

Rocky Mountain Spotted Fever, A Reemerging Disease in Arizona and Sonora- Case Study

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Abstract

Rocky Mountain spotted fever, *Rickettsia Rickettsii* (RMSF) is a reoccurring disease in Arizona and Sonora and a public health problem due to the high risk medical complications it provokes. In the region it is transmitted by the bite of the *Rhipicephalus sanguineus* tick, found in dogs. This tick transmits *Rickettsia rickettsii* bacteria. Following an incubation period of 3-14 days, it causes acute, non-specific effects early on (fever, headache and rash) that -if not diagnosed and treated in time can be serious or cause death. Death is primarily associated with two factors: (a) delay in diagnosis, and (b) doxycycline, a highly effective antibiotic treatment which is inexpensive and simple to administer is delayed. If doxycycline is not provided before the 5th day after the symptoms begin, the patient can worsen and present with dark purple spots on the body, mostly hands and soles, wrists and ankles as well as have heart, hepatitis, renal, central nervous symptoms and other multiple organ complications. RMSF should be considered a medical priority and a public health problem at the regional level with a network of underlying factors. To prevent and control RMSF in Arizona and Sonora, public health interventions will need to address medical challenges associated with a number of social, political, and environmental factors.

Introduction

Since reemerging in Sonora in early 2000, there has been an average of 100 cases of per year of RMSF, with epidemic outbreaks and scattered clusters. The disease has spawned from the southern part of the state and today has extended to border towns along the Arizona-Sonora region such as Nogales and Agua Prieta, affecting rural as well as urban areas. Although RMSF can happen at any age, it is particularly serious in children younger than 10 years of age [1-2]. The gravity observed in the general population in Sonora ranges between 8 and 10%, yet in children it increases to 30% [3] which is considerably higher to that reported (2-3%) in endemic areas from the United States [4]. In the Sonoran Children's Hospital (HIES-Hospital Infantil Estatal de Sonora) between 2004-2012, 125 children have been treated for RMSF from 34 locations throughout the state, of which 37 have died, with a fatality rate of 29.6% [3]. An uprising trend in morbidity and mortality of the disease has been previously reported in this population from Sonora [5], meanwhile in tribal lands of Arizona incidence (17.2 per 1,000,000) is higher than for the general population [6]. Conditions of poverty, lack of access to health services, and cultural patterns associated with migration contribute to health challenges and probably increase the risk and vulnerability of people who settle in communities made up mainly of migrants from the more southern states in Mexico.

RMSF should be considered a medical priority and a public health problem at the regional level with a network of underlying factors which merit specific interventions. In our opinion, for Arizona and Sonora the main interventions include the following:

a) Medical Challenges: There is sufficient scholarly literature and practice to understand that the mortality and complications produced by RMSF can be considerably reduced or avoided if the initial medical provider suspects the diagnosis and initiates opportune treatment with doxycycline [7-9]. From the HIES experience, 9 out of every 10 children with RMSF had at least one doctor's visit before hospitalization was necessary, and the disease was not suspected early by clinicians, who prescribed antibiotics for other illnesses that mimic the disease, which has been related to fatal outcomes [10]. It is also known that there is a general lack of awareness in the medical and public health community about the epidemiology of the disease [11]. This may contribute to delayed therapy and a lack of knowledge and awareness by the community on how to identify the illness and take preventive measures. This may increase risk of infection for vulnerable populations (i.e. children, native groups, migrants) living in rural settings and in impoverished conditions [1,12].

b) Socio-environmental conditions: Although RMSF has long been attributed to contact with domestic dogs [7,13], it is basic to understand that only a small proportion of the tick population lives temporarily on domestic pets and is more commonly found in the soil, between cracks in walls, housing foundations, and other items (i.e. unused furniture in the yard) [14,15]. In fact, dogs may constitute a barrier to mitigate the attacks on humans by ticks, as these ectoparasites tend to be attracted to dogs by warmth, physical contact and odors. Therefore, strategies to eliminate dogs do not solve the problem. What does help is to protect children from ticks through household interventions using safe but effective pesticides, actions such as eliminating unused furniture and other environmental measures [15]. In Sonora and Arizona, social conditions, in addition to climate in the region, may increase the vector density and lessen the factors that can reduce the risk of RMSF (i.e. low education, lack of resources to guarantee pet care). Children are especially vulnerable because they tend to spend long periods of time playing around spaces where ticks survive or because adults do not routinely check children for exposure to ticks [1,7]. Finally, global warming can produce more aggressive attacks on humans [16].

c) Socio-political factors: Indigenous groups are vulnerable because they have fewer resources to deal with RMSF. In HIES, one out of four hospitalized patients belong to indigenous migrant communities, and they had the highest fatality rate (40.6%) for the 2004-2012 period. Moreover, in Sonora, indigenous people are recruited or migrate from southern states in Mexico to work in the agricultural industry. They migrate or agree to the long journey to work in northern Mexico due to their social disadvantage [17]. Limited funding of public health programs may result in few if any prevention and control programs to address this reemerging disease. In the U.S., tribal lands are considered sovereign; therefore, local, state and federal government programs in Arizona and the U.S. can only advise public health authorities on Tribal Lands. Although there are government efforts for this type of population, there is no federal, state or local program well financed or culturally appropriate and socially accepted, designed to prevent, service or control RMSF.

Conclusion

Rocky Mountain spotted fever is a public health problem due to the magnitude and impact at a population level. If not timely diagnosed, health outcomes resulting from RMSF may range from a simple fever and headache to death. Cases resulting in death are primarily associated with two factors: 1) lack of clinical suspicion and 2) a delay in the administration of doxycycline, a highly effective antibiotic treatment that is inexpensive and simple to administer. If doxycycline is not administered to a patient within the first five days after he or she begins having RMSF symptoms, then they may develop heart, renal, and multiple organ complications which can lead to death. RMSF should be considered a major medical priority and a serious public health problem at the regional level with a net of underlying factors. Public health interventions to prevent and control RMSF in Arizona and Sonora will need to focus on a number of medical challenges associated with the social, political, and environmental conditions of the target region.

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