Reviewer’s report

Title: Air pollution exposure is associated with MRSA acquisition in young U.S. children with cystic fibrosis

Version: 0 Date: 16 Feb 2017

Reviewer: Bell Scott Cameron

Reviewer's report:

Thank you very much for asking me to review this interesting analysis from North America based on the Cystic Fibrosis Patient Registry. The authors are experts in analysis and have contributed significantly to the understanding of links between the environment, climate and air pollution and cystic fibrosis past decade or more.

Overall I think that it is an interesting analysis. I do have some questions for the authors:

1. Biological plausibility. Overall the discussion is tight and interesting however it is unclear to me what the biological plausibility of a link between MRSA and measures of air pollution and this should be further clarified. Furthermore, extra discussion about the potential links between bacteria, particularly Staphylococcus aureus and MRSA in the general population and climate (if there are any data) would be most useful. This is absent in the discussion as far as I can see.

2. Some discussion about the types of MRSA. I am aware that there has been a significant increase in MRSA rates particularly in children with cystic fibrosis in the U.S. over the past 15 years with prevalence rates approaching ¼ of the population in some CF centres. Are these so called "community acquired" or "hospital acquired" infections and how might this be further analysed as presumably a significant proportion of people with CF in the U.S. acquire MRSA in the hospital environment. How does this link with the biological plausibility?

3. Analysis of children who may have relocated during the term of the study. I may have missed this but was there an analysis of children who relocated during the term of the study? This should be explicitly stated that patients were analysed in one place.

4. Limitation of using upper airway sampling techniques. There should be some discussion about the limitation of using upper airway sampling techniques particularly as Staphylococcus aureus/MRSA can be resident in the upper airway in healthy individuals.
5. Parallelism between MRSA and Pseudomonas aeruginosa infection in two separate papers. It is interesting that there is a parallelism between MRSA and Pseudomonas aeruginosa infection in two separate papers. I am not sure as to how one would approach the analysis but it would be interesting to see if it was the same patients that had increased risk of P. aeruginosa and MRSA. In the analysis of the two, were the periods overlapping and were the same cohorts analysed. This should be explicitly stated at some point in the study.

6. Links between other pathogenic organisms and air pollution outside the CF population in the general community. As outlined previously, the discussion covers links between health and air pollution and is particularly focused on CF. What is not so well covered is out-with cystic fibrosis patients in the general community and in other disease states, what are the links being shown for bacterial and other pathogenic organisms and air pollution?

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?
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?
If not, please explain in your comments to the authors.

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.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:
1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

No relevant competing interests. Have published in the area and our paper is cited in this MS.

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal