Reviewer’s report

Title: Identifying potential indicators to measure the outcome of translational cancer research: a mixed method approach

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Reviewer: Chris Zielinski

Reviewer’s report:

This study aims to develop a set of indicators to measure the impact (outcomes and outputs) of translational cancer research. Overall it is a valuable and useful study and can be recommended for publication, with a few caveats and areas for improvement.

1. The definition of translational research applied in this paper is "research that transforms scientific discoveries arising in the lab, clinic, or population into new clinical tools and applications that reduce cancer incidence, morbidity, and mortality". The implication is that high-impact translational research would lead to many new clinical tools and applications, and resulting reductions in cancer incidence, morbidity and mortality. As an overall initial comment, it is not clear exactly how the indicators can be used to measure this.

2. Missing is a brief introductory discussion of indicators - what constitutes a good or bad indicator, and the distinction between process indicators and knowledge-based indicators and their relative value. At one point the text says "there is an increased demand to measure the outcome of biomedical research in terms of patients' benefits and move beyond classical bibliometric indicators ", which suggests an understanding of the distinction. However, a short, clear introductory discussion of indicators would be helpful in this paper.

3. The authors also note that "the definition of validity of an indicator [is] its capacity to measure what it is intended to measure and the definition of feasibility of an indicator as the possibility and burden of measuring it." It is not clear how or if they applied this criterion to their initial list of indicators.

4. The absence of a clear discussion of indicators makes it difficult to judge whether the final list of 17 indicators and their very brief descriptions is reasonable and useful. I will come back to this at the end.

5. The methodology of the study included 1) semi-structured interviews seeking a common definition for translational research (there were disagreements about the exact scope and limits of this research, the importance of multi-disciplinarity and collaboration for the success of translational research, the disadvantages that translational research faces in current evaluation systems, the relative lack of pertinence of existing indicators and propositions to measure translational cancer research in terms of clinical applications and
patients outcomes); 2) a 2-round Delphi survey, and 3) a physical meeting. This seems to be a sound methodology.

6. The first line of the Abstract Conclusion is "Indicators need to be accepted by stakeholders who will be evaluated." It is not clear if it is the indicators or the stakeholders who will be evaluated.

7. The authors note that "Of the 267 participants invited to complete the survey, 35 participated in the first round." This very low take up should be commented on.

8. Nothing is said about the range of other possible media to disseminate translational research - "high-impact journals" are mentioned, but there are numerous others - books, government policy briefs, clinical practice guidelines, etc.

9. In discussing journals, there should be an operational definition of impact factor.

10. Does publishing in open access journals play a role?

11. Most participants argued that translational research should ideally be measured in terms of patients' benefits - output indicator. It is not clear why this is largely ignored in the list of indicators.

12. The whole presentation of the indicator reduction/selection process is obscure - they end up with 17 indicators, but where each one came from remains unclear. In the first round, the researchers presented 60 indicators to a panel of 35 participants. - where did these come from? Where did the metadata come from (definitions, etc.)? Of these 60 indicators, "6 were included in the final set without being submitted to a second round". Why? What criteria were used to select these 6 indicators? They say 51 indicators received comments - which means that 9 received no comments. How were these treated? Are any of these among the 6? This section needs revision to clarify these points.

13. The final list of 17 indicators in Table 4 has brief "definitions" attached. These are insufficient - each should be annotated to explain how it meets the purpose of measuring the impact (outcomes and outputs) of translational cancer research. There are also errors - for example, "% of patients included in a clinical trial" is defined as "Number of patients treated at a hospital that participate in a clinical trial" - a percentage of patients is not "a number of patients", "Mean number of citations per article" is defined as "The mean number of citation per articles", which apart from being useless as a definition should not have the "s" in "articles". These indicators, which are the key finding of the paper, should be treated more amply.

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