Reviewer’s report

Title: Acceleration sensors in abdominal wall position as a non-invasive approach to detect early breathing alterations induced by intolerance of increased airway resistance

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Reviewer: Guido Dohmen

Reviewer's report:

Title: Acceleration sensors in abdominal wall position as a non-invasive approach to detect early breathing alterations prior to intolerance of increased airway resistance


In their manuscript „Acceleration sensors in abdominal wall position as a non-invasive approach to detect early breathing alterations prior to intolerance of increased airway resistance“ Breuer and colleagues report the findings in the detection of alterations in breathing excursions with abdominal and thoracic wall acceleration sensors. The results show an interesting approach to predict respiratory failure. Although the manuscript is well written I have some remarks:

Methods:

1. The measurements were made in supine position. It is relevant whether the volunteers were in a position with elevated or flattened torso. Please clarify.

2. The participants had to breathe through orally administered tubes of different diameters. Usually the pre-assembled tubes have different length according to the diameter. Based on the length and the diameter, did you estimate the resistance? Please add the resistance-values of each used endotracheal tube into the method section.

Results:

3. The authors present the changes in abdominal and thoracic wall acceleration. They point out that increased respiratory workload led to a significant decrease of acceleration in the abdominal wall position. The thoracic acceleration sensors did not detect any changes during increased respiratory workload. Are there any significant differences between the 3 abdominal wall sensors? Please add the comparison between the different abdominal positions in the results.
4. The text in combination with Figure 4 is hardly understandable. This is especially because the Figure-legend is wrong concerning description of colors. According to the legend colors differentiate between "completed" (blue circles) and the "abandoned" group (green circles), according to the Figure colors differentiate between thoracic and abdominal sensor position.

Since Figure 4 approaches the main topic of the manuscript it should be overworked and its statement should be made clearer in the results-section as well as in the Figure. Even since "artificial units" are used a table would be very useful to demonstrate the authors arguments (especially concerning statistical significance).

Discussion:

5. The authors show that increased workload lead to changes in abdominal wall movement. Possible explanations were included into the discussion. Additionally no changes in thoracic wall movement were reported. The explanation of this finding is missing. Please add an explanation of this fact into the discussion.

6. The authors mention that "Especially after thoracic and abdominal surgery the respiratory function is hampered due to interventional changes [10, 11]." And "In contrast to recent and/or established methods to assess the respiratory muscle function we investigated a non-invasive, economical and practical approach that demonstrates the valid detection of breathing excursions by accelerator sensors in presence of gradually increased airway resistance."

Most probably behavior of thoracic and abdominal excursions are completely different after a) thoracic or b) abdominal surgery and c) in healthy persons. Even more, the type of thoracic surgery (thoracotomy, sternotomy) will have a different response. Please comment!

In conclusion, if the authors can comment sufficiently to the aforementioned remarks the manuscript would introduce a new and interesting non-invasive approach to predict respiratory failure.

Level of interest
Please indicate how interesting you found the manuscript:

An article of importance in its field

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

Acceptable
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