Reviewer’s report

Title: Impact of leaks and ventilation parameters on the efficacy of humidifiers during home ventilation for tracheostomized patients: a bench study.

Version: 0 Date: 06 Nov 2018

Reviewer: Claudia Brusasco

Reviewer’s report:

I have read the manuscript with extreme interest, as I believe that the airway humidity in the ventilated patient is an extremely important point from a clinical point of view but often neglected and disregarded by many physicians.

This study, however, is focused on a particular subpopulation of patients who are under mechanical ventilation with tracheostomy at home and in this particular setting I believe that the risks associated with the administration of excessive airway humidity (water overload) and the risks associated with formation of condensation (almost unavoidable) with consequent increased infectious risk. Therefore the use of simple HME could be perhaps a good compromise between risks and benefits and practicality of use.

As also under discussion, the set-up of the bench study is valid, especially the feature of positioning the test lung inside a conditioned chamber at 34 °C to better simulate the real situation.

Despite this, the manuscript presents many critical issues:

1. You test old-fashioned active humidifiers according to very recent guidelines and therefore probably were not manufactured for those purposes of HA and HR and T.

2. The calculation of water consumption is not clear. To calculate the consumption of water you state as follows: "water consumption was assessed as a percentage of the threshold flow rate, corresponding to the water flow rate required to empty the reservoir in 8 hours". I do not agree and do not understand this calculation, I always prefer data from measurements. It is not clear how you did it.

It is also very strange that a humidifier produces more absolute humidity by consuming less water (compare between fig.3 and fig.4). Something wrong....

3. Very poor data display both in results and in additional files.

You describe the statistical method used to compare the performance of the various humidifiers (Kruskal-Wallis method with p <0.05), but the results are not clear to me at all. Even the "additional files" are not of easy and immediate interpretation.
4. In the description of data acquisition there may be a writing error: "The measurement period begins 5 minutes after the plateau and lasts 10 minutes, as shown in figure 2.

The plateau "was defined as the absence of temperature greater than 1 °C and absolute humidity variation greater than 5%" (also these "defined" data ...). Sample rate: 1 Hz; N: 300 points."

If you record from 10 minutes to 1 Hz, the sampled points should be 600 and not 300.

6. In the discussion you state that "a humidification for invasive provision can not be provided. I do not understand why." I would almost say the opposite.

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

No

**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.

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.

Not relevant to this manuscript

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Please indicate the quality of language in the manuscript:

Not suitable for publication unless extensively edited

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