Author’s response to reviews

Title: Photoacoustic gas monitoring for anesthetic gas pollution measurements and its crossexsensitivity to alcoholic disinfectants

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Author’s response to reviews:

Dear Prof. Edwards

on behalf of my co-authors, I am re-submitting the enclosed original contribution for possible publication in BMC Anesthesiology.

First, we want to thank you for your feedback; we appreciate the effort to further improve our manuscript. Basically, we added the median [IQR] for ISO and DES baseline values and changed the wording of a few sentences as recommended. All modifications made to the manuscript are listed in the attached point-to-point reply.
I attest to the fact that all authors listed on the title page have read the revised manuscript, attest to the validity and legitimacy of the data and its interpretation, and agree to its submission to BMC Anesthesiology.

This manuscript has not been published or presented elsewhere in part or in entirety and is not under consideration by another journal. We have read and understood your journal’s policies, and we believe that neither the manuscript nor the study violates any of these. There are no conflicts of interest to declare.

Thank you for your consideration. I look forward to hearing from you.

Sincerely,

Jennifer Herzog-Niescery, MD
(3rd of August 2019)

Point-to-Point-Reply

Editor Comments:

1. Reviewer 2 comments

-- Abstract: Conclusion - change to understand: .... one third falsely high measured mean gas ..... Answer: We changed the sentence as recommended.

New version (Abstract, p. 3, l. 50): Photoacoustic gas monitoring is useful to detect lowest anesthetic gases concentrations, but cross-sensitivity caused one third falsely high measured mean gas concentration.
Methods: PA gas monitoring: Clarify if 'Reproducibility is 1%' is with prior reports or with your own results - seems almost unbelievably narrow

Answer: According to the manufacturer, the reproducibility of the measured anesthetic gas concentration by the gas monitor is ± 1% of the measured value. This is consistent with results from most experiments we performed in our laboratory and now clarified in the Methods.

New version (Methods, p. 7, ll. 149-150): According to the manufacturer, the reproducibility of the measured anesthetic gas concentration by the photoacoustic gas monitor is ± 1% of the measured value.

Results: Baseline values: Why IQR only added for Sevo?

Answer: That is because reviewer 1 had asked to mention the median (IQR) if the SD is equal to the mean (which was true for SEVO only). However, we added the information for ISO and DES as well.

New version (Results, p.10, ll. 230-232): Mean ± SD baseline values were 0.05 ± 0.01 (median: 0.05, IQR: 0.001) ppm for ISO, 0.01 ± 0.01 (median: 0.01, IQR: 0.001) ppm for SEVO, and 0.04 ± 0.01 (median: 0.05, IQR: 0.001) ppm for DES (n = 5 per VA).

Volatile add interfering: Consistently probably better that 'always'

Answer: We changed the sentence as recommended.

New version (Results, p. 10, ll. 142-143): Consistently, highest cross-sensitivity peaks were caused by isopropyl alcohol, followed by AD, ethyl alcohol and N-propanol.

Approach to eliminate cross-sensitivity: Sevo exposure in surgeon breathing zone (n = 20) did not differ ......

AND

To overcome ..... drawn for logarithmic data with recovery time marked. A straight ..... 

Answer: We changed both sentences accordingly.

New version (Results, p. 10, ll. 249-250): SEVO exposure in surgeon breathing zone (n = 20) was not distinguished between VA and interfering agents.

AND
New version (Results, p.11, ll. 252-254): To overcome cross-sensitivity, a 10th percentile baseline is drawn for logarithmic data with recovery time marked. A straight line is drawn from the upper left corner (0/log 10; intersection X-Y-axis) to the X-axis and moved to the peak’s maximum.

Discussion

Answer: All sentences were changed according to your suggestions.

1st paragraph: .... it may attract attention and help reduce ..... 

New version (Discussion, p. 12, ll. 282-284): The low detection limits allow for identification of the smallest concentrations of VAs and the immediate feedback of the VA exposure makes the gas monitor valuable in practice, because it may attract attention and help reduce the occupational gas burden.

... aimed to investigate this phenomenon ....

New version (Discussion, p. 12, ll. 286-288): This study aimed to investigate this phenomenon, since it is not considered in most clinical studies and the false-high ‘VA’ concentrations may stir unjustified fears [8-11].

2nd: .... manufacturer advises that 

New version (Discussion, p. 12, ll. 290-292): The photoacoustic gas monitor’s manufacturer advises that cross-sensitivities may occur, but no information is given about the impact of the interfering agent on the measured value, the decay curve, or its significance in the clinical environment [12].

... approach can be quickly performed ..... 

New version (Discussion, p. 12, ll. 299-301): The presented approach can be quickly performed without technical equipment; even the recovery time can be verified in the appropriate documents for every operating room (according to ISO 14644-3 for turbulent ventilation systems) [7].

Limitations: ..... larger amounts are usually used in clinical routine.

New version (Discussion, p. 13, ll. 324-325): Further, we used 25 mL in the experimental setting only, although larger amounts are usually used in clinical routine.
Conclusions: delete 'powerful'

New version (Discussion, p. 14, ll. 337-339): Photoacoustic gas monitoring is an excellent method to detect trace concentrations of anesthetic gases, but clinicians are often unaware of its cross-sensitivity and overestimate VA pollution levels.

Figure legends: 4: After logarithmic presentation of the data .....  

New version (Figure legends, pp. 23-24, ll. 528-530): After logarithmic presentation of the data (purple line in 4B), the 10th percentile baseline is drawn (green line; here 0.29 ppm), and the recovery time is marked (red dotted line in 4C; here 39 minutes).

2. Section
-- Please upload your revised manuscript to the "Perioperative medicine and outcome" section.
Answer: Yes, we will do so.

3. Funding
-- If no specific funding was obtained for your study, please state "No funding was obtained for this study”.
Answer: We changed the sentence as recommended.

New version (Declarations, p. 16, l. 404): No funding was obtained for this study

4. Clean manuscript
-- At this stage, please upload your manuscript as a single, final, clean version that does not contain any tracked changes, comments, highlights, strikethroughs or text in different colours. All relevant tables/figures/additional files should also be clean versions. Figures (and additional files) should remain uploaded as separate files. Please ensure that all figures, tables and additional/supplementary files are cited within the text.

Answer: We now present one single file including the manuscript text (without tracked changes or colors), tables, and figure legends. The 4 figures were uploaded separately. All tables and figures are cited within the text.