Author's response to reviews

Title: Transmission dynamics and control of Ebola virus disease (EVD): A Review

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Author's response to reviews:

Responses to the Reviewers: Chowell and Nishiura.

[Response to Professor Alex Vespignani]

This is a timely review of the transmission dynamics and modeling of EVD. The paper is certainly going to be a relevant resource in the current and future modeling efforts concerning the west african EVD outbreak. This review provides a thorough discussion of past epidemiological data, models and how modeling efforts can help assessing the effectiveness of public health measures. The paper shall be certainly published (possibly fast tracking it) after the authors have considered the following remarks.

Major compulsory revisions

The authors provide a thorough presentation of the various epidemiological data and modeling approaches to EVD. The only part that falls short of the mark is the discussion of the transmission of the disease in funeral settings. This is a major component of the disease transmissibility that it is discussed in one of the modeling approaches that the author themselves define as key studies (ref.s 18,19). Unfortunately while the authors dive into many details of the balance between the community and hospital transmissibility, they do not discuss in detail the issue of the funeral settings. Furthermore they do not offer a short presentation of the model of Legrand et al. (ref.19) where this component is explicitly modeled. I believe that for the sake of completeness the authors shall discuss the funeral transmission and its modeling in more detail.

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We agree with the reviewer. We have additionally written the details of transmission events at funeral settings and have highlighted the model structure of Legrand et al.

Discretionary revisions

In the last few weeks several papers have been published concerning the analysis of the current WA outbreak, including a paper from the authors of this submission. Although I know it is difficult to keep the pace with an obviously growing literature on the WA outbreak, I believe that the present review would be benefit (make it more updated) of one or two paragraphs concerning those
modeling approaches in the discussion section.
In summary I believe that the authors can consider the above remarks and provide a new version of the manuscript in a very short time ensuring a fast publication of this extremely relevant reference work.

We appreciate positive and constructive remarks from the reviewer. We have inserted a paragraph that summarizes the findings from recent modeling studies on the ongoing EVD epidemic.

[Response to Dr Daozhou Gao]
Prompted by the 2014 West African Ebola outbreak, the authors present a timely and relevant review type article on the transmission and control of Ebola virus disease (EVD). It could benefit the mathematical and statistical modeling studies towards Ebola fight. However, some major specific comments need to be addressed before the paper could be accepted for publication.

Major Compulsory Revisions:
1. The writing of the manuscript could be more friendly and easy-to-follow if it has a better structure and clearer section/subsection titles.

Thanks. We have reviewed and revised all section titles accordingly.

2. The background (in particular the epidemiological characteristics) of EVD needs to be strengthened to include distribution of former Ebola outbreaks, regions at the risk of EVD, acquired immunity, possibility and impossibility of the respiratory route [12], transmission heterogeneity, etc.

We have complemented the background section as suggested by the Reviewer.

3. Page 8, the authors may compare their R0 with those in recent publications [1, 5, 2].

We have inserted a paragraph that summarizes the findings from recent modeling studies on the ongoing EVD epidemic.

4. It will be helpful to put key parameters and their ranges (incubation period, serial interval, infectious period, etc) together in one table.

We have prepared a table summarizing the epidemiological parameters.

5. Page 12, lines 16-19, as far as EBV is concerned, two additional categories may be included, i.e., exposed individuals under quarantine (Q) and infectious dead bodies (D).
Thanks. We have pointed out that more elaborate models that incorporate
quarantine efforts (similarly to prior to models for SARS and other infectious
diseases) as well as the role of funerals on transmission. The latter feature is
presented in the context of the Ebola epidemic model by Legrand et al. (2007).

6. From page 12, line 21 to page 14, line 13, is the whole argument new or based
on a specific paper? For what reason is the transmission from infectious corpses
ignored? As we know, transmission in funerals may play an important role in the
early phase of an outbreak. Please clarify it at the beginning of the argument.

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We agree with the reviewer. We have additionally written the details of
transmission events at funeral settings and have detailed the model structure of
Legrand et al.

7. Page 14, the descriptions of Figures 3 and 4 are vague. 1) What are the
corresponding baseline parameter values? 2) Is the y-axis of Figure 3 R or R0?
what does isolation effectiveness mean in Figure 3? It cannot be l0, otherwise R
should be increasing in l0. 3) Is Figure 4 a contour plot of R or R0? What are the
x-axis and y-axis of Figure 4? Are they l0 and a0 (or 1=a0), respectively?

>> Thanks. We have provided a more detailed description and detailed
parameter values to reproduce all of the figures in their corresponding legends.

8. Where do Figures 5-8 come from?

>> Thanks. We have provided a more detailed description and detailed
parameter values to reproduce all of the figures in their corresponding legends.

9. Page 19, since no vaccine or licensed treatment is available for the Ebola
virus, non-pharmaceutical interventions are vital to the success of containing
Ebola spread. The authors may provide more information on contact tracing,
quarantine, isolation, etc (e.g., CDC: What is contact tracing?
with the impact of public health interventions for SARS outbreaks will be helpful
to study the transmission and control of EVD. For example, Lloyd-Smith et al. [9],
Abba et al. [6], Wang and Ruan [11], Mubayi et al. [10], etc.

>> Thanks. This has been noted and references to relevant have been added as
suggested.

Minor Essential Revisions:
designated Zaire ebolavirus)” or “The Zaire ebolavirus (EBOV)”;
line 13, “the first
outbreaks” to “the first outbreak”.
2. Page 7, line 9, insert reference number [18] after “Chowell et al.”; line 11,
“vales” to “values”; line 18, insert “,” after “i.e.”.
3. Page 8, line 2, insert “,” after “i.e.”.
4. Page 9, lines 1-9, it is much clearer to summarize R0 for different infectious
diseases in a table and add a brief comment on the difference; line 1, “Filoviruses” to “filoviruses”; line 19, the abbreviation “DRC” for ‘The Democratic Republic of the Congo’ is undefined.


6. Page 12, line 22, what is the definition of N? does it include the disease induced deaths? If yes, why?

7. Page 13, line 5, insert “,” after “e.g.”; line 9, insert “at 0; I0 and a0 after “remain constant values”; line 13, “1=(a + I)” to “1=(a0 + I)”; line 20, “Rcomm;” to “Rcomm”.

8. Page 14, line 23, “e.g.” to “e.g.,”.

9. Page 16, line 15, “higher” to “longer”.

>> Thanks. These have been addressed as indicated.

10. Page 17, line 11, “[62][63]” to “[62,63]”; it is better to change Figure 7 to a stacked bar chart. Otherwise it is hard to distinguish community health-care worker cases from community cases when the figure is printed in white and black.

>> Actually Figure 7 is a stack bar plot to show the contributions of health care worker cases to total cases.

11. Page 23, line 18, “starts” to “stars”.

In addition, the authors may include some very recent publications on 2014 West Africa Ebola outbreak after their initial submission:[1, 8, 7, 5, 4, 3, 2].

>> Thanks. These have been addressed as indicated.