Reviewer’s report

Title: Factors influencing inpatient rehabilitation length of stay following revision hip replacements: A retrospective study

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Reviewer: James Graham

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Review of manuscript entitled “Factors influencing inpatient rehabilitation length of stay following revision hip replacements: A retrospective study” by Yeung et al.

This is an interesting topic and the authors adequately describe the population-level factors leading to the need to gain a better understanding of the rehabilitation experiences and outcomes of patients following repeated hip replacement surgeries. That being said, I believe there are some aspects of the manuscript that need to be addressed prior to publication. My primary concerns are with the data analysis and corresponding interpretation of the results. Detailed comments and suggestions are included in the sections below.

Discretionary Revisions:

1. pg 5, sentence 2: The fact that the reason for revision surgery affects the potential for observing a difference in outcomes between patients with revision vs. initial replacements is a key point, but it seems to get lost in this long sentence. I suggest dividing this into two sentences, one that explicitly states that reason for revision is influential and another that gives the infection vs. mechanical/pain example from reference 12.

2. pg 4, middle of paragraph 2: Sentence beginning with “Most other studies…” is confusing.

3. pg 10, last sentence: It is unclear to me (and I assume other readers) how a model is run with missing data. I may be wrong, but it is my understanding that even with ‘pairwise deletion’ in SPSS if a variable with missing data is included in the model, that case is omitted; i.e. the Ns will be the same for a given model whether pairwise or listwise deletion is selected. Regardless, since there was no difference in the models “with and without missing data,” it is more appropriate to describe the exact sample that produced the regression model.

4. pg 11, paragraph 3: Significance is not tied to “standardized” beta coefficients only; i.e. it applies to the coefficients (standardized or unstandardized) regardless of which version is displayed.

5. pg 14, paragraph 2: I suggest revising sentence 1 to read “Our results suggest that redo revisions are associated with longer lengths of stay compared to initial revisions.” The rest of this paragraph is excellent!

6. pg 15, paragraph 2: The two sentences with four values (%)s following the
respectively” are difficult to follow. I suggest putting the respective %s in parentheses immediately following the characteristic they are describing.

7. Conclusion (both abstract and text): Combining the significant variables into a single definitive group diminishes the impressive independent effects of each variable separately, which, incidentally, is the proper way to interpret the model; i.e. we cannot assume that the cumulative effects of all four variables are simply additive.

8. Tables 3 & 4: It would be easier to follow if the names of the dichotomous variables simply reflected the category coded as 1; e.g. rather than reading “Sex” and “Redo revision” in the table and then scanning to the legend to find the coding scheme, it would be more efficient to read “Men” and “Revisions # 2” the respective reference categories would be obvious.

9. Table 4: Single cross (†) and double cross (‡) are not labeled correctly.

Minor Essential Revisions:

10. Grammatical errors need to be corrected throughout manuscript.

11. pg 4, end of paragraph 1: How will breakthroughs that increase the lifespan reduce the demand for revision hip replacement? If anything, people living longer following joint replacement will be more likely to outlast the device/material.

12. pg 6, paragraph 1: Why these exclusion criteria and how did patients excluded vary compared to those included in the final sample? Also, excluding first stage revision appears to be contradicted on pg 8 when defining a revision and stating that 2-stage revisions are counted twice.

13. pg 10, paragraph 3: What percentage of cases was missing information on the original 3-level ‘revision type’ variable?

14. pg 12, paragraph 2: Reference 33 must be a typo; it includes neither LOS nor hip fracture.

15. pg 16, paragraph 2: The details describing the strength of this study are overstated. Revisions in the current study also did not capture a dose-response effect. Although you may have had patients with as many as 6 revisions, the same can be said of prior reports. The current study simply dichotomized 1 vs. 2+.

Major Compulsory Revisions:

16. pg 10, end of paragraph 1: You should not create three separate dummy variables from a single 3-level variable. This is a critical flaw throughout the analysis, results, and conclusions. pg 11, paragraph 3: You cannot include all three dummy variables in the model – it leaves no individuals in a reference category which is held constant when calculating coefficients for the other independent variables. The process of eliminating dummy variables in successive steps is peculiar to say the least. Including acetabular only (1 vs. 0) in the final model describes the effect of acetabular revision compared to a combined group of patients with femoral or acetabular+femoral revisions. The rationale for this comparison is not intuitive and it is not provided in the
introduction. I believe this was just the consequence of using backward selection regression with 3 separate dummy variables. pg 14, paragraph 3: Relating to the prior concern, the first half of this paragraph may need to be revised once the analysis is repeated with two of the three dummy variables included in the model.

17. pg 11, last sentence; and pg 12, paragraph 2, sentence 1: The FIM is the only continuous variable in the final model. Thus, the fact that it yields the largest standardized coefficient is undoubtedly influenced by the differences in scaling between predictor variables. The clinical relevance of FIM and gender are briefly mentioned in the last paragraph of the discussion (pg 17), but this is only after the dominance of the FIM has been established. All three dichotomous variables demonstrate remarkably high effects on LOS; approximately 6-7 day difference between categories within each variable. The magnitude of the gender effect, in particular, is interesting since it is much larger than in models predicting rehabilitation LOS for patients in other impairment groups. In sum, the implications of the current findings on rehabilitation planning and costs should be noted and discussed better for all variables. It should also be noted (earlier) that it takes a 10-14 point FIM difference (~ 1 sd) to equal the category differences among the dichotomous variables.

Primary Suggestions:

18. Since the entire approach to developing a predictive model was statistically driven, it would be nice to see the unadjusted relationships between length of stay and all potential predictor variables. This can be accomplished by either tidying up Tables 1 and 2 or by adding an additional table. For dichotomous variables include a column showing means (SDs) for length of stay by group and another column with p-values for the univariate comparisons (independent t-test or Mann-Whitney U). For continuous variables include the bivariate correlation coefficients and p-values for each predictor and length of stay. Not only will this provide valuable information for the reader, but it will also help you determine the pattern between the 3-level revision type variable and length of stay and to choose the most practical reference category for dummy coding… this will also provide additional information to improve the discussion section on this variable/relationship.

19. If your committed to using the combination of stepwise and backward regression, keep in mind that the dummy variables (2 of the 3) need to be force entered together. Alternatively, you can decide to dichotomize the 3-level variable prior to the analysis if you can provide the appropriate rationale for collapsing two of the categories and comparing them with the third.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

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.