Reviewer’s report

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

Version: 0  Date: 18 Feb 2017

Reviewer: Barbara Kahl

Reviewer's report:

The manuscript "Air pollution exposure is associated with MRSA acquisition in young U.S. children with cystic fibrosis" by Psoter et al. investigates exposure of increased fine particular matter (PM) and the acquisition of several CF-related pathogens such as methicillin-susceptible Staphylococcus aureus (MSSA), methicillin-resistant S. aureus (MRSA), Stenotrophomonas maltophilia and Achromobacter xylosoxidans in young children with CF. To do so, the authors use data from the US CF Foundation National Patient Registry from 2003 until 2009 and data from the US Environmental Protection Agency Air Quality System. In this analysis there was only an association of MRSA and increased PM2.5 exposure, but no significant association of the other pathogens and PM2.5 exposure.

The same analysis was conducted by the same group of authors, in which they showed that there was an association between increased exposure to PM2.5 and earlier acquisition of Pseudomonas aeruginosa.

There are major concerns about this analysis and the conclusions drawn by the authors.

1. Staphylococcus aureus is neither an airborne-transmitted not an environmental pathogen. There might be other factors that could explain the association of increased PM2.5 exposure and earlier MRSA acquisition. Did the authors control for social status? In areas with higher PM2.5 exposure the social status and the cultural background could be very different from the overall CF-population. An association of social status, cultural background and acquisition of MRSA is well-known. Are the areas with high PM2.5 data areas, where the overall prevalence of MRSA is higher in the healthy population already compared to other areas, which might explain the increased acquisition of MRSA in the young CF-children?

2. In the conclusion the authors suggest to perform further studies on the acquisition of other CF pathogens. However, in their analysis they already showed that there was no association with other important pathogens such as MSSA, Stenotrophomonas and Achromobacter. Therefore, it is very unlikely that further studies will reveal any important data.
3. The authors should discuss that the effects of increased exposure to PM2.5 might sensitize for earlier acquisition of MRSA due to the increased inflammatory response.

4. The authors relate to literature, which should describe the influence of environmental factors on non-CF MRSA infections. However, the articles, which the authors refer to (31) only show an association of "Seasonal and temperature-associated increases in grammegative bloodstream infections..." and an association of S. aureus and skin- and soft tissue infection but not S. aureus pneumonia and seasonality (32), however this was only one study, which investigated this association, but did not find any no seasonal variation (Watanakunakorn et al.).

**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.

No

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No

**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 competing interests

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