Author's response to reviews

Title: Social contact networks for the spread of pandemic influenza in children and teenagers

Authors:

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Author's response to reviews: see over
January 19, 2008

Dear BMC editorial staff,

We have revised our manuscript (MS: 6826004431533358).

We wish to thank the reviewers again for their thorough and thoughtful review, they have greatly improved our paper. One reviewer had additional comments on our revision.

Our point by point response to the reviewer with remaining comments is provided below (ours in a different font directly below each comment of each reviewer).

Thank you very much,

Robert J Glass
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Complex Adaptive Infrastructures and Behavioral Systems
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Reviewer’s report
Title: Social Networks of Children and Teenagers: Characterization and Application for the Spread of Pandemic Influenza
Version: 2 Date: 18 January 2008
Reviewer: Miriam Kretzschmar

Reviewer’s report:
1. Page 11, last 2 paragraphs: I think it is hard to compare contact level hours in households and random contacts in their transmission potential, because the number of persons who can potentially be infected differs strongly. In a household, even with many contact hours, the number of secondary cases remains limited, while in random contacts potentially many more persons can be infected. This should at least be mentioned or discussed.

We compared random contacts to those in groups in detail in the final paragraph on page 10 and show that the contact-level-hours for random contacts to be less than 3% of the total per person per day values. However we recognize the reviewer’s point in the final sentence: “On the other hand, one infectious person coughing throughout a single passing period during school has the potential to infect 8-15 other students (and there are up to 6 passing periods per day).”

Here on page 11 we are discussing School closure and social distancing measures. We state in the final sentence of the second to last paragraph: “Random contacts are also almost entirely eliminated through school closure (Figure 2).” So closing schools removes almost all the random contacts of a typical student’s typical day.

To emphasize the reviewer’s point, we have modified the beginning of the next paragraph to say (added parts in italics): “If we were to close the schools and additionally keep all the children and teenagers home so that only the black in Figure 6 remained, the influenza transfer potential would be reduced to approximately 50% for 5th graders, down to 18% for 11th-12th graders, and all random contacts are entirely removed. While contact-level-hours within the household would necessarily increase for students kept there, the connection across these age classes within the community would be broken. In a household, even with many contact hours, the number of secondary cases remains limited. The epidemic must then be transmitted within the community by adults (assuming younger children are likewise kept home and the elderly do not play a significant role in transmission).”

2. Page 12, para 3: The arbitrary nature of the scale in which contact levels are measured should be mentioned and discussed.

The nature of the scale is not arbitrary and reflects the work of others published in the literature (e.g., Edmunds et al 2006 referenced in the methods section).

The use of contact level in terms of a multiplier to yield contact level hours is also not arbitrary. It was chosen to be a first order estimate that contains the correct trend in a
linear approximation. This is discussed both in the methods section, second paragraph of page 6:

“Contact-level-hours per-person-per-day combines both the quality and quantity of contact and is our best estimation of potential influenza transmission within a group or public activity. However, at its base, it is formed by a simple product between the level of the primary link and the time for the link within the group. In this way, level 2 is presumed to have twice the potential of transmission of level 1, etc. While this has the correct trend, it is a simple linear approximation.”

And in the discussion of limitations and extensions:

“In the combined contact-hours (quantity) and contact-level (quality) measure of contact-level-hours, we have used a simple product that incorporates the expected trend in the potential for influenza transmission. Experimentally based mechanistic research, however, is required to improve this first order estimate. Depending on the disease, the combination of contact-hours and contact-level could and should be done differently, for example neglecting the level 1’s if a disease can not be passed with a level 1 contact, or neglecting level 2 and below if physical contact is required. In this way, social contact networks characterized as we have in this paper could be used in context of other diseases that spread by human to human contact.”

In the above paragraph, we have already pointed to the need for research to improve our first order estimate. We believe this reviewer’s concerns have already been addressed.

3. Table 1: The table is very useful for understanding the paper! It made clear to me that the essential property of public activities is that in principle there is a chance for contact between any two persons of the population, so a kind of global contact as opposed to local contacts in groups (compare nice paper by F.G. Ball, D. Mollison and G. Scalia-Tomba, Epidemics with two levels of mixing, Ann. Appl. Prob. 7 (1997), p. 46.)

We agree with the reviewer that this table is useful and thank them for suggesting it.

4. Figure 5: a,c and e would look better on a categorial scale, better use of available space.

We have plotted this as grade and there are gaps where we did not survey a particular grade. We like our presentation better because of this.

5. Figure 6: Maybe useful to have a legend (even if colors are explained in figure caption)?
We think so too, but the journal does not allow legends.

6. Page 2, last line: Brittain
Thanks!

7. Page 14, acknowledgements: my name is spelled Mirjam
Thanks again!

**What next?:** Accept after minor essential revisions
**Level of interest:** An article whose findings are important to those with closely related research interests
**Quality of written English:** Acceptable
**Statistical review:** No, the manuscript does not need to be seen by a statistician.
**Declaration of competing interests:**
I declare that I have no competing interests
Reviewer's report

Title: Social Networks of Children and Teenagers: Characterization and Application for the Spread of Pandemic Influenza

Version: 2 Date: 4 January 2008
Reviewer: Cecile Viboud

Reviewer's report:
This paper has been thoroughly and carefully revised in light of the reviewers report. It is now ready for publication.

What next?: Accept without revision

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests