Reviewer’s report

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

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Reviewer: Hourmazd Haghbayan

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August 13th, 2017

Availability and Performance of Image Based, Non-Contact Methods of Monitoring Heart Rate, Blood Pressure, Respiratory Rate, and Oxygen Saturations: A Systematic Review Protocol

Harford M, Catherall J, Young D, et al.

Systematic Reviews

The manuscript by Harford et al. presents the protocol for a planned systematic review seeking to assess the existence and test performance of non-invasive, non-contact, image-based methods of vital sign monitoring. Such technologies could conceivably have a wide applicability in current medical practice that would potentially span a broad spectrum of patient care environments, such as critical care units, inpatient wards, outpatient clinics, and remote telemedical care. In addition to being ambitious in its scope, this systematic review is timely and pertinent; it assesses a field in which there has been a great deal of rapid technical innovation yet also a simultaneous slow translation into widespread clinical use. There is therefore a need for a comprehensive summary of such modalities and an assessment of their performance to adequately inform potential stakeholders prior to their adoption into routine patient care.

This protocol has been adequately designed and is reported in accordance with the existing PRISMA-P guidelines; although not explicitly stated by the authors, the planned systematic review appears to conform grossly with the methodological recommendations outlined by the Cochrane Collaboration's Handbook for Systematic Reviews. There are adequate provisions for the possibility of deviation from protocol or the need for post-publication amendments. This manuscript, in its current form, is close to being ready for publication; however, I have a few recommendations and points of concern. The following will briefly outline an assessment of the fundamental methodological milestones of the planned systematic review as outlined in the protocol, with subsequent major and minor comments for consideration.

Background and Rationale:

- Background as described above; convincing argument for applicability and pertinence to clinical practice.
- Acceptable argument for novelty; the authors express that, to their knowledge, no prior systematic review exists exploring this content.

- Adequate PROSPERO registration, with content matching methodology planned in this protocol.

Search Strategy:

- The authors are aware of the limitations of traditional systematic review search methods specific to this domain, such as data hosted on commercial websites and other data sources outside the realm of scientific journals. This is appropriately addressed in their planned search methods and transparently presented in the discussion.

- An adequate number of databases are planned to be searched. By including conference abstracts, a database of gray literature, and Google/Google Scholar, the authors have taken significant provisions to avoid publication bias or the "file drawer effect".

Study Selection and Inclusion Criteria:

- The inclusion criteria are wide, with no limitations on date, language, population size, or study design (as long as a non-image based method is used as a comparator); both paediatric and adult age populations will be included.

- Adequate two-party study selection planned.

Data Extraction:

- The authors anticipate the major modalities of non-contact vital sign monitoring and appropriately plan extraction accordingly. Specific variables of interest are explicitly listed.

- The authors have described plans to pilot and finalize their data abstraction form to fit the requirements of the review.

Data Assessment

- The authors anticipate potentially high heterogeneity and expect to undertake qualitative synthesis of the data if quantitative synthesis with meta-analysis is not possible.

- The primary planned method of data summary is grossly adequate, with plans for qualitative synthesis of the performance of vital sign methods, stratified by individual vital sign and underlying technology. Plans for potential quantitative synthesis are not presented.
A comprehensive plan for risk of bias assessment is presented. The tool employed, GRRAS, is appropriate for the assessment of studies of reliability/agreement in diagnosis, as anticipated in this review. The authors plan on rating the quality the statistical analysis employed in primary studies via established criteria.

Major comments:

1. 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.

2. 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.

Minor comments:

1. 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?

2. 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.
3. 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.

**Level of interest**

Please indicate how interesting you found the manuscript:

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**Quality of written English**

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