

## ROCKY MOUNTAIN SPOTTED FEVER

### REPORTING INFORMATION

- **Class B2:** Report by the end of the business week in which the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - [Ohio Confidential Reportable Disease form](#) (HEA 3334, rev. 1/09), [Positive Laboratory Findings for Reportable Disease form](#) (HEA 3333, rev. 8/05), the local public health department via the Ohio Disease Reporting System (ODRS), or telephone.
- The Centers for Disease Control and Prevention (CDC) [Tick-borne Rickettsial Disease Case Report form \(CDC 55.1, rev. 5/08\)](#) is available for use to assist in local disease investigation. Information collected from the form should be entered into ODRS and not sent to ODH, unless otherwise requested. If requested, the mailing address for this form is: Ohio Department of Health, Zoonotic Disease Program, 8955 East Main Street Reynoldsburg, OH 43068.
- Additional reporting information, with specifics regarding the key fields for ODRS Reporting can be located in [Section 7](#).

### AGENT

*Rickettsia rickettsii*, a bacterium in the spotted fever group.

### CASE DEFINITION

#### 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 *D. variabilis* (the American dog tick) and *D. andersoni* (the Rocky Mountain wood 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 is reported in most about 80% of patients 4-7 days post-onset, and a rash is often present on the palms and soles. RMSF is fatal as many as 20% of untreated cases, and severe fulminant disease is possible.

#### Laboratory Criteria for Diagnosis

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.

**Note**

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.

**Case classification**

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

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

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

**Comments**

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.

**Exposure**

Exposure is defined as having been in potential tick habitats within the past 14 days before onset of symptoms. Occupation should be recorded if relevant to exposure. A history of a tick bite is not required.

**SIGNS AND SYMPTOMS**

The classic findings for this disease are fever, rash, and history of tick bite. However, this combination is not always detected when the patient initially presents for care.

Initial Signs and Symptoms

Initial symptoms may include fever, nausea, vomiting, severe headache, muscle pain, lack of appetite. The rash first appears 2-5 days after the onset of fever and is often not present or may be very subtle when the patient is initially seen by a physician. Younger patients usually develop the rash earlier than older patients. Most often it begins as

small, flat, pink, non-itchy spots (macules) on the wrists, forearms, and ankles. These spots turn pale when pressure is applied and eventually become raised on the skin.

#### Later Signs and Symptoms

Later signs and symptoms include rash, abdominal pain, joint pain, and diarrhea. The characteristic red, spotted (petechial) rash of Rocky Mountain spotted fever is usually not seen until the sixth day or later after onset of symptoms, and this type of rash occurs in only 40% to 60% of patients with Rocky Mountain spotted fever. The rash involves the palms or soles in as many as 50% to 60% of adults and more than 90% of children. As many as 10% to 15% of patients may never develop a rash.

### **DIAGNOSIS**

A diagnosis of Rocky Mountain spotted fever is based on a combination of clinical signs and symptoms and confirmatory laboratory tests. Other common laboratory findings suggestive of Rocky Mountain spotted fever include thrombocytopenia, hyponatremia, and elevated liver enzyme levels.

Evaluation of both acute and convalescent serum is recommended. The convalescent serum should be drawn about 2 - 4 weeks post-onset. The single convalescent serum is acceptable for testing if the acute sample is not available.

### **EPIDEMIOLOGY**

#### **Source**

*R. rickettsii* is maintained and amplified by hard ticks, primarily the American dog tick (*D. variabilis*) and the Rocky Mountain wood tick (*D. andersoni*). The Brown dog tick (*Rhipicephalus sanguineus*) and the Cayenne tick (*Amblyomma cajennense*) have also been implicated as vectors. Amplification of the organism occurs in meadow voles, one of the vertebrate hosts of immature ticks.

#### **Occurrence**

Although other species of rickettsiae cause similar illnesses worldwide, *R. rickettsii* is restricted to the Americas. In the United States, RMSF was first described from the Rocky Mountain region, but now the majority of cases are reported from the southern states, from North Carolina to Oklahoma. Although all ages are susceptible, children predominate, probably because of greater contact with dogs and tick habitat. Most cases occur in May and June, the peak American dog tick season in Ohio, with fewer cases from July to September.

#### **Mode of Transmission**

Humans contract RMSF through the bite of the dog tick (at least 4 to 6 hours of attachment are required), or by coming in contact with tick secretions or body fluids through careless handling of ticks. In Ohio, the American dog tick is the vector. Dogs can transport ticks into the household environment and may also become ill with spotted fever.

#### **Period of Communicability**

Humans are dead-end hosts, not being able to infect ticks or other humans.

#### **Incubation Period**

The incubation period is 3 to 14 days after infected tick contact.

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

A history of the patient's travel and contact with dogs and ticks is obtained for the 14 days prior to onset. Outdoor occupational or recreational activities by the patient during April-September may provide additional information.

#### Treatment

Rocky Mountain spotted fever is best treated by using a tetracycline antibiotic, usually doxycycline. Patients are treated for at least 3 days after the fever subsides and until there is evidence of clinical improvement. Standard duration of treatment is 5 to 10 days. Because laboratory confirmation is generally not available during acute illness, treatment is initiated based on clinical and epidemiological information.

#### Isolation and Follow-up Specimens

Isolation is not indicated. Convalescent specimens should be collected 2 – 4 weeks after disease onset.

### **Contacts**

No treatment or prophylaxis of contacts is indicated. There is currently no vaccine for RMSF.

### **Prevention and Control**

Tick avoidance in endemic areas is probably the best preventive measure at present. Tuck pants cuffs into sock tops, spray insect repellent on pants and socks and wear light-colored clothing to facilitate frequent checks for crawling ticks. Inspect every hour or two for attached and crawling ticks. Remove ticks promptly. Inspect pets for ticks every day. Keep grass and weeds mowed short. With the identification of endemic areas from case investigations, community education and awareness activities should be initiated before the beginning of tick season (late April). Area residents should be made aware of RMSF symptoms, measures to reduce tick infestations (mowing, dog control, daily inspections of dogs), and precautions on handling ticks to reduce exposure. Specific fliers and posters and informative articles in the media can all be used to promote public awareness of ticks and RMSF.

**What is Rocky Mountain spotted fever?**

Rocky Mountain spotted fever (RMSF) is the most severe and the most frequently reported tick-borne illness in the United States. This disease, affecting humans and dogs, is caused by the bacterial organism *Rickettsia rickettsii*.

In the last 50 years, approximately 250-1,200 cases of Rocky Mountain spotted fever have been reported annually in the USA. It is likely that many more cases go unreported. States with the highest incidences of RMSF cases (35%) were North Carolina and Oklahoma. Since the year 2000, Ohio has seen between 2 and 26 cases per year.

**How do people get Rocky Mountain spotted fever?**

The bacterium that causes RMSF is transmitted by the bite of an infected tick. The most common tick in Ohio, the American dog tick, is the primary carrier for this disease. Rocky Mountain wood ticks and the Brown dog tick have also been known to carry RMSF.

RMSF can not be contracted directly from dogs or other people.

**Who is most at risk for getting Rocky Mountain spotted fever?**

People who spend time in the outdoors in tick-infested environments especially woodlands and brushy areas, are at an increased risk of exposure. Dogs or other pets that frequent these types of areas may also bring infected ticks home.

**How long after a tick bite before symptoms appear?**

Symptoms usually appear within 5 to 10 days.

**What are the symptoms of Rocky Mountain spotted fever?**

Early stages of disease are nonspecific (fever, nausea, body aches, loss of appetite, vomiting, and severe headache). Later signs may include a rash, abdominal pain, joint pain and diarrhea. The rash usually starts on the arms and ankles and moves to the palms of the hands or soles of the feet. Three things that may suggest RMSF infection are fever, rash and history of a tick bite. RMSF can be a very severe illness and require hospitalization. The bacteria attack the cells lining blood vessels throughout the body and can involve the lungs, brain or kidneys.

**How is Rocky Mountain spotted fever diagnosed?**

A diagnosis of Rocky Mountain spotted fever is based on a combination of clinical signs and symptoms and specialized confirmatory laboratory tests. Other common laboratory findings suggestive of Rocky Mountain spotted fever include thrombocytopenia (decreased platelets), hyponatremia (low blood sodium), and elevated liver enzyme levels.

**How is Rocky Mountain spotted fever treated?**

RMSF is often treated with tetracycline class antibiotics, usually doxycycline.

**Can a person get Rocky Mountain spotted fever more than once?**

Previous infection is thought to provide long lasting immunity against re-infection. However, this should not deter persons from practicing good tick-preventive measures or visiting a physician if signs and symptoms consistent with RMSF occur, especially following a tick bite, as other diseases may also be transmitted by ticks.

### **What can be done to prevent Rocky Mountain spotted fever?**

Avoid areas where ticks might be present: tall grass, high brush, weedy or wooded areas. When entering these areas take the following precautions to reduce the risk of acquiring tick-borne diseases:

- Wear light-colored, long pants, tuck pant cuffs into sock tops and spray pant legs and socks with insect repellent. Repellents containing 0.5% permethrin or 20-30% DEET are effective in repelling ticks. Follow application directions carefully.
- When possible, avoid walking in tall grass and weeds.
- Conduct visual "tick checks" on yourself and children every hour or two.
- Check pets for ticks before allowing them into the home.
- Carefully remove attached ticks as soon as possible.
- Keep yard and play areas well mowed to discourage ticks.

### **How should a tick be removed?**

Since disease transmission occurs within hours of attachment, it is important to remove ticks as soon as possible after discovery.

To remove an attached tick, grasp it with tweezers as close as possible to the skin and pull with firm, steady pressure straight out. Do not twist or jerk the tick, as the mouthparts may break off. If tweezers are not available, protect fingers with rubber gloves or tissue paper.

- Do not handle ticks with bare hands.
- Do not squeeze, crush or puncture the body of the tick as it may contain infected fluids.
- After removing the tick, thoroughly disinfect the bite site and wash your hands.
- See or call your doctor if there is a concern about incomplete tick removal.

For more information, contact your local health department or the Zoonotic Disease Program at ODH by calling 614-752-1029.

### **For more information please visit these Web sites.**

CDC RMSF: <http://www.cdc.gov/rmsf/>

ODH Zoonotic Disease Program Tick-borne Diseases (statistics and educational materials):

<http://www.odh.ohio.gov/odhPrograms/dis/zoonoses/vbdp/vbtick.aspx>