Reviewer’s report

**Title:** The Six-minute walk test is an excellent predictor of functional ambulation after total knee arthroplasty.

**Version:** 2 **Date:** 23 November 2012

**Reviewer:** Davide Malatesta

**Reviewer’s report:**

COMMENTS FOR THE AUTHORS

MS ID#: BMC Musculoskeletal Disorders #1296994407790849

Title: “The Six-minute walk test is an excellent predictor of functional ambulation after total knee arthroplasty.”

The overarching aim of this study was to compare the performance of total knee arthroplasty (TKA) recipients in an extended walk test to healthy, aged-matched controls in order to determine the utility of this extended walk test as a research tool to evaluate longer-term functional mobility in TKR recipients. Thirty-two TKA recipients 1 year post-surgery and 43 healthy age-matched controls participated at the study and performed a Timed-Up-and-Go (TUG), a six-minute walking (6MW) and 30-min walking tests (30MW) to assess their walking mobility. Self-reported function was measured using the WOMAC Index and a physical activity questionnaire. The main findings of this study showed that 1) 30MW distance was significantly shorter in TKA than in control counterparts; 2) the 30MW distance was positively and significantly correlated with 6MW and TUG test performances in TKA recipients; 3) 6MW distance was the only significant predictor of 30MW distance (96% of the variability explained) among TKA; 4) Mobility tests were only moderate predictors of WOMAC function and physical activity level in TKA recipients. These results demonstrate that 1) the 6MW test is robust and functional test to assess the mobility in TKA recipients during long-term recover; and 2) the performance-based test should be used together with self-report outcomes in order to assess recovery of the functional mobility. The study addresses a clinical topic of practical importance and his findings would likely be of interest to clinicians to gain perspective for improving the assessment of functional mobility in TKA recipients during long-term recover. Moreover, the manuscript is well written and structured in almost all of its parts. However, some issues need to be addressed to the authors:

1. The aim of the Abstract should be rewritten and keywords should be changed.
2. The authors should strengthen the point concerning the greater functional validity of the 'longer walk test' quoting some references that investigated this issue in other similar population (please see below for more details).
3. The working hypothesis is lacking and the authors should add it at the end of the Introduction.
4. The structure of the Methods seems to be inappropriate.
5. The description of 6MW and TUG tests should be improved and more detailed in the manuscript.
6. The similar average speed of the 2 walking tests in the 2 groups. The authors should proper discuss this result for the two groups.
7. Some issues should be added in the Discussion (please see below).

- MAJOR COMPULSORY REVISIONS

ABSTRACT
1. For sake of clarity, the authors should report only the ‘overarching aim’ in the Abstract (p. 3, at the end of the first paragraph “Background”). Please change to (or similar): “The overarching aim of this study was to compare the performance of total knee arthroplasty (TKA) recipients in an extended walk test to healthy, aged-matched controls in order to determine the utility of this extended walk test as a research tool to evaluate longer-term functional mobility in TKR recipients.”.

INTRODUCTION
2. The authors should strengthen the point concerning the greater functional validity of the ‘longer walk test’ quoting some references that investigated this issue in other similar populations (p. 5, ll. 6-11). This may improve the construction of the rationale of the study. For instance, Butland et al. (British Medical Journal, 1982) have previously compared 2-, 6-, 12-min walking tests in respiratory disease and they concluded that: “The time chosen to assess exercise tolerance by walking tests is not critical. Shorter times are easier for both patient and investigator and are as reproducible but discriminate slightly less well and have less of a training role. The six-minute walk may represent a sensible compromise.”. Are there other similar studies concerning this type of comparison in the literature? Please check and modify this paragraph.

3. The authors should at least write in the Introduction or in the aim of the study that the functional duration of the longer walk test would have been determined during a previous, pilot survey of patients awaiting knee and hip replacement.

4. The working hypothesis is lacking and the authors should add it at the end of the Introduction. This hypothesis should be related only to the overarching aim of the study. The authors may add a proper hypothesis only whether they found and used some references that compared the different test durations in pathological populations in the first part of the Introduction (please see the point 2 here above).

METHODS
5. The structure of the Methods seems to be inappropriate. The authors should use this structure to avoid also the repetitions in the text: 1) Preliminary assessments for defining the functional duration of the longer walk test; 2) Participants with description of the anthropometric measurements (p. 8, last
paragraph ll. 1-2); 3) Experimental design (rapid and brief timing description of the experimental design); 4) Tests (30MW, 6MW, TUG, WOMAC and physical activity questionnaire: test descriptions and main outcomes for each test); 5) Statistical analysis.

6. The description of 6MW and TUG tests should be improved and more detailed in the manuscript in the suggested new structure of the Methods (Paragraph “Tests” here above). Which was the length of the lap for 6MW? How many repetitions did each patient perform in 6MW session? Etc.

7. The paragraph “Testing/protocol/procedure” should be incorporated in the paragraph on the 6MW test.

8. The authors well described and reported the criteria of the selection of the sample size.

RESULTS

9. Did the authors assess Rating Perceived Effort (RPE) with Borg scale during and/or after 30 MW and 6MW tests? Please add.

10. How many stops did the individuals make during 30MW and 6MW? Is there any significant difference between the 2 test and/or the 2 groups?

11. The most important concern is the similar average speed of the 2 walking tests in the 2 groups. It is difficult to explain that the average speed was the same in 30 min and in 6 min walking tests in TKA recipients and control counterparts. Which were the instructions given to the participants? The authors discuss at the p. 14 (first paragraph) that TKA recipients adopted the same pacing strategies to complete both tests and that “the factors limiting their mobility (as described above) also limit walking speed”. However, the walking speed in both tests is similar also in the control group. Therefore, the explanation used by the authors is not suitable to discuss this result in both groups. How may the authors explain this finding in control group? Please clarify and change in the text.

DISCUSSION

12. There was a significant difference in BMI and physical activity scores (Table 1) between the 2 groups. These parameters may be a possible confounding factors to explain difference in walking performance in 30MW and 6MW tests in the 2 groups. The authors should therefore discuss this important point in the Discussion.

13. The authors should add a comparison between the 6MW distances of the two groups and the standard values calculated with the reference equations for the 6MW test (Enright et al., American Journal of Respiratory and Critical Care Medicine 1998; Troosters et al., The European Respiratory Journal 1999). This comparison will allow the authors to better characterize the experimental population tested with respect to aged-matched healthy individuals.
ABSTRACT
1. P. 3 (paragraph “Results”, ll. 1 and 2). Please add a space between number and unit of measurement. Please check and modify throughout the manuscript.
2. P. 3 (paragraph “Results”, l. 7). Please add the explaining rate of the variability for TUG test models in the prediction of WOMAC (55%) and physical activity (36%).

KEYWORDS
3. The authors should delete and change “total knee arthroplasty” (already in the title of the manuscript) and change “outcome measure” to “self-reported outcomes” in the keywords.

INTRODUCTION
4. P. 5, l. 1: add the title of the section “Introduction”.
5. P. 6, second paragraph: add the numbers for each specific aim. “[…] The specific aims of the study were multiple: 1) […] surgery; 2) […]”.

METHODS
6. After the title of each paragraph, the authors should add a dot (e.g. “Protocol development.”, p. 6 first paragraph of the “Methods”).
7. P. 10, paragraph “Statistical analysis”, last line. Please change the sentence to “Data from the first testing session of 30 MW were used in the regression analyses.”.

RESULTS
8. P.11, last paragraph, l. 4. Add “)” after “3”: “(Table 3)”.
9. Why was the distance walked significantly higher in the second 30MW test only in controls? Please briefly discuss.
10. Table 1 (p. 24). The authors should define all abbreviations used in the tables and in the Figures in their Legends (e.g., Table 1, define: CI, IQR, n, WOMAC and TKA). Please check and add throughout the manuscript.
11. Table 1 (p. 24, l. 18). Change “IRQ” to “IQR”.
12. Figure Legends (p. 23). Why are the numbers of subjects (n) different for TUG and 6MW? Clarify and justify in the text of the manuscript. Moreover, add the “n” for 30MW.
13. Figure Legends (p. 23). Please add “r”, “p” and the equations of the two correlations.

DISCUSSION
14. P. 14, second paragraph, l. 7. Add a dot after “et al”: “et al.”.
15. P. 15, first paragraph, l. 10. Please add a reference after “[…] actual physical
activity.”.

16. P. 15, the last paragraph, l. 7. Change the quoting format of reference #33 in the text.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

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