



# HHS Public Access

Author manuscript

*Am J Nurs.* Author manuscript; available in PMC 2020 July 01.

Published in final edited form as:

*Am J Nurs.* 2019 July ; 119(7): 20–21. doi:10.1097/01.NAJ.0000569428.81917.6c.

## Increase in Reports of Tick-Borne Rickettsial Diseases in the United States:

**New resources for diagnosis and treatment from the CDC.**

**Alison M. Binder [epidemiologist],**

Division of Vector-Borne Diseases at the Centers for Disease Control and Prevention, Atlanta.

**Paige A. Armstrong [medical epidemiologist]**

Division of Vector-Borne Diseases at the Centers for Disease Control and Prevention, Atlanta.

### Graphical Abstract



Image courtesy of the Centers for Disease Control and Prevention.

The Centers for Disease Control and Prevention (CDC) has received a record number of reports of tick-borne diseases in recent years. According to data from the National Notifiable Diseases Surveillance System, cases of tick-borne diseases increased more than twofold between 2004 and 2017, from 22,527 to 59,349, respectively.<sup>1</sup> Tick-borne diseases now make up more than three-quarters of all vector-borne disease reports,<sup>2</sup> and reports of tick-borne rickettsial diseases, such as spotted fever rickettsioses (including Rocky Mountain spotted fever, ehrlichiosis, and anaplasmosis), account for 24% of these.<sup>1</sup> Between 2016 and

Contact author: Paige A. Armstrong, [yzu9@cdc.gov](mailto:yzu9@cdc.gov).

The authors have disclosed no potential conflicts of interest, financial or otherwise.

Centers for Disease Control and Prevention. Ticks. 2019. [https://www.cdc.gov/ticks/avoid/on\\_people.html](https://www.cdc.gov/ticks/avoid/on_people.html).

2017, cases of spotted fever rickettsioses rose 46% (4,269 to 6,248), anaplasmosis rose 39% (4,151 to 5,762), and ehrlichiosis rose 19% (1,377 to 1,642).<sup>3</sup> Incidence of tick-borne rickettsial diseases varies geographically in the United States and occurrence is seasonal—most illness occurs in the spring and summer.<sup>4</sup>

Tick-borne rickettsial diseases often present as acute febrile illnesses with nonspecific clinical symptoms including headache, malaise, and arthralgia, and can range from mild to severe.<sup>4</sup> Rocky Mountain spotted fever is the most severe rickettsial disease in the United States, with an estimated case fatality rate of 5% to 10%.<sup>5</sup> Early treatment with doxycycline is essential for preventing death and severe illness from rickettsial diseases.<sup>6</sup> In cases of Rocky Mountain spotted fever, delayed treatment beyond the fifth day of illness is the single most important predictor of fatal outcome.<sup>6</sup>

The CDC and American Academy of Pediatrics (AAP) recommend doxycycline as first-line treatment for people of all ages with suspected rickettsial disease.<sup>4, 7</sup> Despite efforts to educate providers on the importance of clinical diagnosis and early treatment with doxycycline, misconceptions persist. According to a recent CDC study, only 53% of commercially insured patients diagnosed with any rickettsial disease between 2005 and 2016 were prescribed doxycycline within 30 days of diagnosis.<sup>8</sup>

Misconceptions about treatment are even more evident among providers who treat the pediatric population. Children under the age of 10 years represent less than 6% of Rocky Mountain spotted fever cases, but 22% of deaths.<sup>5, 9</sup> A 2012 survey of U.S. providers showed that only 35% believed doxycycline was the appropriate treatment for Rocky Mountain spotted fever in children younger than eight years of age; 80% correctly identified it as the preferred treatment in patients eight years and older.<sup>10</sup> This discrepancy may contribute to the high mortality rate from Rocky Mountain spotted fever among children.

Historically, tetracycline antibiotics, including doxycycline, were contraindicated in children younger than eight years because of reports of tooth staining and enamel hypoplasia.<sup>10</sup> Recent studies have shown no tooth discoloration in children treated with short courses of doxycycline, and this finding has led to a change in pediatric recommendations regarding the drug: the 31st edition of the AAP's *Red Book* now states that short courses of doxycycline are not likely to cause tooth staining or enamel hypoplasia and can be used in children of any age for less than 21 days.<sup>7</sup> Moreover, the *Red Book* continues to highlight the vital importance of doxycycline as the treatment of choice in suspected rickettsial diseases in people of all ages.

To increase provider awareness of recommendations for diagnosis and treatment of Rocky Mountain spotted fever and other tick-borne diseases, the CDC has developed an online training toolkit (available at [www.cdc.gov/rmsf/resources/toolkit.html](http://www.cdc.gov/rmsf/resources/toolkit.html)) and learning module (available at [www.cdc.gov/rmsf/resources/module.html](http://www.cdc.gov/rmsf/resources/module.html)). Providers can receive free continuing education and review information pertinent to the epidemiology, risk factors, clinical characteristics, treatment, and diagnosis of Rocky Mountain spotted fever and other U.S. tick-borne diseases. The toolkit includes (1) a narrated instructional video discussing clinical signs and symptoms, diagnosis, and treatment of Rocky Mountain spotted fever; (2)

a physician pocket card, which serves as a quick reference of key facts for clinical diagnosis and treatment of Rocky Mountain spotted fever; (3) a printable clinical timeline graphic to aid in the diagnosis of Rocky Mountain spotted fever; and (4) the *Tickborne Diseases of the United States* manual, which is a more detailed reference of clinical presentation, diagnosis, and treatment of tick-borne diseases. The hour-long learning module includes a rash comparison tool, which allows providers to test their knowledge of rashes, and two case-based exercises.

Health care professionals can reduce morbidity and mortality from Rocky Mountain spotted fever and other tick-borne diseases through improved awareness, early recognition and diagnosis, and prompt treatment. For more information on other preventive measures, see Preventing Tick-Borne Diseases and visit [www.cdc.gov/rmsf/index.html](http://www.cdc.gov/rmsf/index.html). ▼

## Acknowledgments

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## REFERENCES

- Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector-Borne Diseases (DVBD). Tickborne disease surveillance data summary. 2019 <https://www.cdc.gov/ticks/data-summary/index.html>.
- Rosenberg R, et al. Vital signs: trends in reported vectorborne disease cases—United States and Territories, 2004–2016. *MMWR Morb Mortal Wkly Rep* 2018;67(17):496–501. [PubMed: 29723166]
- Centers for Disease Control and Prevention, National Notifiable Diseases Surveillance System (NNDSS). Notifiable infectious diseases and conditions data tables. Atlanta; 2018 <https://www.cdc.gov/nndss/infectious-tables.html>.
- Biggs HM, et al. Diagnosis and management of tickborne rickettsial diseases: Rocky Mountain spotted fever and other spotted fever group rickettsioses, ehrlichioses, and anaplasmosis—United States. *MMWR Recomm Rep* 2016;65(2): 1–44.
- Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector-Borne Diseases (DVBD). Rocky Mountain spotted fever (RMSF): epidemiology and statistics. Atlanta; 2019 <https://www.cdc.gov/rmsf/stats/index.html>.
- Regan JJ, et al. Risk factors for fatal outcome from Rocky Mountain spotted fever in a highly endemic area—Arizona, 2002–2011. *Clin Infect Dis* 2015;60(11):1659–66. [PubMed: 25697742]
- Kimberlin DW, et al. Rickettsial diseases In: Kimberlin DW, et al., editors. *Red Book: report of the Committee on Infectious Diseases*. 31st ed. Elk Grove Village, IL: American Academy of Pediatrics; 2018 p. 693–6.
- Binder A, et al. Characteristics, treatment patterns, and outcomes of outpatients with rickettsial diseases in a large, commercially insured population: United States, 2005–2016. *Open Forum Infect Dis* 2018;5(Suppl 1):S239–S240.
- Drexler NA, et al. National surveillance of spotted fever group rickettsioses in the United States, 2008–2012. *Am J Trop Med Hyg* 2016;94(1):26–34. [PubMed: 26324732]
- Zientek J, et al. Self-reported treatment practices by healthcare providers could lead to death from Rocky Mountain spotted fever. *J Pediatr* 2014;164(2):416–8. [PubMed: 24252781]

## Preventing Tick-Borne Diseases

### Before going outdoors.

- Know where to expect ticks: ticks live in grassy, brushy, or wooded areas, and even on animals.
- Treat clothing and gear: use products that contain 0.5% permethrin on boots, clothes, and camping gear.
- Use Environmental Protection Agency–registered insect repellents, such as DEET, picaridin, IR3535, oil of lemon eucalyptus, para-menthane-diol, or 2-undecanone.
- Avoid contact with ticks: avoid wooded areas with high grass and walk in the center of trails.

### After coming in from outdoors.

- Check your clothing for ticks.
- Examine gear and pets.
- Shower soon after being outdoors.
- Check your body for ticks: conduct a full body check and remove any ticks you find.