



Published in final edited form as:

J Pediatr. 2014 February ; 164(2): 416–418. doi:10.1016/j.jpeds.2013.10.008.

Self-Reported Treatment Practices by Healthcare Providers Could Lead to Death from Rocky Mountain Spotted Fever

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Abstract

Among 2012 Docstyle survey respondents, 80% identified doxycycline as the appropriate treatment for Rocky Mountain spotted fever in patients ≥ 8 years old, but only 35% correctly chose doxycycline in patients <8 years old. These findings raise concerns about the higher pediatric case-fatality rate of Rocky Mountain spotted fever observed nationally. Targeted education efforts are needed.

Rocky Mountain spotted fever (RMSF) is a tick-borne disease that poses a significant clinical dilemma for physicians, progressing rapidly from a nonspecific febrile illness to organ failure and death in some untreated cases.^{1,2} Fatalities can be avoided with prompt empiric treatment with a tetracycline antibiotic, but treatment is most effective when started in the first 5 days of illness, and other broad spectrum antibiotics are not effective.^{3,4} Doxycycline, as recommended by the American Academy of Pediatrics, is the treatment of choice in patients of all ages.^{5,6} However, in a recent survey in Tennessee, <40% of providers correctly identified doxycycline as the treatment of choice in children <8 years old.⁷ We sought to evaluate age-specific national prescribing practices for patients with RMSF, using a web-based survey of healthcare providers (HCPs).

Methods

DocStyles is an annual web-based survey conducted by Epocrates, Inc that assesses US HCP practices. Respondents were required to currently treat patients and have practiced for ≥ 3 years, and were paid an honorarium of \$20-\$85. The overall response rate for the 2012 DocStyles survey was 52%. Our analyses were limited to responses from primary care physicians, internists, pediatricians, and nurse practitioners (n = 1503). The 2012 survey included 2 questions pertaining to the treatment of RMSF: which antibiotic would be their first choice of treatment for RMSF in: (1) adults and children 8 years old or older; and (2)

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The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. The authors declare no conflicts of interest.

children less than 8 years old. “Doxycycline” was the correct answer to both questions, with trimethoprim-sulfamethoxazole, chloramphenicol, azithromycin, other, and no antibiotic considered incorrect choices. Respondents were also asked how often they used different sources of continuing medical education (CME). Pearson χ^2 test was used for hypothesis testing at $\alpha = 0.05$.

Results

General practitioners (36%) and internists (31%) were the most frequent respondent type, and the majority of respondents (74%) reported seeing pediatric patients in clinical practice (Table I).

Most respondents (80%) correctly identified doxycycline as the treatment of choice for adults and children 8 years and older (Table II). A minority of respondents (35%) correctly identified doxycycline as the treatment of choice for children less than 8 years old, although pediatricians responded correctly (51%) more often than other HCPs (32%) ($P < .0001$). Of the respondents who correctly selected doxycycline as the treatment of choice for adults and children 8 years and older, 58% failed to identify doxycycline as the treatment of choice in children less than 8 years old. Provider characteristics significantly associated with correct selection of doxycycline to treat RMSF in children less than 8 years old included male HCP, having an exclusive inpatient practice, seeing pediatric patients, having privileges at a teaching hospital, and practicing ≥ 15 years, although none of these characteristics resulted in a frequency of doxycycline usage greater than 43%.

Most respondents (76%) reported often or always using journals or the internet for sources of CME.

Discussion

A majority of US HCPs failed to identify doxycycline as treatment of choice for RMSF in children less than 8 years old, despite its use being recommended by the American Academy of Pediatrics.⁶ In contrast, 80% of HCPs correctly identified doxycycline as the treatment for adults and older children. This indicates a significant variation in clinical practice decisions based on patient age. Delayed treatment, or treatment with an antibiotic other than a tetracycline, carries a risk of fatality from RMSF.⁴ During 1999–2007, US children aged 0–9 years were 6 times more likely to die from RMSF compared with older children and adults, and children ≤ 9 years old represented 33% (13/40) of all reported fatalities.¹ This raises a serious concern that provider decisions may be directly contributing to a preventable cause of pediatric mortality.

Provider hesitancy to prescribe doxycycline for children may be based on concerns about possible dental staining.^{8–10} The current doxycycline label indicates that unless there are no other effective antibiotics, the drug should be avoided in children less than 8 years old to avoid staining of permanent teeth.¹⁰ The label does not directly address the fact that there are no equally effective alternatives for the treatment of RMSF, or that short courses of doxycycline have not been shown to have this effect.^{8–10} Although inferences regarding HCP perceptions of dental staining are limited because this survey did not explore factors

influencing treatment decisions, this study points toward an important gap in HCP knowledge regarding RMSF treatment that should be addressed with targeted CME using journals and internet sites.

Prompt and empiric administration of doxycycline to suspected cases of RMSF in children less than 8 years old is one important key to reducing the elevated case-fatality rate in this age group. Knowledge of and confidence in doxycycline likely plays a crucial role in influencing HCP age-specific prescribing decisions. Additional studies examining the effects of doxycycline on developing teeth, as well as possible label changes to reassure providers of safety at the recommended dose and duration, may improve compliance with national treatment recommendations in children less than 8 years old.

Acknowledgments

The authors would like to acknowledge Suzanne Todd and Naomi Drexler (both from the Centers for Disease Control and Prevention) for their contributions to the review and provision of background information for this project.

Glossary

CME	Continuing medical education
HCP	Healthcare provider
RMSF	Rocky Mountain spotted fever

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Table I

HCP and practice characteristics

Respondent characteristics	All respondents N = 1503
Practice type	
Internist	464 (31%)
Family/general practitioner	537 (36%)
Pediatrician	250 (17%)
Nurse practitioner	252 (17%)
Age group	
25–35	170 (8.7%)
36–50	778 (52%)
51–65	522 (37%)
>65	33 (2.4%)
Sex	
Female	618 (41%)
Male	885 (59%)
Years in practice	
3–7	270 (17%)
8–12	411 (26%)
13–20	396 (27%)
21–30	367 (26%)
>30	59 (4.9%)
Patients seen per week	
<50	96 (6.4%)
50–100	909 (60%)
101–200	453 (30%)
201–300	19 (1.3%)
>300	26 (1.7%)
Pediatric patients	
Yes	1112 (74%)
No	391 (26%)
Teaching hospital privileges	
Yes	692 (47%)
No	811 (53%)
Practice type	
Outpatient	1358 (90%)
Inpatient	145 (9.7%)

Table II

HCP characteristics associated with correct response to RMSF treatment, bivariate analysis

	<u>Doxycycline in patients ≥ 8 years</u>		<u>Doxycycline in patients <8 years</u>	
	N = 1202 (80%)	P value	N = 522 (35%)	P value
Provider type				
Family/general practitioner	419 (78%)	<.0001	161 (30%)	<.0001
Internist	377 (81%)	<.0001	157 (34%)	<.0001
Nurse practitioner	174 (69%)	<.0001	77 (31%)	<.0001
Pediatrician	232 (93%)	Referent	127 (51%)	Referent
Provider sex				
Male	717 (81%)	.22	326 (37%)	.04
Female	485 (78%)	Referent	196 (32%)	Referent
Practice type				
Outpatient	1082 (80%)	.38	460 (34%)	.03
Inpatient	120 (83%)	Referent	62 (43%)	Referent
Sees pediatric patients				
Yes	905 (81%)	.02	403 (36%)	.04
No	297 (76%)	Referent	119 (30%)	Referent
Privileges at a teaching hospital				
Yes	564 (82%)	.17	258 (37%)	.05
No	638 (79%)	Referent	264 (33%)	Referent
Years in practice				
15	707 (82%)	.04	321 (37%)	.02
>15	495 (77%)	Referent	201 (31%)	Referent
Patients seen per week				
100	797 (79%)	.36	348 (35%)	.9
>100	405 (81%)	Referent	174 (35%)	Referent
Reported patient financial status				
Very poor to middle class	709 (81%)	.10	306 (35%)	.7
Middle class to affluent	493 (78%)	Referent	216 (34%)	Referent