

INFECTIOUS DISEASES

An Ongoing Series

Rocky Mountain Spotted Fever

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INTRODUCTION

Rocky Mountain spotted fever (RMSF), one of the most confusingly named of all infectious illnesses, is a tick-borne rickettsial disease that has been reported across most of the United States, as well as northern Mexico and into South America. In fact, five eastern and central states (North Carolina, Tennessee, Missouri, Arkansas, and Oklahoma) account for almost two-thirds of all cases of RMSF in the United States.

Caused by *Rickettsia rickettsii*, a bacterium in the order Rickettsiales, RMSF is transmitted to humans as incidental hosts by the bite of several species of ticks. At least four species of ticks have been shown to carry the disease in humans. *Dermacentor variabilis*, the American dog tick, is the most common culprit and has been found in the eastern, central, and Pacific coastal regions of the United States. The Rocky Mountain wood tick, *D. andersoni*; the brown dog tick, *Rhipicephalus sanguineus*; and a number of tick species of the genus *Amblyomma* have been shown to transmit the disease in the western and southwestern regions of the United States, with the range of the latter as far south as Argentina. The range of this rickettsial disease is clearly not limited to the Rocky Mountains.

Clinical Presentation

Nonspecific symptoms, which may include a sudden onset of fever, headaches, chills, nausea, vomiting, myalgia, and photophobia, develop anywhere between 3 and 12 days after the bite of an infected tick, or between the fourth and eighth day after an attached tick is found. The rash of RMSF appears 2–4 days after the onset of fever. The rash is described initially as small (1–5mm) pink macules on the wrists and ankles, which spread to the palms, soles, arms, legs, and trunk. Over the next several days the rash becomes petechial, eventually becoming the classic generalized petechial rash that also involves the palms and soles of the feet. Less than 50% of those infected exhibit the rash in the first 3 days of

the illness, and the rash may be faint or difficult to appreciate in those with dark skin. A small percentage of patients may never develop an appreciable rash. Children more often develop a rash, and do so earlier in the course of illness, than do adult patients.

Left untreated or improperly treated, patients with RMSF may develop abdominal pain, thrombocytopenia, cutaneous necrosis, renal failure, and meningoencephalitis. RMSF is the most commonly fatal rickettsial disease in the United States. The case fatality was a quarter of all cases in the preantibiotic era, and still approaches 10% today. Long-term problems of survivors of this disease include cognitive deficiencies, hearing loss, blindness, and cerebellar, vestibular, and motor disabilities.

Diagnosis

The laboratory diagnosis of RMSF is confirmatory; consideration of the disease process, and including it in the differential diagnosis is key. Paired acute and convalescent indirect immunofluorescence antibody assays are the gold standard but are not sensitive in the first week of the illness, and the convalescent sample may be affected by the prompt initiation of appropriate antibiotics. Testing for immunoglobulin IgM and IgG antibodies or detection of *Rickettsia rickettsii* by polymerase chain reaction can be problematic because these results can be difficult to interpret, and should be done in conjunction with an infectious disease specialist.

Thrombocytopenia, hepatic transaminase elevation, and hyponatremia in a febrile patient with or without a rash should raise the suspicion of a rickettsial infection, which, in the United States, must include consideration of RMSF.

Treatment

The drug of choice for treatment of any tick-borne rickettsial infection is doxycycline, including for infection in

children under the age of 8 years and pregnant women, for whom doxycycline is usually contraindicated because of concerns of tooth staining. The recommended dosage is 100mg twice a day either orally or intravenously, and 2.2mg/kg of body weight twice a day for children weighing less than approximately 45kg (100 lb). The recommended length of treatment is at least 3 days after the resolution of fever and until clinical improvement is noted, which is typically at least 1 week of therapy. Limited studies performed do not recommend prophylactic treatment for those who have had recent tick bites but who are not ill.

Vaccination

There is no vaccination available for the prevention of RMSF.

Importance in a Deployed Setting

RMSF is a risk to military forces who train and deploy to wooded areas of the Americas. Wearing permethrin-treated uniforms and using *N,N*-diethyl-meta-toluamide (DEET)-containing insect repellents is key to the prevention of this potentially catastrophic disease. Recognition that this disease can be seen outside of the Rocky Mountain region of the United States—and most often, it is—is paramount to the initiation of prompt appropriate treatment that can be life-saving.

Disclaimer

The views expressed in this publication are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the US Government.

Disclosure

The author has nothing to disclose

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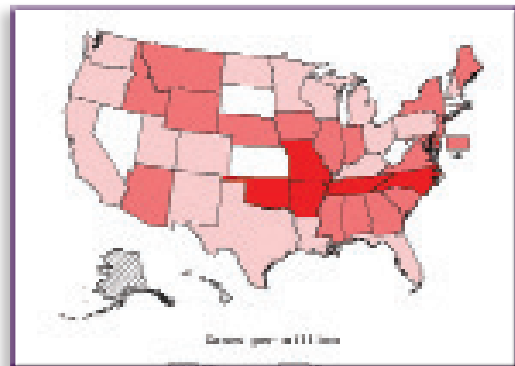
KEYWORDS: *Rocky Mountain spotted fever; disease, rickettsial, tick-borne; Rickettsia rickettsii*

Rash of RMSF



Source: Hardin Library for the Health Sciences, University of Iowa
<http://hardinmd.lib.uiowa.edu/cdc/1962.html>

Annual reported incidence (per million population) for RMSF in the United States for 2010. (NN= Not notifiable)



Source: Centers for Disease Control and Prevention
<http://www.cdc.gov/rmsf/stats/>

This figure shows the annual reported incidence of RMSF cases by state in 2010 per million persons. RMSF was not notifiable in Alaska and Hawaii in 2010. The incidence rate was zero for Connecticut, Kansas, Massachusetts, Nevada, South Dakota, Vermont and West Virginia. Incidence ranged between 0.2 to 1.5 cases per million persons for California, Colorado, Florida, Kentucky, Louisiana, Michigan, Minnesota, New Hampshire, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, Texas, Utah, Washington and Wisconsin. Annual incidence ranged from 1.5 to 19 cases per million persons in Alabama, Arizona, the District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Maine, Maryland, Mississippi, Montana, Nebraska, New Jersey, New York, Rhode Island, South Carolina, Virginia and Wyoming. The highest incidence rates, ranging from 19 to 63 cases per million persons were found in Arkansas, Delaware, Missouri, North Carolina, Oklahoma, and Tennessee.



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