Reviewer's report

Title: Estimation of cumulative number of post-treatment Lyme disease cases in the US, 2016 and 2020

Version: 1 Date: 25 Nov 2018

Reviewer: Gerrit Gort

Reviewer's report:

The authors improved the paper substantially, taking the comments into careful consideration.

I like the addition in the Discussion section about two types of uncertainty: uncertainty in disease incidence and treatment failure rates handled by different "settings" (where all six settings are more or less realistic now) and uncertainty, given a specific setting, stemming from probability distributions, which would give rise to the data.

In the Conclusions it should be mentioned that the variability in the estimates is very high, as mentioned in Results. E.g. a range of 65,000 - 1,500,000 is very large indeed.

A few points remain feable, in my opinion.
- Contrary to the addition in the Discussion part (see above), I think that disease incidence and treatment failure rates are currently not treated in a similar fashion. Both are indeed handled in different "settings", but the treatment failure rates get an extra layer of uncertainty through the beta distribution: simulation of the occurrence of PTLD does not come from a binomial distribution with 10% and 20%, but from a binomial distribution with probability of success sampled from a beta distribution. The same procedure could be used for disease incidence: starting from a specific setting for the expected number of PTLD cases in a year a random deviation (expressing the uncertainty about it) from that number could lead to a count, to be used as parameter for the probability distribution (like Poisson) for counts. However, the parameter for the count probability distribution is the expected number of PTLD cases directly.
- Again, there is little rationale for the use of the Poisson distribution for counts, which lead to very small relative variation. Other distributions for counts exist, which allow for more variation, like the negative binomial distribution (but admittedly without much rationale too). The differences between the settings, however, will probably drown whatever variability would be obtained from the probability distributions.

p7, line 12-15 Please give reference for this (PTLD death rate equals general US population death rate), or mention that you explain this later, as you do give a reference at p 9, l 24 in the survival part.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
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Yes

Are the conclusions drawn adequately supported by the data shown?
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Yes

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