



## DEPARTMENT OF HEALTH AND HUMAN SERVICES DIVISION OF PUBLIC HEALTH

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Date: June 2, 2017  
To: All North Carolina Clinicians  
From: Zack Moore, MD, MPH, State Epidemiologist  
Subject: Annual Update on Diagnosis and Surveillance for Tickborne Rickettsial Disease (2 pages)

### Introduction

Tickborne rickettsial diseases share clinical similarities and include Rocky Mountain spotted fever as well as diseases caused by other *Rickettsia*, *Ehrlichia* and *Anaplasma* species. Rocky Mountain spotted fever and other spotted fever illnesses cannot be distinguished by routine testing and, for surveillance purposes, are reported as Spotted Fever Group Rickettsiosis (SFGR, *Rickettsia spp.*). SFGR comprised 86% of all TBRD reported in North Carolina during 2016. Cases of human monocytic ehrlichiosis (11%) and anaplasmosis (3%) comprised the remainder of tickborne rickettsial disease reports.

### Diagnosis and Surveillance

Paired serologic testing of specimens by immunofluorescent assay of IgG antibody is the gold standard for diagnosing tickborne rickettsial diseases[1]. IgG is not detectable during the first week of illness of most tickborne rickettsial diseases; convalescent samples should be collected 2 – 4 weeks after acute samples for comparison. Because ELISA (EIA) tests are not quantitative and IgM tests lack specificity, relying on these tests alone for diagnosis is not recommended.

Testing for spotted fever rickettsia is available at no charge from the State Laboratory of Public Health (<http://slph.state.nc.us/virology-serology/special-serology.asp>). It is important to keep in mind that currently available serological tests are not species specific and will cross react with other species in the genus *Rickettsia*.

Several commercial laboratories also offer PCR testing for *Rickettsia rickettsii*, *Ehrlichia chaffensis* and *Anaplasma phagocytophilum*. DNA detection confirms the diagnosis and can be very helpful when assessing patients acutely ill with anaplasmosis or human monocytic ehrlichiosis. PCR is less sensitive for RMSF because the organism may not be present in the blood in large enough numbers to be detectable.

In North Carolina, the number of reported cases of SFGR (including RMSF) has increased steadily since 2009 (Fig. 1–4). However, only about 5% of cases in any year are confirmed via paired acute and convalescent serology. The vast majority of cases are classified as probable, based on a single serologic result. While this is consistent with national reporting patterns, we request your support to improve diagnostic specificity and surveillance by ordering both acute and convalescent serum samples or considering PCR testing.

### Treatment

Regardless of the ultimate cause of infection, if tickborne rickettsial disease is suspected, patients of all ages, including children, should be treated promptly and appropriately with doxycycline [1,2,4]. Tickborne rickettsial diseases are potentially fatal, and since laboratory confirmation of infection may take weeks, therapy should not be delayed pending diagnosis. In a recent survey of healthcare providers, 80% identified doxycycline as the appropriate treatment for Rocky Mountain spotted fever in patients greater than 8 years old, but only 35% correctly chose doxycycline in patients aged

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less than 8 years. These findings raise concerns about the higher case-fatality rate of Rocky Mountain spotted fever among children that has been observed nationally [3].

**Recommendations of the CDC and American Academy of Pediatrics [1,4,5]**

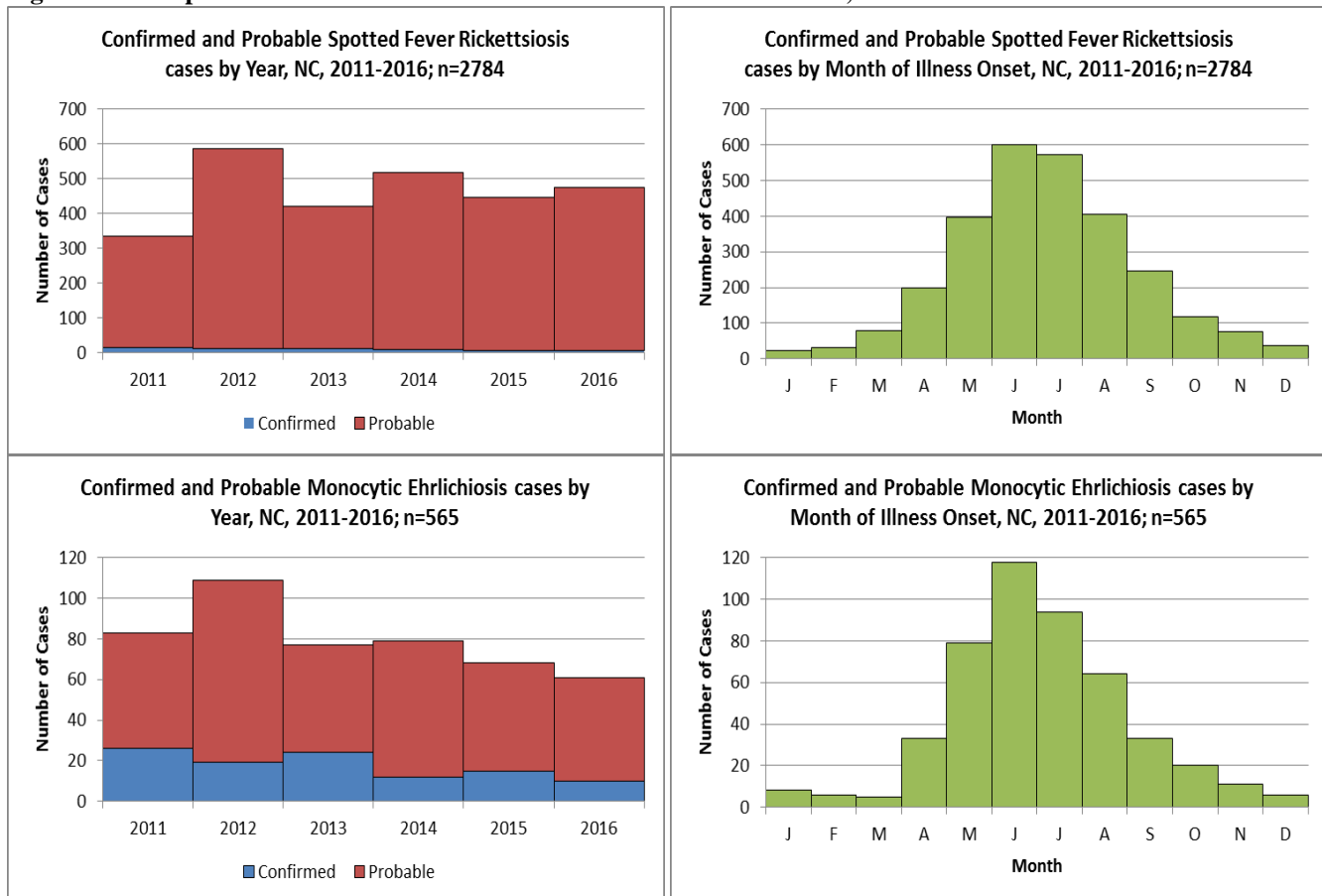
The use of doxycycline to treat suspected ehrlichiosis/RMSF in children is standard practice recommended by both CDC and the AAP Committee on Infectious Diseases. Unlike older generations of tetracyclines, the recommended dose and duration of medication needed to treat ehrlichiosis/RMSF has not been shown to cause staining of permanent teeth, even when five courses are given before the age of eight. Healthcare providers should use doxycycline as the first-line treatment for suspected ehrlichiosis/RMSF in patients of all ages.

If you have any questions about surveillance of tick borne rickettsial diseases please visit our website (<http://epi.publichealth.nc.gov/cd/diseases/ticks.html>) or contact Dr. Alexis M. Barbarin or Dr. Carl Williams at 919-733-3419.

**References**

1. <http://www.cdc.gov/rmsf/symptoms/>
2. Biggs HM, Behravesh CB, Bradley KK, 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(No. RR-2):1–44. DOI: <http://dx.doi.org/10.15585/mmwr.rr6502a1>.
3. Zientek, et. al. Self-reported treatment practices by healthcare providers could lead to death from Rocky Mountain spotted fever. *J Pediatr.* 2014 Feb;164(2):416-8. DOI: <http://dx.doi.org/10.1016/j.jpeds.2013.10.008>
4. <http://www.cdc.gov/ehrlichiosis/symptoms/>
5. Todd, et. al. No Visible Dental Staining in Children Treated with Doxycycline for Suspected Rocky Mountain Spotted Fever. *J Pediatr.* 2015 May; 166(5): 1246-1251. DOI: <http://dx.doi.org/10.1016/j.jpeds.2015.02.015>

**Figures 1–4: Reported Cases of Tickborne Rickettsioses in North Carolina, 2011–2016\***



\* Note: 2016 data are preliminary and subject to change.