Reviewer’s report

Title: Reproducibility of Clinical Research in Critical Care: A Scoping Review

Version: 0 Date: 24 Nov 2017

Reviewer: Lex M Bouter

Reviewer's report:

Comments to author

This is an interesting and relevant attempt to assess the reproducibility of clinical research in critical care medicine. We know little of the typical rates of reproducibility of research in specific disciplinary fields. This study shows that for clinical research in critical care medicine both attempts to reproduce and successful replications are somewhat more common than what has been reported for some other fields. But also in clinical research in critical care medicine the situation is not acceptable and needs to be improved.

— Reproducibility can mean two different things:

   o Do have enough details been reported to reproduce a study if we want?
   o Do we get the same results if we repeat a study?

The article concerns the second meaning, but it took me a while to understand that. So please explain this early in the introduction.

— Similarly 3 forms of replication can (and should) be discriminated:

   o Re-analysis of the same data set (with same or alternative data-analysis plan)

   o Direct replication (methods reproducibility): collect (and analyse) new data with the same study protocol. You label this as 'retest reproduction attempt' in table 1.

   o Conceptual replication (external validity, generalizability): collect (and analyse) new data with an alternative study protocol for the same study objective. You label this as 'approximate reproduction attempt' in table 1.

I suggest to explain this in the introduction. I only discovered that you say something about this when I found table 1. The article concerns a mixture of direct and conceptual replications. Probably most are conceptual replications because a slightly modified study protocol is used. If a conceptual replication is successful all is well. But if not, it's difficult to decide whether that's due to the (small) differences between the study protocols. You may want to add this to the discussion section.
— I believe that it would be better to explain what you mean by (un)sucessful reproducibility more clearly early in the text of the manuscript. I was in confusion on this until I found the reproducibility classification in table 1. Your choice is defensible, but many alternatives are available. Please reflect on that and on the consequences of choosing e.g. a stricter criterion in the discussion section.

— By now you will have guessed that I prefer the term replicability over reproducibility. But that is of course a matter of taste.

— Two recent preprints you may find handy to place your work a bit more in the relevant methodological context can be found at:

https://www.cambridge.org/core/journals/behavioral-and-brain-sciences/article/making-replication-mainstream/2E3D8805BF34927A76B963C7BBE36AC7


— I was really confused by your search strategy. I tried to sort this out but it escaped me. It seems that different journals were searched for primary studies and for replication attempts, but it escapes me why that is and how exactly you searched for eligible publications.

— Please provide a more clear description of the inclusion and exclusion criteria for the publications/studies accepted for your analyses. And add the combination of search terms you utilized (formal search strategy) to the digital supplements. I was quite puzzled about this.

— I doubt the wisdom of both including RCTs and systematic reviews (with or without meta-analyses). I could have understood the use of SRs as a means to identify eligible RCTs. But if I understand it correctly you also look at the reproducibility of SRs. To me that's quite a different topic. The data points in SRs are the outcomes of RCTs, not individual patient data. And the overlap of publications between primary SRs and its replication attempt will be large, unlike the overlap in data between the RCTs you compare. It the taxonomy explained above this would render the replications of SRs largely as a re-analysis of the same data.

— Did I understand it correctly that you included only RCTs on diagnostic accuracy? If so, why did you decide to exclude the large majority of non-randomized diagnostic accuracy studies?

— Selecting your primary publications from high impact journals only might bias your findings because the replicability of primary publications in lower impact journals might be different. Please comment on this in the discussion section.

— Please put your findings more in context by explaining what frequencies of attempts to reproduce and successful replications have been reported for other (similar) disciplinary fields.
Some of the studies you identified have more than one replication attempt. Please reflect in the discussion section how many replication attempts would be best. When does it become redundant?

I was surprised that in your reflections on the causes of the low replication rate you do not mention non-publication (publication bias) and selective publication (outcome selection bias or 'cherry picking'). To me there is little doubt that these are the most important drivers of the current 'replication crisis'.

You might want to be a bit more extreme in your views on when replication is necessary. To me replication is the essence of scientific research. All relevant studies need to be replicated. And irrelevant studies should not be done in the first place. With a few but not many exceptions.

You make the data sets available on reasonable request. Why not add the data set as digital supplement or upload it to a publicly accessible registry or repository? That would make your work more reproducible in the first meaning outlined above.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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