Reviewer's report

Title: Modeling the variations in pediatric respiratory syncytial virus seasonal epidemics

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Reviewer: Gerardo Chowell

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Modeling the variations in pediatric respiratory syncytial virus seasonal epidemics

Lee caster et al.

RSV epidemics in children occur every year. Early estimates of the characteristics of the epidemics each year including peak size, attack rate and duration could lead to improved management of resources. The authors model and characterize RSV epidemics using confirmed cases in Utah during the period 2001-2008. The questions addressed in this paper are relevant. However, there are some aspects that need clarification (e.g., description of data), and there are issues with their parameter estimation approach that could have important implications on their conclusions. Below I provide specific comments:

ABSTRACT

The authors seem to use RSV data from children aged less than 2 years. However, this age cutoff is not justified as the authors state in the results of the paper that 81% of the children were less than 3 years old. It is not clear why the authors exclude children older than 2 years from the analyses. If the authors have age data, age-specific analyses would be interesting to conduct. How do age-specific epidemic characteristics change over RSV seasons?

DATA

The data needs to be better described. Please describe exactly the type of data being used. The authors mention hospitalization and notification data, but it is not clear exactly the type data being used in their paper.

REGRESSION ANALYSIS

The authors refer to epidemic size, length, days to peak. These terms are not clearly defined in the paper. In my view, Figure 1 should show weekly RSV incidence over for each year of data. Figure is not very informative in its present form.

SEIDR model

The authors refer to the equations as “differential equations.” Please see the SEIRD model defined as differential equations in [Epidemiol Infect. 2008}
How did you calibrate population size in this model?

The authors estimate the transmission rate $\beta$ and the proportion of susceptible individuals using a grid search method. The estimation of these two parameters from the epidemic curve may not be identifiable (possible existence of more than one unique set of parameters providing a good fit to the data, see for instance Stat Med. 2006 Jun 15;25(11):1840-57). The authors should carry out a full uncertainty and sensitivity analysis [see Epidemiol Infect. 2008 Jun;136(6):852-64.] to check for this possibility since their conclusion that the proportion of susceptible individuals vary over the years may not be supported.

RESULTS and CONCLUSIONS

These will need to be better supported following my questions above.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests