Author's response to reviews

Title: Current level and determinants of inappropriate admissions to township hospitals under the New Rural Cooperative Medical System in China: a cross-sectional study

Authors:

Zhang Yan Dr. (yanzhang@hust.edu.cn)
Yingchun Chen Pro. (chenyingchun@mail.hust.edu.cn)
Xiang Zhang Pro. (zhangchxiang@163.com)
Liang Zhang Pro. (zhangliang@mails.tjmu.edu.cn)

Version: 5 Date: 27 October 2014

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Response to reviewers’ comments

Dear Professors Li and Niehoff,

Thank you for your work reviewing our manuscript. We have made revisions in accordance with your comments and advice, and would like to re-submit our revised manuscript. We would also like to express our gratitude to you for your valuable input.

Our responses to your comments are below:

1. Please make the title more specific. What are the main objectives of the paper? Are the main objectives the criteria for inappropriate admissions, the rate of inappropriate admissions, or the determinants?

A: We have adjusted the title to focus on the level and the determinants. The main objectives are to look at the rate of inappropriate admissions and its determinants. The development of the criteria, AEP, provides a way to identify the inappropriate admissions and examine the rates (page 1, line1-3; page 7, line147-149)

2. The introductory part should be improved, eg. 2.1 What are the determinants of inappropriate admissions according to the existing studies?

A: We have inserted new information on page 5, lines 75–83 to explain this better: There are many studies about the determinants of inappropriate admissions. Mozes et al [1] found that inappropriate admissions were much higher in groups requiring an operation and in children than other groups. De Marco et al [2] also demonstrated that inappropriate admissions were seen more often in children, especially if they had an influenza-like illness. Barker Bausell [3] found that older people also had a high inappropriate admissions rate. Pileggi et al [4] demonstrated that emergency patients were at high risk of inappropriate admissions. Brown [5] found that the insurance
reimbursement ratio and day limits on insurance payouts also had a significant influence on the admission appropriateness.

2.2 What are the differences between the existing studies on inappropriate admissions of NRCMS and this paper?
A: There is no existing research on inappropriate admissions in China. The existing studies on NRCMS are more focused on health-seeking behavior or fund efficiency. This paper aims to look specifically at inappropriate admissions in Chinese township hospitals (page 7, line 145–146)

2.3 In the fourth paragraph, are there any references for the “three reasons”?
A: We have added two references for the “three reasons” [6,7] (page 4, line 90–95).

2.4 The introductory doesn’t state clearly what are the main objectives? What is the assumption?
A: We aim to make clear the status and determinants of inappropriate admissions in Chinese township hospitals by establishing AEP criteria (page 7, lines 147–149).

3.1 In the method, what are the revisions of the international AEP?
A: The revisions of the international AEP, such as the United States [8] and EU countries [9], were not used in this study, and all indices in the three revisions of international AEP were collected in the preliminary AEP libraries (page 7, lines 154–155).

3.2 Please list the results of inappropriate admissions by a crosstab using the two methods, AEP and implicit criteria, because the establishment of the new AEP criteria is an important part of the paper.
A: Table 2 shows the results of inappropriate admissions by a crosstab using the two methods (page 25, line 497–499).

3.3 Are all the patients covered by NRCMS?
A: All the sampling patients were covered by NRCMS, and received reimbursement (page 9, line 187-188).

3.4 In the data source of the method, although the authors stated that they collect sociological characteristics, inpatient admission information, and other patient data, they should give more detailed information.
A: We have inserted information to make clear that:

*From previous research, we identified possible determinants including gender, age, department, admitted severity, length of stay, disease category, complication and the payment [1,3-5]* (page 9, line 188-191,196-198).

4. Please provide flow-diagram of sample design. How do you calculate the sample size?
A: We have added information to explain how we calculated the sample size (see page 9, lines 177-182).

5. Does the medical record cover all the items in the international AEP?
A: Every medical record includes some indices, and part of those indices in inpatient medical records would cover some items in the international AEP. Patients not meeting any criteria were deemed to have been inappropriately admitted (page 10, line 209-210).

6. Please list the two-level variables. How do you choose the independent variables? How about the multi-collinearity in the model?
A: The MLwiN2.30 software was used to obtain the multilevel zero test data. The medical records were supposed to be level 1, the township hospitals level 2, and the county level 3 to test the level variation in all data. A two-level binomial logistic regression model was created as below.

\[
\text{logit } (P_{ij}) = (\beta_0 + \mu_{ij}) + \beta_1 X_{ij}
\]
\[ \mu_{0j} = \beta_{0j} - \beta_0 \]
\[ \mu_{0j} \sim N(0, \sigma^2_{\mu_0}), \text{var}(P_{ij}) = \delta \pi_{ij} (1 - \pi_{ij}) / n_{ij} \]

This model has a good function to deal with multi-collinearity in the regression (page 12, line 240–241).

7. In the second paragraph in the part of the AEP criteria in the result, both the Cronbach coefficient and kappa coefficient are 0.729, please check.
A: We apologize for the mistake; this has now been corrected (page 10, lines 216-217).

8. The two sentences are confusing. There is contradiction.
(1) In the second paragraph in the part of the AEP criteria in the result. “Results show that the ultimate AEP criterion was consistent with the current status of inpatients in Chinese rural township hospitals to a degree of 86.8%. Thus, the experts found that the criteria can cover more than 80% of the township hospital inpatients.”
A: The sentence now reads:

The applicability of the new AEP criteria was investigated by 32 experts, of whom 28 (87.5%) claimed the criteria could be suitable for more than 80% of the township hospital inpatients (page 10, line 213–214).

(2) In the first paragraph in 3.3, “A total of 26.5% of the records indicated inappropriate admissions”
A: This is correct. The sentence reads:

A total of 26.5% of the records indicated inappropriate admissions (page 11, line 227).

Professor Niehoff
It needs some additional activities of the readers to become closer to the particular regulars and conditions of the fast developing health services and its financing system. This kind of knowledge can certainly not become included into this paper.
A: We have added some information on the health service and its financing system in Section 4.2 (page 15, lines 300 and following).

References


9. Liberati A, Apolone G, Lang T, Lorenzo S: A European project assessing the
appropriateness of hospital utilization: background, objectives and preliminary results. The Project Steering Group and the Coordinating Center.