Author’s response to reviews

Title: Contemporary Portable Oxygen Concentrators and diverse breathing behaviours – A Bench Comparison

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Author’s response to reviews:

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Dear Sir or Madam,

Thank you for the invitation to resubmit manuscript “Contemporary Portable Oxygen Concentrators and diverse breathing behaviours -- A Bench Comparison” (PULM-D-19-00069) as a new manuscript for consideration for BMC Pulmonary Medicine. Thanks also to your reviewers for their thorough review and comments which have resulted in a much improved manuscript.

The reviewer concerns have been addressed; below is a point-by-point summary of my edits in response. Previous revisions were viewed as tracked changes.

Yves Lacasse comments:

The author addressed several of my previous comments. The length of the manuscript is now reasonable. The proportions of "triggering successes" (i.e., pulses aligned with inspiration) are presented in Table 2. I would have liked to see some formal statistical comparisons (p values) in this table. Is Device B really different from Device C? These proportions are reported on the 78
final consecutive breaths of the breathing sequence. Why 78? It seems to me that this number is small.

Author response:

The end of the breathing sequence - the “78 final consecutive breaths” - was chosen to allow time for devices to stabilise their triggering. While 78 breaths may be a small number for in-vivo studies, bench studies by default do not possess the same variability, so representative behaviour may be more readily be gauged with smaller samples. Please consider that this study does not aim to judge significant superiority of one device to another. No claims are being made. The study is more to challenge a range of contemporary devices (with more sophisticated triggering system than their predecessors) to a diverse set of breathing behaviours, behaviours that proved problematic in earlier clinical studies that revealed enormous variability between devices. By using state-of-the-art simulation techniques, informed by substantial literature review, the aim was to examine performance using credible and repeatable methods, such that we could focus specifically (in this publication) on triggering performance. And in discussing these behaviours, I have drawn upon various recent research findings which have added much to the understanding of how pulsed oxygen delivery can be compromised. So the precise bench comparative performance is only one element of this contemporary review. The author does agree that future studies with a larger sample size, longer time, and in-human testing with statistically powered outcomes will lend to this body of evidence.

Yves Lacasse comments:

Finally, I do not see anything about the volume and flow of oxygen delivered. Visual inspection of Figures 4, 5 and 5 indicates that the flow and volume of oxygen that is delivered is different among the 3 concentrators. I understand that the focus of this study was on triggering however.

Author response:

Indeed, there is much more to efficacious pulse oxygen therapy across a broad patient population than triggering. This is acknowledged fully in the text, eg lines 253-262, lines 454-457. The first draft contained more on the topic of pulse volume and peak flow, but has been trimmed in response to earlier feedback. But as is discussed in the submission, if oxygen pulses are generally not synchronized with inspiration, the oxygen pulse may be wasted regardless of its volume. Hence the focus of this initial publication was upon inspiratory synchrony, and as part of that, sharing a range of recent research which provides valuable insight to the earlier landmark oxygen studies.

Yves Lacasse comments:

Otherwise, this version of the manuscript is much improved compared to the original one.

Author response:
I thank the reviewers for their highly constructive feedback.

Please do not hesitate to contact me should there be further queries regarding this work.

Best regards

Dion Martin