Reviewer's report

Title: HIV/AIDS length of stay in Portugal under financial constraints: a longitudinal study for Public hospitals, 2009-2014

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Reviewer: Julian Perelman

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The paper is relevant, generally clear and well-written. There are however several issues that must be accounted for so that the paper is suitable for publication, in particular regarding the rationale and objectives of the paper, and the interpretation of results. I also feel the analysis could be further developed to increase the paper relevance for an international audience. These comments are detailed here-below.

Introduction

1. The rationale/objective of the paper is presented in a way that is misleading. At first sight, it seems the study is about HIV, but then it seems it is more about how the economic crisis and austerity measures reduced LOS. I suggest starting the paper focusing on measuring the crisis/austerity impact, and then present HIV as a relevant case study to evaluate this issue.

2. Theoretical considerations and literature review are missing regarding why austerity measures and the economic crisis might have affected LOS. There is a large literature to be referred, not only for Portugal but also for other countries, about the implications of this context on hospital practice.

3. Theoretically, LOS might be reduced because of financial constraints. However, some papers mention that the crisis might have reduced access to primary care and increased the severity of diseases, so that an increase in LOS may also be expected. This alternative hypothesis must be mentioned and supported by the literature.

4. A reduction in LOS can be viewed as an efficiency improvement but also as a decrease in the quality of care. Authors should present this issue with more caution.

5. The econometric considerations should be removed from the Introduction to the Methods section.
Methods

1. The data source must be more detailed, giving some information about how data are collected, from which institutions, and detailing which information is collected. Remember this paper will be read by an international audience that is not familiar with these data.

2. It is unclear whether the database permitted follow patients across hospitalizations at different settings, in particular when transfers occurred across different years. In case of transfer, was the total LOS considered across admissions?

3. What about short-term readmissions, were they considered as part of the same hospitalization? i.e., hospitals may have shortened LOS but readmitted the patient shortly thereafter, so that complete LOS over admission could be considered.

4. It is ESSENTIAL to present the "period" or year variables, which are the explanatory variable, i.e., the variable of interest, which allows answer the research question. All other variables are merely covariates or potential confounders. In the results, it is unclear whether the "period" variable was a linear trend, a dummy for a specific period, or a dummy referring to a specific sub-period. In case it is a period variable, it is a loss of information, so that I suggest substitute by year dummies.

5. LOS is presented as proxy of efficiency; again, this is a very subjective view, which may be challenged. I suggest mentioning only that LOS was the outcome, without further referral to efficiency.

6. It is unclear why random effects were used instead of fixed effects. Hospital fixed effects allow control for all unmeasured hospital characteristics that are potentially strong driver of LOS, namely its location, financial situation, professionals' experience and training, type of practice, etc.

7. I suggest extending the analysis by including a variable on the hospitals' financial situation. I would expect a larger LOS among more indebted hospitals. This would allow measure to what extent LOS was reduced due to austerity measures and financial incentives. Alternatively, other hospital characteristics.

8. The choice of a Poisson distribution must be justified. In particular, overdispersion must be tested.

Results

1. It would be important to include values, for the reader to know the magnitude of the effects. E.g., by how much does the number of diagnoses increase LOS? This is relevant also to
inform how coefficients must be interpreted. I suppose it is in percentage terms (e.g., each diagnosis increases LOS by 4.3%) but I am not sure.

Discussion

1. The decreasing trend followed by an increase in 2014 was only supported by descriptive results, but not by the multivariate analysis. I suggest testing this by including year dummies instead of a period effect.

2. The effect of HAART is expected to decrease the risk of hospitalization, by preventing the occurrence of opportunistic diseases. It is unclear why HAART would decrease LOS for those who are hospitalized. A good explanation must be found for the increase in 2014, although it may not be confirmed by year dummies in the multivariate analysis (to be checked).

3. I am not surprised that hospital mergers increased LOS. The mergers in Portugal were merely cosmetic, that is, grouping hospitals from different areas under a common administration, but generally keeping the previous practices and duplication of services. Anecdotal evidence suggests mergers reduced efficiency because a single administration had to deal with hospitals situated in different places, increasing the difficulties in monitoring practices. The literature refers economies of scale up to a certain number of beds; when hospitals become too large, efficiency decreases.

4. The random hospital effects are difficult to interpret, and authors use hypothetical explanations. I suggest substituting these effects by explicit hospital characteristics, in particular the hospital financial situation, and test the interaction between these characteristics and period variables, to examine what type of hospitals have more reduced their LOS.

5. A major limitation must be mentioned, i.e., that a longer period was not considered. The economic crisis started officially in 2009 (two consecutive trimesters of recession), so that to measure its impact data should be been included for the pre-crisis period. This would have allowed distinguish the crisis/austerity effect from long-term trends in LOS.

6. Beyond long-term care, other reforms have been adopted over the period that might have a confounding effect, namely the continuation of the primary care reform, the increase in co-payments, the decrease in hospital beds and hospitals human resources, etc.

Conclusion

1. The last paragraph mentions policy implications that are not supported by the data, namely the possibility to benchmark hospitals, which was not assessed nor an objective of the paper. Some recommendations are also too vague and of little interest, "Appropriate policies can
be developed to manage hospital resources”. It is necessary for the paper to develop policy implications that are not well supported, making the reader less confident or confused about the real findings, which are strong enough by themselves.

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

Yes

Does the work include the necessary controls?
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Yes

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