Reviewer’s report

Title: Contact among healthcare workers in the hospital setting: Developing the evidence base for innovative approaches to infection control

Version: 0 Date: 12 Oct 2017

Reviewer: Timo Smieszek

Reviewer’s report:

I enjoyed reading and reviewing the manuscript "Contact among healthcare workers in the hospital setting: Developing the evidence base for innovative approaches to infection control".

The authors present novel data that combine information on location, contacts, and IPC compliance from three hospitals. I completely agree with the authors that, to the best of my knowledge, such data have not been collected before in this combination for complete hospitals. Therefore, I believe that this research can be a valuable addition to the literature.

A) My main points of criticism re the manuscript as it stands at the moment are:

a) While the data in this combination are novel and interesting, I feel that the design of the data collection instrument and the structure of the data are not well described. In my opinion, the authors should better describe how the questionnaire looked like, they should share a pdf of the questionnaire as supplementary material, and they should share their data (as it is good standard in this field).

b) I feel that the authors make suboptimal use of the data they collected. Collecting different kinds of information in a combined way clearly begs for a combined analysis. What is the point of collecting location and contact data in one combined study if the two different kinds of information are not related to each other? I would like to know, for instance, where the places with most contacts are. Do individuals with many places also have many contacts? Are there spatial contact hubs? Obviously, since the data structure is not well described (see point a), it is hard for me to tell how much more potential is in the data, but I believe that the authors should go beyond what is presented in the manuscript as it stands.

B) Detailed comments in no specific order:

1) Table 1: Would the data allow investigating specific "oHCW" groups? The groups lumped together in this category are very different in their roles and I would assume that, e.g., physiotherapists cover a larger range of locations within a hospital and have more (and more intensive) contacts than, e.g., medical imaging technologists or pharmacists.
2) p. 5, ll. 22-34: I would appreciate if different modes of transmission, their role in (different) nosocomial infections, and the relationship between contact definitions and their quality as proxies for transmission events would be discussed a bit more thoroughly [see, e.g., the "Appropriateness of contact definitions" section in BMC Infectious Diseases 2014, 14:136]. For many HCAI physical contact is of high importance!

3) p. 5, ll. 39-44: Was this a retrospective or prospective study design (i.e., were the participants asked to fill in the questionnaire more or less while things happened or according to their memory after a shift)?

4) Question re indirect vs. direct contacts: do the indirect contacts include direct ones (my understanding is that indirect contacts are based on co-location, which is also true for direct ones.

5) p.8, ll. 37-38: "The probability of transmission is generally considered to be proportional to the duration of contact for each pair of individuals" - this statement is only (approximately) true for low transmission probabilities or short contacts. Otherwise, there needs to be saturation. Relevant publications for the relationship of contact (exposure) duration and transmission probability are: (i) Biostatistics. 2014;15(3):470-83; (ii) Theor Biol Med Model. 2009;6:25; (iii) Haas/Rose/Gerba's book on "Quantitative microbial risk assessment".

6) For the discussion (since not measured): not only will the duration of contact be important for infection transmission, but also the type and intensity of contact. As mentioned before, physical contact might play an important role in HCAI. See, e.g.: (i) Biostatistics. 2014;15(3):470-83; (ii) Epidemics. 2011;3(3-4):143-51; (iii) R Stat Soc C. 2010;59:255-77.

7) Figures: I am aware that network graphs always look impressive in a publication (and some journals tend to like them). However, in dense networks (such as the hospital networks presented here), network graphs are of limited use for gaining insight into network characteristics (it is, e.g., hard for me to learn much from Fig 1 and 2, because the graphs are extremely dense). May I suggest that the authors (a) discuss the information that can be derived from the figures a bit more thoroughly and (b) to include some more network statistics that can be interpreted in an epidemiologically meaningful way, like the coefficient of variation of the number of contacts. Examples of meaningful statistics (not exhaustive, truly just illustrative) can be found here: BMC Infectious Diseases (2016) 16:341

8) I would further appreciate if the authors would critically discuss the limitations of their measurement instrument.

C) Literature that might be considered helpful:

(honest suggestions, I do not expect the authors to cite specific publications if they don't find them useful)

- Epidemiol Infect. 2012;140(12):2117-30
- Epidemics. 2015;10:72-7
- BMC Infect Dis. 2014;14:136
- PLoS One. 2015;10(9):e0136497
- Netw Sci. 2015;3(3):298-325
- Epidemics. 2011;3(3-4):143-51
- Infect Control Hosp Epidemiol. 2015;36(3):254-60
- PLoS Comp Biol. 2015;11(3):e1004170
- BMC Infectious Diseases (2016) 16:341

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Unable to assess

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

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

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

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Please indicate the quality of language in the manuscript:

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