Author's response to reviews

Title: The Impact of a Pay-per-Performance System on the Quality of Care of Patients with Hip Fracture: Experience from the Lazio Region (Italy).

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Author's response to reviews: see over
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To the Editor of

BMC Health Services Research

Object: point-by-point response to comments of the reviewers of the manuscript: “The Impact of a Pay-for-performance System on timing to Hip Fracture Surgery: Experience from the Lazio Region (Italy).”

The point-by-point responses to comments of the reviewers are listed below.

All changes made in the manuscript are in bold character.
Reviewer: Eila Kankaanpää

Reviewer's report:

Major Compulsory Revisions

1. The authors state that they study the impact of a pay-for-performance payment system on quality of care of hip fracture. However, they report that not all hospitals in the study are paid according the DRG payment system linked to performance (page 4). What they compared is the performance of hospitals according to different payment systems. The payment system changed only for a small part of them. The pay-for-performance system has been studied before (see for example the editorial by Andrew Ryan in Health Econ. 18: 1109–1113 (2009)). The authors should have summarized the existing literature.

The text (and abstract) should be rewritten so that throughout the article it is clear that the pay-for-performance payment was applied only to some hospitals.

The aim of the study has been modified.

2. The hospitals not paid for their performance could act as a comparison group. Therefore, differences-in-differences would suit the question addressed better (they refer to Farrar et al. (2009) who applied the DiD method). If the authors would use the panel design properly it would be better to not spend so much effort (and space) on co-morbidity which now blurs the message of the article.

The aim is not to “explain” the probability of surgery within 48 hours in hip fracture but to study the impact of a change in the DRG payment system. I recommend to use a DiD analysis. If the authors prefer not to, the results are still interesting but need then rewriting and a different literature to support the discussion of the results. If they would change the focus of the article to performance, ownership and different payment system it could lead to an interesting discussion of ownership and incentives of hospitals. I recommend that the authors familiarize themselves with the literature on payment systems. A good summary can be found in


We have elaborated this issue in the statistical analysis section.

We just use a DID analysis, in fact we perform a multivariate logistic regression analysis including comorbidities and an interaction term between types of hospital payment and study period. This allows comparisons across types of hospital payment between the two periods under study, before and after the pay performance act. Furthermore the inclusion of comorbidities allows us to explain the differences between types of hospital payment taking into account patient case-mix.

3. Comment on the analysis as it currently is.

3A The authors used stepwise bootstrapping to assess the importance of “risk factors” and report how they did it. However, the interesting point is how this changed the model. Please do report this.

We have elaborated this issue in the result section.

We are interested to compared hospital type in the two study periods, taking into to account the “severity” of subjects, and not to estimate the association of each confounder with the outcome.
Furthermore we reported in the discussion section:”In addition, although several covariates were included in the models to adjust for differences in patient characteristics, unmeasurable or unmeasured covariates that might affect the likelihood of intervention within 48 h of admission may not have been taken into account. However, the lack of major differences between the crude and adjusted proportion of patients receiving surgery within 48 h and the homogeneity of results by hospital payment type suggest that these covariates may not affect the results. Furthermore, different coding practices across hospitals and misclassification of comorbidity are unlikely to be associated with hospital payment type.””

3B The authors applied logistic regression without an intercept. They should report if the model improved compared to a model with an intercept. Anyway, there should be arguments why this was done. **The model without the intercept estimates log odds of surgery within 48 h by hospital payment type. This is equivalent to the amount \((β_0 + βj)\), for the j-th hospital, in traditional regression models with intercepts, such as:**

\[
\log(τ_i) = \beta_0 + S1i \beta_1 + S2i \beta_2 + \ldots + Xki \beta_k
\]

*The parameters estimated by the model were used to calculate the expected rates (adjusted predicted rate) in the case in which all hospitals had the same distribution of the general population for age, sex, severity of illness / surgery and comorbidities. In order to obtain the predicted adjusted rate, all covariates have been centered on the average of the general population:*

\[
\log(τ_i) = S1i \beta_1 + S2i \beta_2 + \ldots + \beta C_i
\]

*Where C is the vector of covariates centered with respect to the respective overall averages.*

3C The journal has the nice feature of offering space for additional files. I strongly recommend that the results of the model will be published as such in an additional file. **Done, we presented the model results in an additional file 2.**

4. It would help the reader to understand the differences between hospitals if the authors would describe the health care system in Italy. How many hospitals there are in the Lazio region, if they are different (size, specialties, population served etc.), do hospitals compete on patients, do patients have access to quality data …

In the discussion, the authors refer to their previously published article. Some information that is given in that article is of interest and important also for this article. For example, the fact that the Lazlo region has a low level of patients receiving surgery within 48 hours. **Added in the discussion section according to your suggestions**

The authors describe the data mainly at the level of all patients, “before” and “after” characteristics. What is equally interesting, are the characteristics of the hospitals and the characteristics of patients per hospital type. If the data will not be analysed with DiD, the patient characteristics per hospital type should be published as well. **We have added a table with the characteristic of hospitals per types of hospital payment, before and after the pay performance act (table 2).**

5. Probably because all hospitals had a higher rate of surgery after the change
the authors focus in their discussion on programs to improve quality and not on the differences in payment systems. Here, they should combine the literature on payment systems and discuss the differences between hospital types.

*Added in the discussion section according to your suggestions*

Minor Essential Revisions
6. The text under the heading “Comorbidities” could be combined with the text on outcome.
   *We have modified in the text. See appendix A: Comorbidities included in a model to predict surgery within 48 hours.*

7. The conclusion in the abstract:
The abstract should also contain the main results: the share of patients with hip fracture that were operated within 48 hours was 11.7% before the change in the DRG system and 22.2% after the change.
   *We have added in the abstract.*

8. Instead of pay-per-performance the authors should use pay-for-performance.
   *We have modified in the text.*

Discretionary Revisions
9. The text would benefit from language editing.
   *Edited by S. Francisco edit.*

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

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

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.
Reviewer: Juhani Lehto

Reviewer's report:
This is an interesting study which is linked to health care reform policies in many countries. It adds to knowledge on the impact of payment methods on one patient group in one particular context, and together with many other studies to the opportunities to make generalizations on the impact of payment methods.

Minor Essential Revisions

1. The heading of the article gives a rather large promise of assessing the impact of payments reform on quality. The article only deal with one aspect of quality, the timing of the surgical operation. I suggest that the heading is changed to reflect better to the narrow content.
   We have modified the heading of the article.

2. Although the patient mixes of the different hospital types might not have changed during the study period, they probably are different, for instance in terms of the socio-economic characteristics of the patients. This may have impact on the flexibility of the hospitals to react to the changes in payment. Thus, information about the differences might be useful for the readers and their impact on the differences between different hospitals could be discussed.
   We have added a table with the characteristic of hospitals per types of hospital payment, before and after the pay performance act (table 2).
   Added in the discussion section according to your suggestions

3. The differences between private and public hospitals is probably not only restricted to differences in payments (only DRG, also other methods). Are they also different in terms of narrow/large patient mix, different role of elective/emergency patients, number of different specialities etc? In addition to payments metyhods and the socio-economic mix of patients, also such differences might effect the flexibility to react to cahnges in payment methods. These issues could be mentioned and discussed, although the emöpirical study does not give an answer to them.
   Added in the discussion section according to your suggestions

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests:
I declare that I ahve no competing intrestests.