Author’s response to reviews

Title: Availability and performance of image/video-based vital signs monitoring methods: A systematic review protocol

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Title: Availability and performance of image based, non-contact methods of monitoring heart rate, blood pressure, respiratory rate, and oxygen saturations: A systematic review protocol

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Dear Editorial Team,

We have the pleasure in resubmitting a revised manuscript addressing the editorial and reviewers’ comments. We would like to thank the reviewers and editorial team for the thoughtful and valid comments on our manuscript. Please find the specific comments and responses below.

Reviewer comment 1: “Reference device” is vague; does it have to be a clinically validated or gold standard device or can it be any independent device?

Response 1: This has been clarified in the text as “clinically validated reference device”
Reviewer comment 2: Will pilot studies be included? Considering much of the work in this field is promising but preliminary, much of it have small sample sizes with prototype technology. Will these be included?

Response 2: We agree that much of the work is likely to be small scale pilot studies and this is a question we have considered in detail. We feel it is important to include pilot studies in this systematic review as they individually contribute towards the wider picture of current state of technology and including these may help to avoid duplication of similar work. We have therefore made the decision not to limit the studies by sample size.

Reviewer comment 3: Regarding the analysis used, if pilot work and/or preliminary research are reviewed, then there may not be a large enough sample size or enough data to perform extensive statistical analysis; likely not enough to ascertain for certainty whether the method is robust at a clinical level. Will these types of studies be included? If so, will a technology readiness level (or other means) be used to convey the relative sophistication of the technology so that a fair comparison may be made?

Response 3: In choosing to include pilot studies we recognise that extensive statistical analysis may not be possible. Therefore, the protocol includes a quality assessment tool and a method for evaluating the statistical validity for each study. By evaluating the studies in this way, we aim to draw more valid conclusions from the data. We also intend to provide qualitative comment on the clinical readiness of the technology, as well as comparing reported accuracy measures with current calibration thresholds for validated clinical monitoring devices. We have also included a plan for numerical analysis should this be possible from clinical homogeneity of studies.

Reviewer comment 4: If there are no exclusions on language, please describe ability to handle all languages beyond English.

Response 4: Authors of studies published in languages other than English will be contacted by email for assistance with data extraction. For any papers published in languages within the capability of the authors the data may be extracted directly.

Reviewer comment 5: Considering the topic, recommend adding IEEE and ACM to the search databases.

Response 5: Thank you for these suggestions. These have been added in the search strategy.

Reviewer comment 6: The authors should anticipate stratifying imaging methods by pediatric vs. adult (or other applicable age divisions). Although I agree that avoiding study exclusions based on age ensures a more comprehensive systematic review, the test characteristics of the monitoring modalities are likely to vary based on patient age and certain modalities may conceivably be only available or applicable for specific age populations.

Response 6: The proposed data extraction form includes the clinical setting and the age group of study participants. Therefore, we anticipate that should the monitoring modalities or their application be sufficiently different between age groups, these studies will be stratified by
appropriate age divisions. We expect this is likely to be a stratification of neonatal versus adult studies.

Reviewer comment 7: The authors anticipate significant between-study heterogeneity in the primary literature and thus the likelihood of presenting the results of their meta-analysis as a qualitative synthesis of the literature. Although I agree it is important to address this likelihood in the protocol and anticipate appropriate methods of qualitative synthesis, the authors should also present plans for quantitative synthesis in the event meta-analysis is possible for part or all of their outcomes of interest. Even though statistical methods may not be employed in the final systematic review, the possibility of their need should be anticipated and the specific methods intended to be used in such an event be identified and outlined a priori in the protocol. This foresight would avoid significant revisions to the protocol and post hoc decisions on statistical methods that may introduce bias in the event that meta-analysis is possible. The authors may introduce a clause in the Methods such as: "Should the extracted data be deemed sufficiently homogenous from a clinical standpoint for quantitative synthesis to be undertaken, we anticipate performing meta-analysis employing [...]" to conditionally introduce the plans for any statistical methods for meta-analysis.

Response 7: Thank you for raising this. We have now included in the Methods section details of the specific statistical methods that will be utilised should there be sufficient homogeneity between studies to allow a quantitative analysis.

Reviewer comment 8: The authors plan to exclude studies on temperature monitoring from the systematic review due to an existing advanced body of literature on infrared imaging for this specific vital sign. Is it possible to cite reference studies supporting this statement (or previous reviews on non-contact temperature monitoring)? Would there be an interest in including non-infrared methods of temperature monitoring, as there may be alternative, less established methods that could still be of pertinence?

Response 8: The use of non-contact, non-invasive infrared thermometers is widespread in general practice and commercial settings. We have now cited references to support this. From our clinical experience of critical care, non-contact non-invasive continuous monitoring of heart rate, blood pressure, respiratory rate and oxygen saturations would provide a significant clinical advantage over currently available monitoring. We feel that this is less true for non-infrared methods of temperature monitoring and therefore is outside the scope of this review.

Reviewer comment 9: Several of the search terms pertaining to the setting of assessment presented in the "Search Strategy" section ("critical", "intensive", "ICU", "PICU", etc.) are not integrated into the example MEDLINE search strategy presented in Table 1. Is this intentional? The authors should either reconcile the two lists for consistency or explain why certain terms of interest are excluded from the search strategy.

Response 9: Thank you for this comment. We had initially considered these other terms but have taken a broader search strategy. The lists have been reconciled as per suggestion.
Reviewer comment 10: I suggest avoiding use of the term "narrative" synthesis as this has the connotation of non-systematic literature reviews. The term "qualitative synthesis" would be a better term to refer to the planned non-statistical synthesis of data.

Response 10: Thank you very much for this suggestion – we have updated this in the manuscript.

Thank you very much for your consideration of our revised manuscript.

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