Reviewer's report

**Title:** Functional capacity, physical activity and muscle strength assessment of individuals with non-small cell lung cancer: A systematic review of instruments and their measurement properties.

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**Reviewer:** Janet Parsons

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Reviewer's Comments on Manuscript

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Manuscript: Functional capacity, physical activity and muscle strength assessment of 2 individuals with non-small cell lung cancer: A systematic review of instruments and their measurement properties

Manuscript type: Research

Reviewer’s report:

General comments:

I have had the opportunity to review this manuscript which addresses an important topic in the assessment and management of patients with non-small cell lung cancer (NSCLC). Identification of valid and reliable assessment tools for determining the functional capacity of persons with lung neoplasms is critically important, as it has been recognized for many years that exercise tolerance is predictive of operative and other outcomes. Surgical lung resection remains the primary definitive treatment for early stage NSCLC, with perioperative morbidity and mortality remaining significant. Identifying patients at higher risk for adverse operative outcomes continues to be a priority.

Major Compulsory Revisions:

Overall the paper is a welcome addition to the literature, compiling measurement properties on a range of commonly used tools for assessing functional capacity, physical activity and muscle strength in NSCLC patients. However there are some important revisions that should be undertaken prior to publication. My reasons are outlined below.

I think the paper would benefit from a stronger, more detailed Introduction, so that readers have a better understanding of how this paper fits within the broader


literature on NSCLC and exercise science. The authors appear to be making some major assumptions about the average reader’s understanding of the measures assessed, their use in other populations (for example, walk tests and CPET in lung transplantation and COPD populations), and how they relate to patient health status, HRQL and even survival (to which the authors refer later in the paper). BMC Cancer is not a lung cancer or thoracic surgery journal and a few comments about exercise capacity, current gold standards, and how NSCLC is known to affect exercise physiology seem important to ‘set the stage’ for the reader. Some readers may not know what terms such as ‘functional capacity’ actually mean. Moreover, some justification to link why measures of muscle strength such as hand-held dynamometry might be related to measures like the 6MWT is also advisable. As a physiotherapist, I am familiar with this literature, but I suspect many readers of BMC Cancer will not bring this background to their reading of the paper. I am not recommending lengthy explanations, but I would recommend re-working the introduction to include additional well-crafted background information.

In terms of methodology, the search strategy and rating criteria are reasonably well-described. A bit more explanation about the COSMIN checklist and its domains/items seems warranted. Specifically, the authors should indicate which four items were dropped from the checklist. This would contribute to the paper’s methodological transparency. Figure 1 describing the inclusion of studies and the authors’ decision-making was very helpful.

The Results section is clearly written and this section is definitely enhanced by the accompanying tables provided, and they filled in details missing from the manuscript text. I’m not sure that these should be included as supplementary material as these seem integral to readers’ understanding the paper and I would encourage their inclusion with the main paper at publication.

With respect to the Discussion, the study’s limitations are reasonably well-addressed. I think it is important that they note the inherent problems of including studies with patients with mixed types of cancers (not just NSCLC) since lung neoplasms are likely to affect exercise capacity and gas exchange in significantly different ways from cancers at other sites. It was not sufficiently clear why they chose to include these studies in the first place. Further consideration in the Discussion concerning the large SDs seen in some of the measures reported in Appendix 3 would be welcomed. The age ranges for patients with NSCLC cited in the tables would suggest that some consideration of comorbidities and their contribution to this variability in functional capacity/exercise tolerance should be mentioned. Many of these patients are smokers and may have COPD or heart disease that may influence their exercise performance, and still others will have arthritic conditions. Some studies included patients receiving chemotherapy – some chemotherapeutic agents have cardiotoxic side effects which can in turn affect functional exercise capacity. The authors would do well to consider that there is considerable heterogeneity amongst patients with NSCLC, and specifically in terms of ‘performance status’.

In addition to the limitations section of the Discussion however, the authors do a
good job of contextualizing their results within the larger body of literature. The authors are thoughtful/reflective and the claims they have made are grounded in the data presented.

Minor Essential Revisions:

In addition to the more substantial suggestions for improvement outlined above, I do have some minor revisions.

1) In both Methods and Results, I think the terms Search one and Search two should be re-formatted as Search 1 and Search 2 as it was sometimes confusing to have the ‘one’ and ‘two’ lower case in the text. This will enhance readability.

2) Methods, pages 5-6: The methods for Search 2 are overly ‘broken up’ into headings with one sentence underneath each one (see lines 130 – 142 for example). I think some re-writing so that the ideas have a more narrative flow would help the paper.

3) Discussion (1st paragraph): lines 283 – 286. I take issue with the statement “Research into the benefits of exercise for individuals with NSCLC is relatively recent and this review has demonstrated that research into the suitability of instruments for use in exercise trials is embryonic” for two reasons. First, the importance of exercise/early mobilization following thoracic surgical procedures has long been recognized. This is standard clinical practice. Moreover the role of exercise in a wide array of post-surgical and oncologic populations outside of NSCLC has been researched previously and I would suggest that some of this literature is certainly informative to the NSCLC population (the authors would do well to consult the work of K. Courneya for example). I would suggest rewording this sweeping statement or at least making their argument clearer. The second reason I find this statement problematic is that the authors are introducing a very different concept at the outset of this discussion from the focus and results that have been presented up to that point. The paper focuses on evaluating and validating an array of clinical assessment measures used in the NSCLC population. The results presented are NOT about the benefits of exercise, but rather about how these tests perform as assessment tools. While these tests may indeed ultimately be used to evaluate the benefits of exercise in NSCLC, to bring this up at the beginning of the discussion is confusing for readers.

4) Discussion (under Limitations). Lines 385-387: The sentence , “There is the risk of publication bias however given registration of studies evaluating measurement properties is not standard practice, the extent of this in unknown.” The wording here is awkward and I would recommend that the authors simply re-write this sentence so that it is clearer.

In closing, once the authors make these changes, I would then recommend that this paper be published in BMC Cancer. Thank you for the opportunity to review this very interesting manuscript.

Level of interest: An article of importance in its field
Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.