Author’s response to reviews

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

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Reviewer reports:

Julian Perelman (Reviewer 1):

The paper has substantially improved, but there are still some problems how the aim of the paper is presented, and in the interpretation of results.

Some sentences are grammatically incorrect; the paper should be reviewed by an English native speaker.

The authors apologize for the incorrections in the paper submitted, which were certainly due to the changes performed in previous reviews. The authors have carefully reviewed the paper as well as an native English speaker.

Abstract

The LOS acronym should be defined at first appearance.

The authors have defined LOS in the abstract.
The sentence: "The impact of austerity on health and health care has been the focus of recent research, but findings are still unclear" is not clearly related to the topic of interest. It should be said, instead, why examining the impact on LOS is of relevance.

The authors have changed the abstract to meet the reviewer’s comments.

The Methods section does not mention the key issue of the paper, presented in the Introduction, which is the impact of austerity measures. The Methods must be coherent with the aim of the paper.

The authors have included the aim of the paper in the methods section.

Background

The reduction of hospital operational cost was a consequence of the measures, not a measure itself. It is because the prices paid to hospitals were cut (measure) that hospitals had to reduce their operational costs (consequence).

Among the measures, you may mention also the creation and implementation of clinical guidelines, and the severe cuts in professionals' wages.

The authors thank you for your thoughtful suggestion. The sentence was reformulated accordingly.

The Background still refers several aspects related to the disease, which are not really connected to the aim of the paper (e.g., how the crisis might have affected HIV incidence, HIV burden of disease, epidemiology of HIV in Portugal). This could be summarized in one paragraph.

The authors have summarized contextual aspects of HIV/AIDS in only one paragraph, as suggested.

The aim of the paper cannot be "explore the effect of a number of variables". All the Introduction has been constructed around the crisis impact, hence the aim of the paper should be coherent with this background.
You don't need to give so many methodological details when formulating the aim of the paper.

The last paragraph of the “Background” section was reformulated in order to meet the reviewer’s suggestion.

Methods

Clarify if, in case of transfer, the LOS was the total one, i.e., the sum of LOS in first and second hospital.

The sentence clarifying that issue is: “Thus, shorter hospitalizations in smaller hospitals followed by longer hospitalizations in bigger hospitals were all included in this analysis. Length of stay was considered for each discharge, including patients transferred between different hospital centres, in order to capture all hospitalizations.” The LOS was not summed; each LOS was considered.

Results

Considering that year changes are a key issue of the paper, I suggest testing whether differences between years are statistically significant, in Table 3. That is, test differences between joint years, and not only with respect to 2009.

We test for the differences between consecutive years using the following hypothesis:

H0: Coefficient of dummy in year t = Coefficient of dummy in year t+1


As can be seen below for the 5% significance level the null is rejected when comparing 2011 with 2012 and 2012 with 2013; however no differences were found between year 2010 and 2011 and between 2013 and 2014.

This table was not included in the paper:

Compare dummy coefficients for joint years:
# Compare 2010 with 2011

> cov10_11 <- vcov[8,8]+vcov[9,9]-2*vcov[8,9]
> SE10_11 <- sqrt(cov10_11)
> teste10_11 <- (fixef(glm4)[8]-fixef(glm4)[9])/SE10_11
> as.numeric(2*pnorm(teste10_11))

[1] 1.532731 < 1.96; dont reject the null

>

> # Compare 2011 with 2012

> cov11_12 <- vcov[9,9]+vcov[10,10]-2*vcov[9,10]
> SE11_12 <- sqrt(cov11_12)
> teste11_12 <- (fixef(glm4)[9]-fixef(glm4)[10])/SE11_12
> as.numeric(2*pnorm(teste11_12))

[1] 1.998969 > 1.96, reject the null

>

> # Compare 2012 with 2013

> SE12_13 <- sqrt(cov12_13)
> teste12_13 <- (fixef(glm4)[10]-fixef(glm4)[11])/SE12_13
> as.numeric(2*pnorm(teste12_13))

[1] 1.999322 > 1.96, reject the null

>

> # Compare 2013 with 2014

> SE13_14 <- sqrt(cov13_14)
> teste13_14<-(fixef(glm4)[11]-fixef(glm4)[12])/SE13_14
> as.numeric(2*pnorm(teste13_14))

[1] 0.825067 < 1.96 dont reject the null

Discussion

The discussion of the efficiency versus quality hypothesis is questionable.

1. The current ratio is used to explain the decline in LOS, but this is not tested in the methods/results. To test that, authors should check if year dummies vary whether the current ratio is included or not (a mediation analysis). This would allow measure if part of the year dummies is explained by the deterioration of hospitals' financing condition.

We estimated 3 models (included in the methods section)

• Model 1 without current ratio, as suggested by the Reviewer
• Model 2 with current ratio and year dummies (as it was in the last version of the paper)
• Model 3 including current ratio, year dummies and an interaction term between each year and the variable “current ratio”; this is the complete model if we want to assess possible mediation.
Results from comparing Model 1 and Model 2 suggested possible mediation; only final results for Model 3 are presented and discussed.

Note: if the coefficient for the interaction term is positive and significantly different from zero, then the impact of current ratio depends on the year; for example, for year 2012 everything else being constant, the impact of current ratio on estimated LOS is equal to: \(-0.184 + 0.099 \times 1 = 0.084\), because `dummy_2012`=1 in year 2012;

2. Greater financial margins may be related to lower LOS because these are the most efficient hospitals: they manage to reduce LOS and have a better financial situation. It is not necessary because they cut the quality. The results for the "current ratio" do not help disentangle whether findings are due to better efficiency or lower quality.

We do agree. We have changed the sentence in the paper.

3. Also, if the decrease in LOS was purely due to the worse financial condition, this would be captured by the current ratio variable, and year dummies would be non-significant when the current ratio is included as covariate. Hence, there is more than that.

We agree with the reviewer’s comment. We estimated 2 other models to explore the possible relationship between current ratio and LOS, and the results suggest that, adjusting for other factors, for certain years, the impact of current ratio on estimated LOS depends on the year.

4. Note finally that the negative estimate for the current ratio means that, the better the financial situation, the lower the LOS. Hence, it would be expected a higher LOS, since the financial situation of hospitals deteriorated over the period.
The model with interaction term attenuates this impact; however, it is still negative. With our results we can say that, everything else being constant, on average, hospitals with better financial situation, over this period of time, have lower LOS. This paradox must be addressed in further research namely by analyzing more in depth the characteristics of hospitals with lower LOS.

Conclusions

Again, it is unclear how the association with the current ratio indicates that quality might have been reduced, and not efficiency.

We have suppressed that sentence.

Alberto Freitas, Ph.D. (Reviewer 2):

Methodological options and study limitations are now clearer and with further discussion in the paper.