Reviewer's report

Title: Diagnostic behaviour of general practitioners when suspecting Lyme disease: a database study from 2010-2015

Version: 0 Date: 30 Aug 2017

Reviewer: Eugene D Shapiro

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This manuscript reports the results of a study, using data from electronic medical records, of the number of contacts related to Lyme disease or to tick bites and the proportions of those contacts for which diagnostic tests for Lyme disease were ordered each year for 5 ½ years at 12 general practices in Amsterdam, Netherlands. The authors found that serologic tests for Lyme disease were ordered in 36% of all of the contacts, and that ordering a serologic test was not recommended by guidelines in a majority of the instances. For example, tests were ordered for more than two-thirds of the contacts with only non-specific complaints such as arthralgia, headache or fatigue. The number of tests ordered for Lyme disease did not increase during the study period. The authors conclude that a diagnostic algorithm tailored to general practitioners might decrease over/inappropriate diagnostic testing for Lyme disease.

The way the data are presented may be misleading for some readers. For example, information in table 2 indicates that serological testing was ordered for 70.3% of the contacts who presented with "general" ("non-specific" may be a better term) symptoms. However, we do not really know in what proportion of ALL patients that presented to the practitioners with general symptoms was Lyme serology ordered. The method that the authors used to identify subjects for the study meant that many patients were identified BECAUSE a test for Lyme disease was ordered; consequently, a better way to present the data would be to say that: of all patients for whom serology was ordered, (#) had general symptoms. Or, at least, to present the data both ways. Of course, this applies for all of the categories in table 2. Somewhere, either in the background or in the discussion section, the issue of pre-test probability and positive predictive value of a test result should be emphasized. The authors seem to imply that the reason for a false-positive test result must be prior infection. While that could be one reason, there are
many other possible reasons for a false-positive result, by far the most important being Bayes theorem (see Ann Intern Med 1997;127:1109 and Pediatr Infect Dis J 1996;15:762-3). While it is true that serologic testing adds little to evaluation and management of patients with erythema migrans (EM) since they should always receive antimicrobial treatment, the authors should also point out that serologic testing of patients with EM may be misleading, since in most patients with EM, the test result will be negative since the rash usually develops before antibodies are detectable.

Other minor points: Line 62, the authors use arthritis as an example of symptoms. Arthritis is a sign, not a symptom. Arthralgia is a symptom. Indeed, no symptom, by itself (without more specific signs), is associated with a high enough probability that Lyme disease is the cause that serologic testing for Lyme disease is justified (another important point that the authors may wish to make). Line 96: How is definite tick bite defined? Many patients will assume a bite is from a tick when it is not. What constituted evidence such that it was classified as definite? "Insect sting" seems like an inappropriate designation for bites for which the cause is uncertain but might be from a tick. Ticks are arachnids; they are NOT insects! The authors should correct the dates of the study reported in the manuscript, in which they say the study went from January 2010 to July 2015; since they also say it included only the first 6 months of 2015, and since presumably the year began January 1, it should be expressed as to June (not July) 2015—alternatively give precise months and days. Finally, the authors conclude that a diagnostic algorithm tailored to primary care may decrease over-testing for and over-treatment of Lyme disease. There is no basis for reaching this conclusion. There already are guidelines that clearly do not have much (or at least do not have adequate) impact on the behavior primary care providers. Indeed, there are many studies that show that guidelines and diagnostic algorithms have relatively little influence on behavior of care providers. Perhaps a better conclusion would be that additional studies are needed (perhaps beginning with qualitative studies) to determine how to change the behaviors of primary care physicians towards evaluation of patients who are concerned about Lyme disease.

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