests for detection of arthropod-borne diseases in animals.
- Report findings to the DOH Division of Environmental Health on a regular basis.

VII. Florida Universities

Contact: FMEL, (772) 778-7200; PHEREC, (850) 872-4184.

- Provide arthropod-borne disease research at: the Florida Medical Entomological Laboratory (FMEL), University of Florida; the John A. Mulrennan, Sr. Public Health Entomology Research and Education Center (PHEREC), Florida A&M University and University of South Florida.
- Distribute research findings.
- Provide consultation and technical assistance to disease and arthropod control agencies.

VIII. Department of Environmental Protection (DEP)

Contact: Office of the Director, Florida Park Service, (850) 245-3029.

- Coordinate efforts for arthropod control on protected public lands as needed during health threats.
- Provide consultation and technical assistance as required.

IX. Florida Fish and Wildlife Conservation Commission (FWC)

Contact: Florida Fish and Wildlife Conservation Commission, (850) 488-3831.

- Provide consultation and technical assistance as needed.

X. Florida Tourism Marketing Corporation

Contact: Visit Florida USA, (850) 488-5607.

- Provide timely and accurate prevention information to attractions, hotels/motels and travel agencies.
- Maintain a toll-free number, 888-735-2872, with appropriate health information for people wishing to visit the state.

XI. Physicians and Hospitals

Contact: local physicians and hospitals or the Florida Medical Association at (850) 224-6496.

- Report suspected cases of arthropod-borne diseases to the CHD as required by law.
- Submit appropriately timed specimens for confirmation of clinical diagnosis (e.g., CSF and sera, or paired sera drawn at least 1 week apart).

XII. Veterinarians

Contact: local veterinarians or the Florida Veterinary Medical Association at (407) 851-3862.

- Report suspected cases of LD, RMSF, and ehrlichiosis to the State Veterinarian as requested.

XIII. Centers for Disease Control and Prevention (CDC), Division of Vector-Borne Infectious Diseases

Contact: Division of Vector-Borne Diseases, (970) 221-6400.

- Provide technical assistance and laboratory support as requested.
- Coordinate with the World Health Organization and its regional offices (e.g., Pan American Health Organization) on international research, prevention, and control.

Section 3

Tick-borne Disease Prevention and Control

I. Prevention

Prevention is the best way to avoid diseases vectored by ticks. Persons involved in outdoor activities in tall grass, brushy or treed areas should follow these instructions:

1. Wear long pants and long-sleeved shirts when you are in areas where ticks are likely to be present. Wear white or light-colored clothing so you can see if any ticks are crawling on your clothes. Tuck your pants legs into your boots or socks.
2. Use repellents containing up to 30% N,N -diethyl-m-toluamide (DEET), and/or clothing-applied insecticide, such as permethrin (e.g., Permanone[®] Tick Repellent) according to labeled directions.
3. Check to remove crawling ticks at least every three hours while outdoors. Wearing light-colored clothing will make spotting ticks easier.
4. Before going to sleep or after returning indoors, remove and wash clothing or place in a tightly sealed bag for storage until washing. Conduct a full-body check for ticks followed by a shower or bath.
5. Outdoor pets should be checked frequently and treated with an acaricidal shampoo and tick preventative under the care of a veterinarian.
6. Prevent tick infestations around your home by using landscaping techniques to create a tick-free zone. For additional information on controlling ticks around the home, visit http://www.cdc.gov/ncidod/dvbid/lyme/Prevention/ld_Prevention_Control.htm

II. Control

Area pesticide spraying programs for ticks are not practical for many situations. Consultation with PHEREC is advisable before considering this procedure. Deer feeders equipped with self-treating permethrin-containing insecticide dispensers may be useful in reducing ticks in locations with large deer populations.

III. Monitoring

Diagnosis of LD, RMSF, ehrlichiosis, and anaplasmosis cannot be accurately or reliably accomplished through tick identification or by examining ticks for the presence of the disease agents. However, tick collections may be helpful in determining vector species and foci of infection, but only after tick-borne disease has been medically confirmed. Tick surveys are advisable in counties where tick-borne diseases are known to be endemic and when sufficient information exists concerning a specific locality where transmission has occurred. Technical assistance in conducting such surveys may be arranged by contacting the PHEREC, phone (850) 872-4184.

Four tick species are suspected as potential vectors of LD in the southeastern U.S.: *I. scapularis* (the black-legged tick), *A. americanum* (Lone Star tick), *A. maculatum* (Gulf Coast tick) and *D. variabilis* (American dog tick). None have been adequately incriminated as the primary vector, though the black-legged tick is the most likely vector of LD in the southeast. This is because it has exhibited a greater capability of transmitting *B. burgdorferi* under laboratory conditions and has been more commonly found naturally infected in the field. Important tick

vectors in the southeast for RMSF include *D. variabilis* and *A. americanum*. The most likely tick vector for human monocytic ehrlichiosis is *A. americanum*; for human granulocytic anaplasmosis *I. scapularis*.

All of these ticks require three different hosts to complete a life cycle, consisting of egg, larval, nymphal and adult stages. After hatching from eggs deposited on the ground usually in grassy, brushy or wooded areas, tiny six-legged larval ticks (also known as "seed" ticks) climb on vegetation and wait to cling upon passing hosts. Small rodents (woodland mice), ground birds and reptiles (lizards and snakes) most commonly serve as hosts for larval and nymphal ticks. After obtaining blood meals, larval ticks drop to the ground, molt (i.e., shed their "skin") and develop to eight-legged nymphs. Nymphs follow a similar sequence feeding on a different host before molting to the adult stage. Adult ticks usually seek larger hosts such as deer, cattle and possibly humans. Under field conditions, each of these species require 1-2 years to complete their life cycle. This period may sometimes span over 3 calendar years for eggs deposited late in the season.

Based on submissions for tick identification to the then HRS Entomology Services office (now Florida Department of Agriculture and Consumer Services, Bureau of Entomology and Pest Control), the Lone Star tick and the Gulf Coast tick are the most common human-biting species in Florida. For additional information about tick removal and identification after diagnosis, please see Appendix L.

Section 4

Surveillance Case Definitions

Ehrlichiosis/Anaplasmosis, Human *phagocytophilum*

reporting code = 08381 Ehrlichiosis/Anaplasmosis HGA, A.

reporting code = 08382 Ehrlichiosis/Anaplasmosis, HME, *E. chaffeensis*
reporting code = 08383 Ehrlichiosis/Anaplasmosis, *Ehrlichia ewingii*
reporting code = 08384 Ehrlichiosis/Anaplasmosis, Other/Undetermined
case report form: CDC 55.1 (1/08)
Tick-Borne Rickettsial Disease Case Report
MERLIN ELECTRONIC SUBMISSION

Clinical description

A tick-borne illness characterized by acute onset of fever and one or more of the following symptoms or signs: headache, myalgia, malaise, anemia, leukopenia, thrombocytopenia, or elevated hepatic transaminases. Nausea, vomiting, or rash may be present in some cases. Intracytoplasmic bacterial aggregates (morulae) may be visible in the leukocytes of some patients.

Laboratory criteria

For the purposes of surveillance,

1. *Ehrlichia chaffeensis* infection (formerly included in the category Human Monocytic Ehrlichiosis [HME]):

Laboratory confirmed:

- Serological evidence of a fourfold change in immunoglobulin G (IgG)-specific antibody titer to *E. chaffeensis* antigen by indirect immunofluorescence assay (IFA) between paired serum samples (one taken in first week of illness and a second 2-4 weeks later), **OR**
- Detection of *E. chaffeensis* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, **OR**
- Demonstration of ehrlichial antigen in a biopsy or autopsy sample by immunohistochemical methods, **OR**
- Isolation of *E. chaffeensis* from a clinical specimen in cell culture.

Laboratory supportive:

- Serological evidence of elevated IgG or IgM antibody reactive with *E. chaffeensis* antigen by IFA, enzyme-linked immunosorbent assay (ELISA), dot-ELISA, or assays in other formats (CDC uses an IFA IgG cutoff of >1:64 and does not use IgM test results independently as diagnostic support criteria.), **OR**
- Identification of morulae in the cytoplasm of monocytes or macrophages by microscopic examination.

2. *Ehrlichia ewingii* infection (formerly included in the category Ehrlichiosis [unspecified, or other agent]):

Laboratory confirmed:

- Because the organism has never been cultured, antigens are not available. Thus, *Ehrlichia ewingii* infections may only be diagnosed by molecular detection methods: *E. ewingii* DNA detected in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay.

3. *Anaplasma phagocytophilum* infection (formerly included in the category Human Granulocytic Ehrlichiosis [HGE]):

Laboratory confirmed:

- Serological evidence of a fourfold change in IgG-specific antibody titer to *A. phagocytophilum* antigen by indirect immunofluorescence assay (IFA) in paired serum samples (one taken in first week of illness and a second 2-4 weeks later), **OR**
- Detection of *A. phagocytophilum* DNA in a clinical specimen via amplification of a specific target by polymerase chain reaction (PCR) assay, **OR**
- Demonstration of anaplasma antigen in a biopsy/autopsy sample by immunohistochemical methods,

OR

- Isolation of *A. phagocytophilum* from a clinical specimen in cell culture.

Laboratory supportive:

- Serological evidence of elevated IgG or IgM antibody reactive with *A. phagocytophilum* antigen by IFA, enzyme-linked immunosorbent Assay (ELISA), dot-ELISA, or assays in other formats (CDC uses an IFA IgG cutoff of $\geq 1:64$ and does not use IgM test results independently as diagnostic support criteria.), **OR**
- Identification of morulae in the cytoplasm of neutrophils or eosinophils by microscopic examination.

4. Human ehrlichiosis/anaplasmosis – undetermined:

- See case classification

Exposure

Exposure is defined as having been in potential tick habitats within the past 14 days before onset of symptoms. A history of a tick bite is not required.

Case Classification

Confirmed: A clinically compatible case (meets clinical evidence criteria) that is laboratory confirmed.

Probable: A clinically compatible case (meets clinical evidence criteria) that has supportive laboratory results. For ehrlichiosis/anaplasmosis – an undetermined case can only be classified as probable. This occurs when a case has compatible clinical criteria with laboratory evidence to support ehrlichia/anaplasma infection, but not with sufficient clarity to definitively place it in one of the categories previously described. This may include the identification of morulae in white cells by microscopic examination in the absence of other supportive laboratory results.

Suspect: A case with laboratory evidence of past or present infection but no clinical information available (e.g. a laboratory report).

Comment

There are at least three species of bacteria, all intracellular, responsible for ehrlichiosis/anaplasmosis in the United States: *Ehrlichia chaffeensis*, found primarily in monocytes, and *Anaplasma phagocytophilum* and *Ehrlichia ewingii*, found primarily in granulocytes. The clinical signs of disease that result from infection with these agents are similar, and the range distributions of the agents overlap, so testing for one or more species may be indicated. Serologic cross-reactions may occur among tests for these etiologic agents.

Four sub-categories of confirmed or probable ehrlichiosis/anaplasmosis should be reported: 1) human ehrlichiosis caused by *Ehrlichia chaffeensis*, 2) human ehrlichiosis caused by *E. ewingii*, 3) human anaplasmosis caused by *Anaplasma phagocytophilum*, or 4) human ehrlichiosis/anaplasmosis - undetermined. Cases reported in the fourth sub-category can only be reported as “probable” because the cases are only weakly supported by ambiguous laboratory test results.

Problem cases for which sera demonstrate elevated antibody IFA responses to more than a single infectious agent are usually resolvable by comparing the levels of the antibody responses, the greater antibody response generally being that directed at the actual agent involved. Tests of additional sera and further evaluation via the use of PCR, IHC, and isolation via cell culture may be needed for further clarification. Cases involving persons infected with more than a single etiologic agent, while possible, are extremely rare and every effort should be undertaken to resolve cases that appear as such (equivalent IFA antibody titers) via other explanations. Current commercially available ELISA tests are not quantitative, cannot be used to evaluate changes in antibody titer, and hence are not useful for serological confirmation. Furthermore, IgM tests are not always specific and the IgM response may be persistent. Therefore, IgM tests are not strongly supported for use in serodiagnosis of acute disease.

Acute and convalescent sera from reported and suspect cases should be acquired on all cases and sent to the Bureau of Laboratories.

A copy of laboratory test results must accompany the paper case report form.

Lyme Disease

reporting code = 06959
case report form: CDC 52.60 (2/06)
Lyme Disease Case Report Form
MERLIN ELECTRONIC SUBMISSION

Clinical description

A systemic, tick-borne disease with protean manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is erythema migrans (EM), the initial skin lesion that occurs in 60%-80% of patients. For purposes of surveillance, EM is defined as a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing. A single primary lesion must reach greater than or equal to 5 cm in size across its largest diameter. Secondary lesions also may occur. Annular erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as EM. For most patients, the expanding EM lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mildly stiff neck, arthralgia, or myalgia. These symptoms are typically intermittent. The diagnosis of EM must be made by a physician. Laboratory confirmation is recommended for persons with no known exposure.

For purposes of surveillance, late manifestations include any of the following when an alternate explanation is not found:

- *Musculoskeletal system.* Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. Additionally, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.
- *Nervous system.* Any of the following, alone or in combination: lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Encephalomyelitis must be confirmed by demonstration of antibody production against *Borrelia burgdorferi* in the cerebrospinal fluid (CSF), evidenced by a higher titer of antibody in CSF than in serum. Headache, fatigue, paresthesia, or mildly stiff neck alone, are not criteria for neurologic involvement.
- *Cardiovascular system.* Acute onset of high-grade (2nd-degree or 3rd-degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

Laboratory criteria

- Demonstration of diagnostic IgM or IgG antibodies to *B. burgdorferi* in serum or cerebrospinal fluid (CSF) by EIA or IFA screen followed by demonstration of IgM or IgG antibodies by Western Blot (WB, same as immunoblot). When WB is used during the first 4 weeks of disease onset (early Lyme Disease), both IgM and IgG procedures should be performed*. A positive IgM test result alone is not recommended for use in determining active disease in persons with illness greater than 1 month's duration because the likelihood of a false-positive test result for a current infection is high for these persons. If a patient with suspected early Lyme Disease has a negative serology, serologic evidence of infection is best obtained by testing of paired acute- and convalescent-phase serum samples. Serum samples from persons with disseminated or late-stage Lyme Disease almost always have a strong IgG response to *Borrelia burgdorferi* antigens.¹ OR

- Isolation of *Borrelia burgdorferi* from a clinical specimen OR
- A single positive IgG immunoblot*

For the purposes of surveillance, the definition of a qualified laboratory assay is

- A positive culture for *B. burgdorferi*, [1], OR
- A two-tier testing (EIA or IFA followed by WB) interpreted using established criteria*, OR
- A single-tier IgG immunoblot seropositivity interpreted using established criteria*. [3]

*An **IgM immunoblot** is considered positive if a band is present at two of the following three locations: 21-25 kDa (OspC)**, 39 kDa (BmpA), and 41 kDa (Fla).

An **IgG immunoblot** is considered positive if a band is present at five of the following 10 locations: 18 kDa, 21-25 kDa (OspC)**, 28 kDa, 30 kDa, 39 kDa (BmpA), 41 kDa (Fla), 45 kDa, 58 kDa (not GroEL), 66kDa, and 93 kDa.³

**The apparent molecular mass of OspC is dependent on the strain of *B. burgdorferi* being tested. The weight of this particular protein can range from 21-25 kDa.

Exposure

Exposure is defined as having been (less than or equal to 30 days before onset of EM) in wooded, brushy, or grassy areas (i.e., potential tick habitats) in a county in which Lyme disease is endemic. A history of tick bite is not required. For surveillance purposes, the state of Florida is considered Lyme endemic.

Case classification

Confirmed: a) a case of EM with a known exposure (as defined above), or b) a case of EM with laboratory evidence of infection (as defined above) and without a known exposure or c) a case with at least one late manifestation that has laboratory evidence of infection.

Probable: any other case of physician-diagnosed Lyme disease that has laboratory evidence of infection (as defined above).

Suspect: a) a case of EM where there is no known exposure (as defined above) and no laboratory evidence of infection (as defined above), or b) a case with laboratory evidence of infection but no clinical information available (e.g. a laboratory report).

Comment

Lyme disease reports will not be considered cases if the medical provider specifically states this is not a case of Lyme disease, or the only symptom listed is "tick bite" or "insect bite."

[1] Centers for Disease Control and Prevention. Recommendations for test performance and interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. MMWR MMWR Morb Mortal Wkly Rep 1995; 44:590-1.

[2] Dressler F, Whalen JA, Reinhardt BN, Steere AC. Western blotting in the serodiagnosis of Lyme disease. J Infect Dis 1993; 167:392-00.

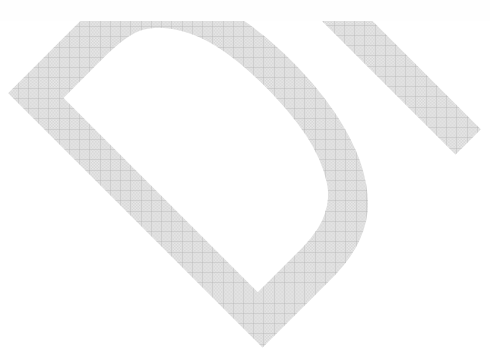
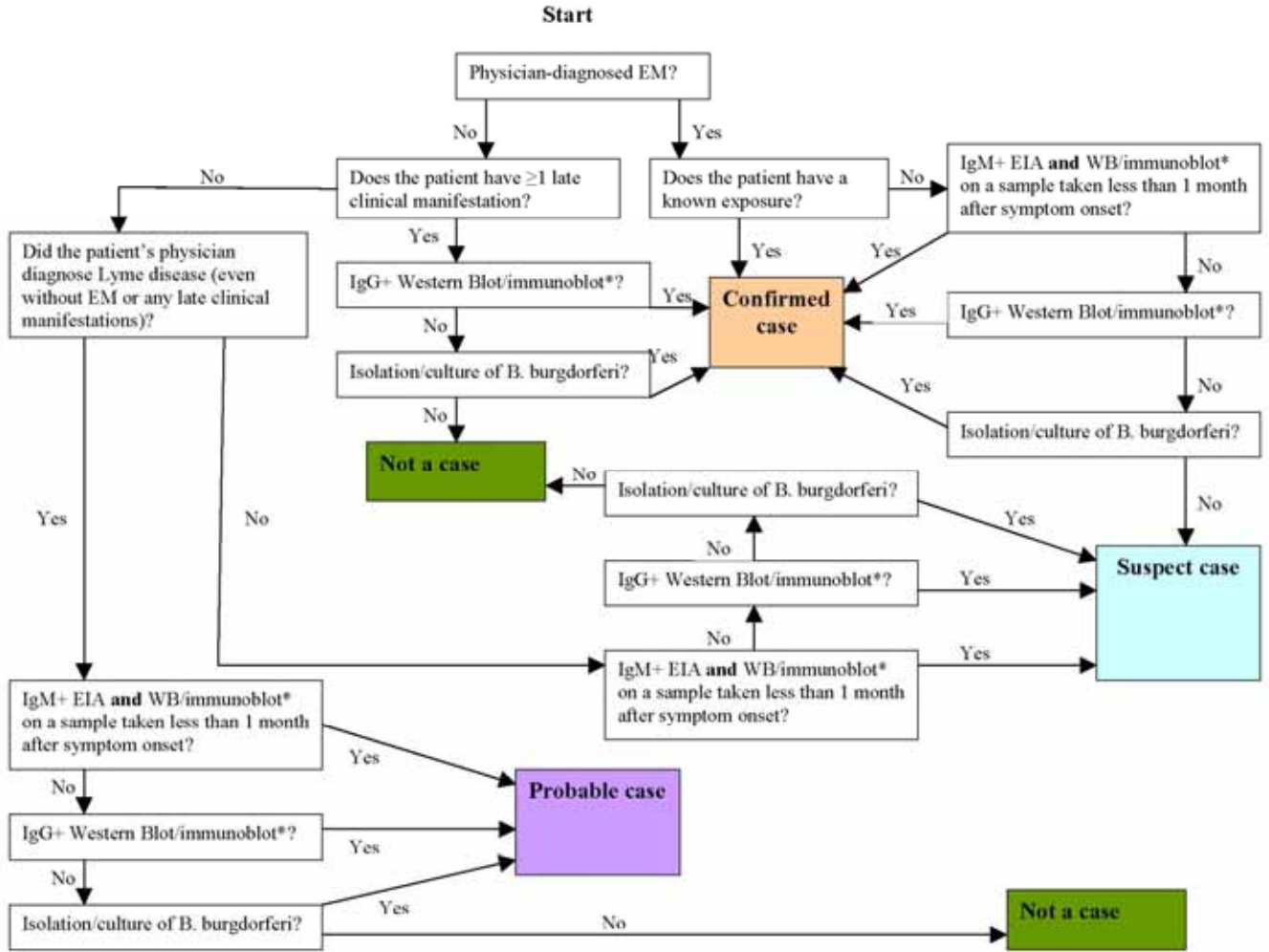
[3] Engstrom SM, Shoop E, Johnson RC. Immunoblot interpretation criteria for serodiagnosis of early Lyme disease. J Clin Microbiol 1995; 33:419-27.

[4] Centers for Disease Control and Prevention. Notice to readers: caution regarding testing for Lyme disease. MMWR Morb Mortal Wkly Rep 2005; 54:125-6.

A copy of laboratory test results must accompany the paper case report form.

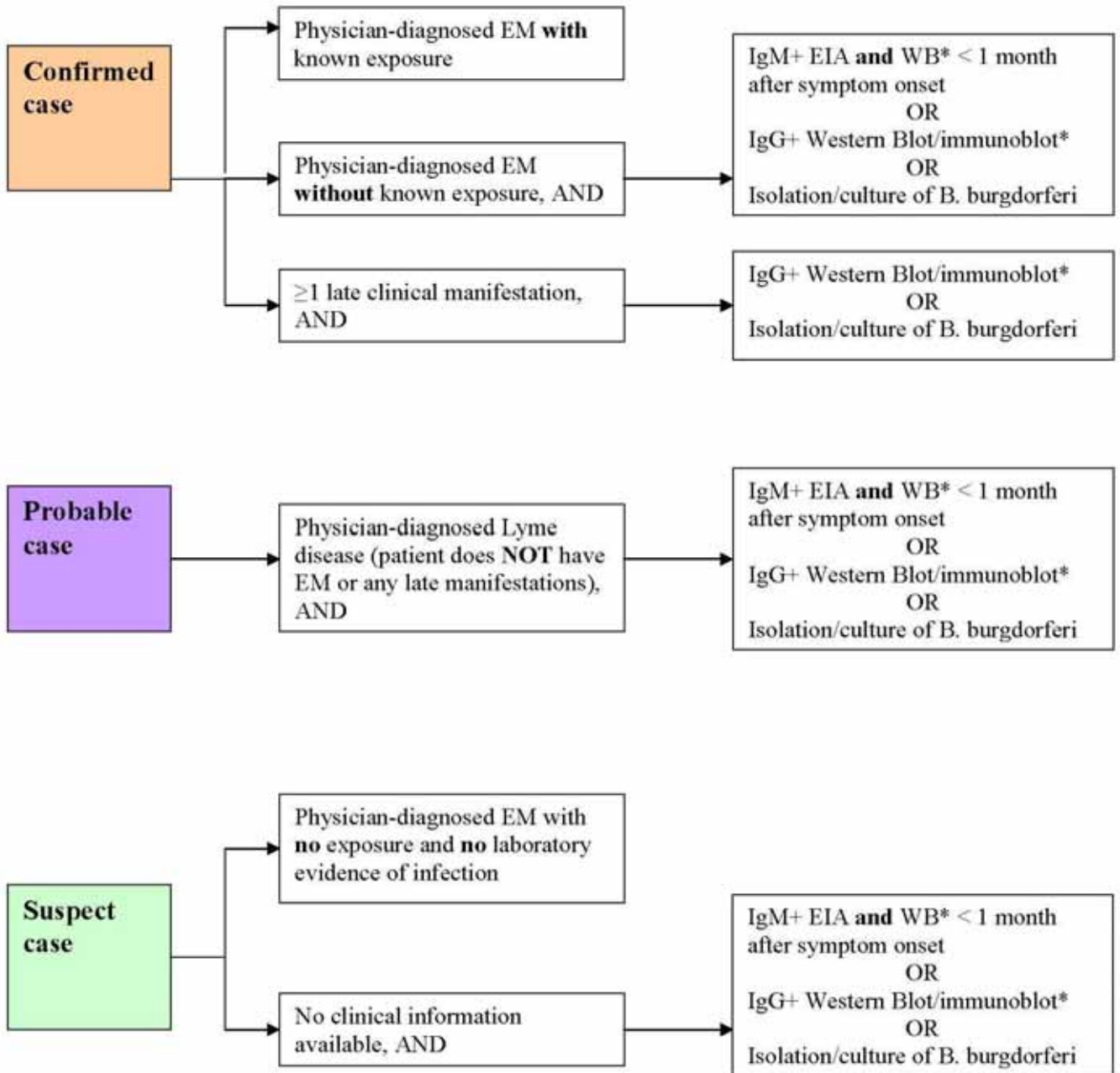
Flow charts have been created to provide additional guidance in determining case classifications for Lyme disease.

Lyme Disease Flow Chart #1



Lyme Disease Flow Chart #2

Lyme Disease Case Classification Chart



Rocky Mountain Spotted Fever

reporting code = 08200
case report form: CDC 55.1 (1/08)
Tick-Borne Rickettsial Disease Case Report

Clinical description

Rocky Mountain spotted fever (RMSF) is an illness caused by *Rickettsia rickettsii*, a bacterial pathogen transmitted to humans through contact with ticks. *Dermacentor* species of ticks are most commonly associated with infection, including *Dermacentor variabilis* (the American dog tick), *Dermacentor andersoni* (the Rocky Mountain wood tick), and more recently *Rhipicephalus sanguineus* (the brown dog tick). Disease onset averages one week following a tick bite. Age-specific illness is highest for children and older adults. Illness is characterized by acute onset of fever, and may be accompanied by headache, malaise, myalgia, nausea/vomiting, or neurologic signs; a macular or maculopapular rash appears 4-7 days following onset in many (~80%) patients, often present on the palms and soles. RMSF may be fatal in as many as 20% of untreated cases, and severe, fulminant disease can occur.

Acute illness is best detected by polymerase chain reaction (PCR) and immunohistochemical methods (IHC) in skin biopsy specimens, and occasionally by PCR in appropriate whole blood specimens taken during the first week of illness, prior to antibiotic treatment. Serology can also be employed for detection, however an antibody response may not be detectable in initial samples, and paired acute and convalescent samples are essential for confirmation.

Clinical evidence

Any reported fever **and** one or more of the following: rash, headache, myalgia, anemia, thrombocytopenia, or any hepatic transaminase elevation.

Laboratory evidence

For the purposes of surveillance,
Laboratory confirmed:

- Serological evidence of a fourfold change in immunoglobulin G (IgG)-specific antibody titer reactive with *Rickettsia rickettsii* antigen by indirect immunofluorescence assay (IFA) between paired serum specimens (one taken in the first week of illness and a second 2-4 weeks later), **OR**
- Detection of *R. rickettsii* DNA in a clinical specimen via amplification of a specific target by PCR assay, **OR**
- Demonstration of spotted fever group antigen in a biopsy or autopsy specimen by IHC, **OR**
- Isolation of *R. rickettsii* from a clinical specimen in cell culture.

Laboratory supportive:

- Has serologic evidence of elevated IgG or IgM antibody reactive with *R. rickettsii* antigen by IFA, enzyme-linked immunosorbent assay (ELISA), dot-ELISA, or latex agglutination.

Exposure

Exposure is defined as having been in potential tick habitats within the past 14 days before onset of symptoms. A history of a tick bite is not required.

Case Classification

Confirmed: A clinically compatible case (meets clinical evidence criteria) that is laboratory confirmed.

Probable: A clinically compatible case (meets clinical evidence criteria) that has supportive laboratory results.

Suspect: A case with laboratory evidence of past or present infection but no clinical information available (e.g. a laboratory report).

Comment

Current commercially available ELISA tests are not quantitative, cannot be used to evaluate changes in antibody titer, and hence are not useful for serological confirmation. IgM tests are not strongly supported for use in serodiagnosis of acute disease, as the response may not be specific for the agent (resulting in false positives) and the IgM response may be persistent. Complement fixation (CF) tests and other older test methods are neither readily available nor commonly used. CDC uses in-house IFA IgG testing (cutoff of $\geq 1:64$), preferring simultaneous testing of paired specimens, and does not use IgM results for routine diagnostic testing.

Recently, a growing number of case reports have included commercial laboratory results as supportive evidence. For example, the previous case definitions have used the word “antibody.” A review of testing protocols and reagents distributed to the state laboratories reveal that these existing tests were specific for IgG-class immunoglobulins. With the increased availability of IgM testing at commercial laboratories, it becomes necessary to clarify the traditional meaning of the word “antibody” as used in all previous definitions and routinely used by rickettsial laboratories. The use of IgM is less supported by scientific evidence, and actually is complicated by false negatives when IgG is present and false positives when rheumatoid factor or cross-reactive, non-rickettsial, antibodies are present. Thus, IgM testing cannot be recommended for confirmation of cases at this time. **Acute and convalescent sera from reported and suspect cases should be acquired and sent to the Bureau of Laboratories.**

A copy of laboratory test results should accompany the case report form.

Human Case Investigation Guidelines

Tick-borne illnesses of concern in Florida include ehrlichiosis, anaplasmosis, Lyme disease, and Rocky Mountain spotted fever. Lyme disease is mostly localized to states in the northeastern, mid-Atlantic, and upper north-central regions (Connecticut, Rhode Island, New York, Pennsylvania, Delaware, New Jersey, Maryland, Massachusetts, and Wisconsin). RMSF cases have been largely reported from the south-Atlantic region and the western south-central region; few cases are reported from the Rocky Mountain region. Disease caused by *E. chaffeensis* infection occurs primarily in the southeast and Midwest, while disease caused by *A. phagocytophilum* infection occurs more frequently in the northeast, Midwest, and pacific coast areas.

Case Interview

- History of tick bite or exposure to tick habitat (wooded, grassy, or brushy areas) in 30 days prior to onset of symptoms
- Travel and activity history: occupation, hobbies (e.g., camping, hunting, other outdoor activities, especially in wooded areas), travel outside Florida
- Environmental investigation: residence surrounded by woods or forest (ticks especially like a grass/forest border from which to quest or wait for the next animal or human to bush by or approach), deer or rodents on property
- Copies of the case report forms for Ehrlichiosis/anaplasmosis, Lyme disease and RMSF can be found on Bureau of Epidemiology's website http://www.doh.state.fl.us/disease_ctrl/epi/topics/crforms.htm.

Disease Control Measures

A. Education

The risk of acquiring a tick-borne illness is greatly reduced by taking precautions to limit exposure to ticks.

- Avoid tick habitats if possible
- If exposure to tick habitats cannot be avoided, when outdoors in a tick area, cover up by wearing shoes, socks, long pants and long-sleeved shirts (light colored clothing preferred for spotting ticks)
- Use insect repellent containing DEET or permethrin according to the manufacturer's directions
- Perform daily tick checks

Provide "What you should know about tick-borne disease in Florida" brochure, distributed by the Florida Department of Health, Division of Environmental Health

B. Community Intervention

- Control tick populations in yards and on pets
- Protect pets from ticks by consulting with your veterinarian

Laboratory Support

Laboratory criteria differ by tick-borne illness and may be based upon paired sera antibodies, or IgM and IgG antibody detection. Please refer to the Bureau of Epidemiology Surveillance Case Definitions for Select Reportable Diseases in Florida for additional information on laboratory criteria for reporting Ehrlichiosis, Lyme, and RMSF (http://www.doh.state.fl.us/disease_ctrl/epi/topics/surv.htm). The flowcharts on pages 16 and 17 of this guidebook are helpful for interpreting lab results for Lyme Disease.

Also refer to “Notice to Readers Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease” published in the MMWR, August 11, 1995/44(31) 590-591 (<http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm>). The Centers for Disease Control and Prevention (CDC) recommends laboratories follow a 2 step process for detection of Lyme antibodies within 4 weeks of symptom onset, an ELISA or IFA screen with IgM confirmation by Western Blot. A single positive IgG Western Blot is also sufficient laboratory criteria for case confirmation.

For additional information for clinicians on tick-borne diseases, please refer to: CDC. Diagnosis and Management of Tick-borne Rickettsial Diseases: Rocky Mountain Spotted Fever, Ehrlichiosis, and Anaplasmosis --- United States: A Practical Guide for Physicians and Other Health-Care and Public Health Professionals MMWR 2006;55. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5504a1.htm>

Wormser, GP et. al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: Clinical practice guidelines by the Infectious Diseases Society of America. CID 2006; 43: 1089-1125. Available at: <http://www.journals.uchicago.edu/doi/abs/10.1086/314053>

Section 5 Tick Identification and Removal

Ticks suspected as potential disease vectors in the southeastern US are among the following:

Ixodes scapularis

Common name: Black-legged Tick



Adult Female

Seasonal Abundance: Larvae and Nymphs: April - August
Adults: September - May

Hosts: Larvae and Nymphs: Reptiles (skinks and snakes), birds and, to much lesser degree, rodents.
Adults: Larger animals including cattle and humans.

Amblyomma americanum

Common Name: Lone Star Tick



Adult Female

Seasonal Abundance: Larvae: June - November
Nymphs: February - October
Adults: April - August with peaks in July

Hosts: Larvae and Nymphs: Small mammals and birds. Do not feed on rodents.
Adults: Deer, cattle and humans.

Amblyomma maculatum

Common Name: Gulf Coast Tick



Adult Female

Seasonal Abundance: Larvae: June - September
Nymphs: February - October

Hosts:	Adults:	June - September
	Larvae and Nymphs:	Ground birds and small rodents.
	Adults:	Larger mammals including cattle, deer, dogs and humans.

Dermacentor variabilis

Common Name: American Dog Tick



Adult Female

Seasonal Abundance:	Larvae:	July - February
	Nymphs:	January - March
	Adults:	March - September
Hosts:	Larvae and Nymphs:	Almost exclusively small rodents, particularly mice and cotton rats
	Adults:	Large variety of mammals and humans

Tick Removal and Storage for Possible Identification

Ticks are best removed using fine-tipped tweezers or a spoon-type device (for example, Ticked Off). Grasp the tick as close to the surface of the skin as possible, and pull upward with a steady, even motion.

Tick identification may be of interest to the person or the physician; however, it will not predict whether or not the person will become infected with a particular disease. For this reason, many entomologists suggest using tick identification ***as a supplement to diagnosis by a physician of a tick-borne disease.***

Ticks may be placed separately in small jars or vials stuffed to about 1/2" depth with paper towels and sealed with a top containing air holes. The containers should be placed inside a zip-lock plastic bag containing moistened cotton balls or paper towels and stored in a refrigerator. Ticks will survive for several weeks to months using this technique. The bag should be labeled with: name of patient, date, location and contact person's phone number. Specimens must be mailed along with a completed tick submittal form (below).

Tick Identification Submittal Form

After the physician has made a presumptive diagnosis of a tick-borne disease, a completed copy of this form should be sent along with the tick specimen to:

Dr. John P. Smith
John A. Mulrennan, Sr. Public Health Entomology Research and Education Center

Florida A & M University
4000 Frankford Avenue
Panama City, Florida 32405

Date: _____ Submitter's Name: _____ Phone: _____

Submitter's address: _____

Reason for submitting tick: _____

Patient's Name/Address/Phone Number: _____

Patient's Age: _____ Sex: _____

Where tick was acquired: City _____ State _____

Specific location/address _____

Acronyms/Definitions

A.:	Abbreviation for ticks in the genus <i>Amblyomma</i>
Arbovirus:	Arthropod-borne virus
Arthropod:	Animals in the phylum which includes insects (mosquitoes, flies, etc.) and arachnids (ticks, spiders, etc.)
B.:	Abbreviation for spirochete bacteria in the genus <i>Borrelia</i>
BoEPC:	Bureau of Entomology and Pest Control (DACs)
BOL:	Bureau of Laboratories (DOH)
CDC:	Centers for Disease Control and Prevention
CHD:	County health department
CF test:	Complement fixation test
D.:	Abbreviation for ticks in the genus <i>Dermacentor</i>
DACS:	Department of Agriculture and Consumer Services
DEET:	N,N-diethyl-meta-toluamide; the active ingredient in many insect repellent products
DEP:	Department of Environmental Protection
DOH:	Department of Health
EIA/ELISA:	Enzyme immunoassay/enzyme-linked immunosorbant assay
EM:	Erythema migrans. EM is defined as a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a large round lesion, often with partial central clearing
Encephalitis:	Inflammation of the brain
FMEL:	Florida Medical Entomology Laboratory
F.S.:	Florida Statutes
FWC:	Florida Fish and Wildlife Conservation Commission
Hemostasis:	The arrest of bleeding

HGA:	Human granulocytic anaplasmosis
HGE:	Human granulocytic ehrlichiosis
HME:	Human monocytic ehrlichiosis
I.:	Abbreviation for ticks in the genus <i>Ixodes</i>
IFA:	Immunofluorescent antibody test
Ig:	Immunoglobulin or antibody (as in IgM, IgG, IgD, IgA or IgE)
LA/LAT:	Latex agglutination test
LD:	Lyme Disease
MA:	Microagglutination test
Morulae:	Spherical mass of cells (from the word “mulberry”)
PHEREC:	John A. Mulrennan, Sr., Public Health Entomology Research and Education Center (Florida A&M University)
PRNT:	Plaque Reduction Neutralization Test
RMSF:	Rocky Mountain spotted fever
Serum/Sera:	The liquid fraction of blood remaining after cells and fibrinogen removed
SN :	Serum neutralization test; gold standard test for arbovirus serology
Surveillance:	Close observation for disease detection
UF:	University of Florida
USF:	University of South Florida
Vector:	A carrier which transfers infective agents from one host to another
Venipuncture:	Puncture of a vein as for drawing blood
Zoonosis:	Disease of animals transmissible to people
>=:	Greater than or equal to
<=:	Less than or equal to

DEPARTMENT OF HEALTH OFFICIALS EMPHASIZE PRECAUTIONARY MEASURES TO HELP PREVENT TICK-BORNE ILLNESSES

TALLAHASSEE — As you start to spend more time outside this spring and summer, remember to protect yourself and your family and pets against tick-borne diseases. Most tick exposures occur when people and animals are venturing outdoors into tick habitats, including wooded, grassy, and brushy areas.

If you find a tick on you, remove it right away with a pair of fine-tipped tweezers by following these steps:

- Grasp the tick as close to the surface of the skin as possible
- Pull upward with a steady, even motion without squeezing or crushing the tick.
- After removing the tick, clean the bite site and wash hands well with soap and hot water
- If you have become ill after being bitten by a tick, call your health care provider.

What you can do to prevent tick-borne disease

Avoiding tick bites is the best way to keep from getting ill.

- **Apply repellent** to help prevent ticks from biting. EPA registered repellants containing up to 30 percent DEET (N,N-diethyl-meta-toluamide), picaridin, or IR3535 can give you several hours of protection. Read label directions carefully when applying repellent.
 - Some repellents are not suitable for children. DEET is not recommended on children younger than 2 months old.
 - Repellents with permethrin can be used on clothing, shoes, tents, and gear if additional protection is required.
- **Dress so your skin is covered in white or light-colored clothing** when ticks might be present so you can see if any ticks are crawling on your clothes. Tuck your pant legs into your socks so that ticks cannot crawl up the inside of your pants
- **Walk in the center of the trail or path** to avoid touching tall grasses and other plants in tick-infested areas
- **Check your body and your child's body for ticks** after spending time in a place where ticks are likely to be found. Look carefully at your feet and legs, as some ticks are small enough to crawl into shoes and through socks. It takes a number of hours after a tick bites for it to be able to transmit disease, so a careful tick check and early removal can prevent illness.
- **Check your pets for ticks.** Talk to your veterinarian about products that keep ticks off your pets. Follow package directions.
- **Prevent tick infestations around your home** by landscaping your yard to be a tick-free zone. To see how you can control ticks around the home, visit <http://www.cdc.gov>.

Tick-borne diseases that are present in Florida include Lyme disease, Rocky Mountain spotted fever, and Ehrlichiosis. Symptoms can be severe, but people treated with antibiotics soon after becoming ill usually get better quickly. Treatment is not recommended unless a person starts to show signs of illness. If you have a fever and flu-like symptoms, tell your doctor about any recent tick bites or exposure to ticks or tick habitats. Rash is another common symptom of some tick-borne diseases. Tick activity is increased throughout the United States during the spring and

summer, so it is also important to take precautions when you travel. People of all ages can get sick, but African American men and the elderly may be at greater risk for severe disease.

For more information on tick-borne illnesses, visit the DOH Web site at http://www.doh.state.fl.us/Environment/medicine/arboviral/Tick_Borne_Diseases/Tick_Index.htm, the CDC Web site www.cdc.gov or contact your local county health department.

DRAFT

Chagas Disease Resource for County Health Department Epidemiology Staff

Chagas disease is caused by the parasite *Trypanosoma cruzi* and is prevalent in many Central and South American countries. In January 2007, the American Red Cross blood banks began screening blood donations for *T.cruzi* in the United States. Screening is not required by law, and it is estimated that about 70% of the nation's blood supply is currently being screened. This has led to the identification of Chagas disease infections among Florida blood donors.

Transmission

T. cruzi is transmitted by insects from the subfamily Triatominae. Triatomine bugs become infected by feeding on the blood of infected animals and people. The bugs then pass the parasite through feces. They stay hidden in homes during the day and come out at night to feed. After feeding, the bugs will defecate on the person. Infected fecal droplets can enter the bite wound, or migrate to mucosal membranes and cause an infection. The parasite can also be transmitted orally (by consuming uncooked food contaminated with the feces of infected bugs), congenitally (from a pregnant woman to her baby), via organ transplantation and blood transfusion, and from accidental exposure in the laboratory.

Risk to family members

Family members might be at risk if their exposure history is similar to that of the infected individual. They may also be at risk if they were born to or received blood or organs from an infected family member after the individual was infected.

Symptoms

Individuals in the acute phase of the disease (up to about 8 weeks after becoming infected) are often asymptomatic, but when symptoms are present they can include fever, fatigue, body aches, headache, rash, loss of appetite, diarrhea, and vomiting. During the chronic phase (infected for greater than 8 weeks) many people remain asymptomatic, though some develop cardiac or intestinal complications. The average lifetime risk of developing one or more complications is about 30%

Follow-up testing

Blood from individuals with positive results from the initial screening will be tested again. Specimens that are repeat-reactive will then be tested by a radioimmunoprecipitation assay (RIPA). Though not FDA licensed, RIPA positive results were considered confirmed positive in clinical trials. RIPA positive individuals will receive a letter from the blood agency notifying them of the test results, and asking them not to donate blood in the future. The letter also refers individuals to their physicians.

CHD Information

Chagas disease is not reportable. However, Florida Department of Health would like to collect basic information on infected individuals to get a better idea of the groups at risk for Chagas disease in Florida. Currently, the CDC receives data on the number of Chagas-infected donors for each state from the American Association of Blood Banks (AABB). These data, which do not include identifying information, are then sent to FL DOH and will be forwarded to CHDs in affected counties.

Some counties have expressed an interest in actively pursuing follow-up of Chagas-infected donors. The best way to accomplish this is to facilitate a close relationship with local blood

donation centers. CHDs can ask the centers for information on positive donors, but as the disease is not reportable, sharing of this information is not required. CHDs can also work through their local blood donation centers to list CHD contact information in the letter that is sent to the positive donor.

If your CHD is contacted by an infected individual, please refer to the following guidelines:

- Contact the individual for an interview
- Fill out the case report form (<http://www.doh.state.fl.us/environment/medicine/arboviral/pdfs/2007/ChagasCRF.pdf>) and return it to Elizabeth Radke, Bureau of Environmental Public Health Medicine
- Identify any family members who may be infected (especially children of an infected woman) and help facilitate testing for *T. cruzi*. For chronic infections, CDC can perform an IFA test on serum free of charge. If the clinical and epidemiologic factors are consistent with an acute infections, CDC can examine whole blood for the presence of parasites. Samples submitted to CDC for testing must be routed through one of the FL DOH laboratories. Testing for *T. cruzi* is also available at some commercial laboratories.
- Enter the case information into the Merlin outbreak module #1366.
- Refer the individual/family member to a local physician or clinic for follow-up care and treatment. In the United States, antitrypanosomal medication is only available through CDC under an investigational new drug protocol. The physician will need to consult with CDC to determine if a patient is eligible for treatment. The CDC consult line for physicians is 770-488-7775. Biologics from CDC are free of charge for eligible patients, and will be shipped directly to the physician's office.
- Many infected individuals will not have access to health care, or may be uninsured and unable to afford the full cost of treatment. Please attempt to identify physicians or clinics in your county that may be willing to treat these patients on a sliding fee scale or at a reduced cost.

DOH Contact Information

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