Reviewer’s report

Title: Comparative bench study evaluation of different infant interfaces for Non-Invasive Ventilation.

Version: 0 Date: 03 Nov 2017

Reviewer: Juan Mayordomo-Colunga

Reviewer’s report:

Thank you very much for giving me the opportunity to review this bench study comparing different interfaces to deliver non-invasive ventilation (NIV) in infants. This topic is very important as interface is of utmost importance to achieve synchrony during NIV, and very few interfaces are available for infants. The present study suggests that a new nasal interface may have some advantages over another nasal mask. The main limitations of this work are related to the delivery of NIV in 'ideal' conditions: no unintentional leaks, use of pressure support ventilation without NIV mode (air leak compensation software), and steady respiratory rate. Authors adequately address these limitations in Limitations.

Major comments:

* Please clarify why the air leak compensation software was not used. Leaks are always present during NIV, especially in children (ill-fitting interfaces, non-cooperative patients, mouth opened...). Authors sealed the masks (and filled the mannequin mouth to reduce the dead space) and that is not applicable in clinical practice. This may limit the usefulness of the results in daily practice. Please comment on this.

* Pressure support used (13 cmH2O) is quite high. Please clarify why authors made this choice.

* What do authors mean when they state that inspiratory trigger, pressurization time and trigger threshold were set 'to optimize patient-ventilator interaction'? Please explain this further.

* Could authors please provide the name/brand of FPM? Reference 17 studied FP Zest, but that does not seem the one authors analyzed in their bench study.

* It would be very useful and informative providing a figure where most of the parameters analyzed could be seen graphically.

* Results are summarized in the first paragraph of Discussion, but tidal volume delivery is not included. I believe VT is also important, especially in restrictive lung disease, as shown by Carteaux et al (Failure of Noninvasive Ventilation for De Novo Acute

* Page 9, lines 24-28. Authors state that NIV in PICU is "delivered by high pressure ICU ventilators with active valves adopting a double circuit, without any intentional leak". That is not true in many PICUs, where NIV is delivered by dedicated NIV ventilators.

* It is surprising that Respireo showed better Swingtrigger and PTPtrigger than ET. Why do authors think this could be related to? It may seem that an interface with smaller dead space would show better performance. Please elaborate on this.

* There are some relatively new total face masks specifically designed for 'small children', that are being used very frequently in many PICUs. They have the advantage of avoiding leaks through the mouth, apart from avoiding pressing the forehead and the nasal bridge. Maybe a comment about this should be added.

* Main limitations are adequately addressed. However, a direct comparison of different interfaces (not including ET) is not technically or ethically impossible. Several studies have used a crossover study (face mask Vs helmet for example).

Minor changes:

* Please include abbreviations in figures legends.

* Page 9, line 44. Please correct: tested the efficiency of face masks in the resuscitation of newborn infants [28, 29] 26, 29.

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.

Not relevant to this manuscript

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