PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Determinants of Inappropriate Admission of Elderly People in County-Level Hospitals: A Cross-Sectional Study in Rural China
AUTHORS	Hu, Xiaomei; Gao, Hongxia; Zhang, Yan; Li, Haomiao; Su, Dai; Chang, Jingjing; Jiang, Di; Lei, Shihan; Chen, Yingchun

VERSION 1 - REVIEW

REVIEWER	Mingsheng Chen School of Health Policy and Management, Nanjing Medical University
REVIEW RETURNED	05-Nov-2018

GENERAL COMMENTS	The manuscript investigates the characteristics and determinants of inappropriate to hospital of elderly people in rural china through a cross-sectional study from the perspective of supply and demand. The manuscript has some general and specific concerns. These include unanswered questions regarding the study methodology as well as some basic concerns regarding readability. Specific concerns and questions are as follows: 1. Introduction a. Page 4 line 71-72. Please provide a figure about "The high hospitalization rate of the elderly in rural areas". 2. Method a. Page 8 line 153. How do you define "similar". Why do you think the R0 in Dingyuan (45%) and Weiyuan (90%) is similar, and R1 of county hospitals in Dingyuan (85%) is similar to that in Weiyuan (70%). b. Page 10 line1. I recommend that the author elaborate on "R-AEP criteria" used for evaluating the appropriateness of admission so that readers can understand it better. c. Page 10. Variables. The object of the manuscript is "identify the determinants of inappropriate admission of elderly people to hospitals in the rural areas of China from the perspective of supply and demand". I suggested that it should be further explained which variables are from the supplier's perspective and which variables are from the demand's perspective. 3. Result a. Please check the accuracy of the data carefully. (e.g., page 12 lines 225) b. Table 3: i: " the comparison of R0 and R1". There is no difference between R0>R1 and R1<R0. Please check again. c. Table 4: If the age significantly affects inappropriate admission of early ,you should label *.

	d. The related statement about " Elderly patients who can fully afford the hospitalization costs had the highest inappropriate admission rate." that seem to contradict the results of Table 3. 4. Discussion a. Page 21 line 313-314. Similarly, the related statement about " Elderly patients who can fully afford the hospitalization costs had the highest inappropriate admission rate." is not consistent with the result of Table 3, and revise the corresponding discussion. 5. Kindly review the references list for conformity.

REVIEWER	Sajad Khosravi
	Bam University of Medical Sciences, Bam, Iran
REVIEW RETURNED	20-Nov-2018

GENERAL COMMENTS	1- Overall, the paper requires revisions in terms of language, structure and narrative. 2- The introduction is very long and tedious. It's better to summarize 3- In the methodology section, some of the content is non-relevant, and it's best to move it to the introduction section, or delete it. (For example, figure 1 and table 1). 4- Explain the way of doing the work more clearly and concisely. In general, the method section needs to be reformed and should be written more regularly. 5- In discussion section, it is expected to explain what problems might be solved by this paper. 6- it is not obvious how the conclusions emerge from the study result? In conclusion should be mentioned how the policy makers could use the results provided by this study and how they could overcome the problem Regards

REVIEWER	Teh-Fu Hsu
	Department of Emergency Medicine, Taipei Veterans General Hospital, Taipei City, Taiwan, ROC.
REVIEW RETURNED	24-Jan-2019

GENERAL COMMENTS	Your study can provide us with valuable observations considering inappropriate admission of elderly people in rural China. Reviewer commend: 1. In Line 139. "This cross-sectional study was conducted in 2017, and cluster random sampling was adopted." And in line 223. "The study included 652 admitted patients." What's the number of annual hospitalizations in each county-level general hospital in the study period (i.e. in 2017)? What's the sampling rates in each hospital? Please add relevant descriptions in the Result section. 2. In line 181. "The evaluation was performed by professionally trained personnel. The R-AEP criteria are based on the value of the medical record." How to train data collectors or what's the experience of trained personnel? 3. Following question 2. Is there any procedures to prove the consistency and validity of collected data? For example, two independent data collectors to ensure the correctness of data.

| | 4. Was the final judgement of inappropriate admission made in personal decision or in consensus meeting?
5. In line 237. "which was lower than that of non-elderly patients (40.7%)." According to Table 2 (data line 1), the percentage is 40.8%. (minor typing error)
6. In line 256. "Elderly patient who can fully afford the hospitalization cost had the highest inappropriate admission rate (37.8%)." According to Table 3 (data Affordability line 3), the percentage is 39.9% in the elderly group and 37.8% is the percentage of non-elderly group. (error)
7. Following question 6, the corresponding discussion on lines 314 to 319 should be revised. According to Table 3, the inappropriate admission rates of difficult affordability and fully payable in the elderly are 38.3% and 39.9% respectively. The non-elderly counterparts are 16.4% and 37.8%. The discussion in your manuscript seem to be applicable to non-elderly populations.
8. In Table 3. Data - Comparison of RO and RI line 2 should be "RI>RO". (greater than, NOT lesser than, typing error)
9. In line 305 to line 307. "Moreover, an elderly person presents more obvious and serious symptoms at the onset of a disease and is thus more likely to be inappropriately admitted." According to line 302 to line 304, "The inappropriate admission rate of elderly patients (30%) was lower than that of non-elderly patients (40.8%)" The conclusion should be revised from "more likely" to "less likely". |

VERSION 1 – AUTHOR RESPONSE

Dear professors Mingsheng Chen,

Our responses to your comments are below:

1. Introduction

a. Page 4 line 71-72. Please provide a figure about "The high hospitalization rate of the elderly in rural areas".

Response: It's a very good suggestion. In fact, there was already a description of the hospitalization rate for the elderly in the article, but in order to make the expression clearer and more concise, we have modified the relevant sentences(Line 70-73).

Line 70-73: In recent years, the rate of hospitalisation for the elderly in rural China has increased from 12.7% in 2003 to 21.5% in 2013, which suggests that the utilization of health services for rural elderly population in China has increased sharply.

2. Method

a. Page 8 line 153. How do you define "similar". Why do you think the R0 in Dingyuan (45%) and Weiyuan (90%) is similar, and R1 of county hospitals in Dingyuan (85%) is similar to that in Weiyuan (70%)..

Response: It's a question. Actually, We define "similar" as that the reimbursement policies in the four counties were all include the reimbursement of outpatient and inpatient.However, in order to make the method part more standardized, we have deleted the relevant content of this part and added the table"the NRCMS reimbursement policies in the survey areas in 2017"as additional file 2 to the relevant discussion. This is also the comment of another reviewer(line 333-334).

b. Page 10 line1. I recommend that the author elaborate on "R-AEP criteria" used for evaluating the appropriateness of admission so that readers can understand it better..

Response: It's a very good suggestion. We added additional file 1 " R-AEP criteria for county hospitalization " to give the details so that readers can understand it better(line 169).

c. Page 10. Variables. The object of the manuscript is "identify the determinants of inappropriate admission of elderly people to hospitals in the rural areas of China from the perspective of supply and demand". I suggested that it should be further explained which variables are from the supplier's perspective and which variables are from the demand's perspective.

Response: Good point – we agree. We have added the explanation about which variables are from the supplier's perspective and which variables are from the demand's perspective (line 160-164).

line 160-164: Among the above variables, gender, age, subjective cognitive, disease, health status and DOCD are from the demand's perspective, while county, RTDAR, affordability to hospitalisation costs, CORR, hospitalisation convenience, department and DOCD can also directly or indirectly reflect the influence of the supplier on the inappropriate admission of the elderly.

3. Result

a. Please check the accuracy of the data carefully. (e.g., page 12 lines 225)

Response: Yes, we recognized it, and we were so sorry for our negligence. We have checked the accuracy of the data and corrected all the wrong data (line 219-234).

b. Table 3:

i: " the comparison of R0 and R1". There is no difference between R0>R1 and R1

Response: Yes, we recognized it. Comparison of RO and RI line 2 have been corrected to be "RI>RO" in table 2 (line 264-265).

c. Table 4:

If the age significantly affects inappropriate admission of eldly , you should label *.

Response: It's a question. The age do significantly affects inappropriate admission of eldly , and we have labeled * in table4 (line 284).

d. The related statement about " Elderly patients who can fully afford the hospitalization costs had the highest inappropriate admission rate." that seem to contradict the results of Table 3.

Response: It's a question, and we were so sorry for our negligence. We have corrected it to be" Elderly patient who affords the hospitalization cost difficult had the lowest inappropriate admission rate (38.3%)." (line 252-254)

4. Discussion

a. Page 21 line 313-314. Similarly, the related statement about " Elderly patients who can fully afford the hospitalization costs had the highest inappropriate admission rate." is not consistent with the result of Table 3, and revise the corresponding discussion.

Response: It's a question. We have revised the corresponding discussion (line 313-315).

line 313-315: Elderly patients who affords the hospitalisation costs difficult had the lowest inappropriate admission rate. It may be caused by economic difficulties that restrict the utilization of health services for elderly patients in rural areas in China.

5. Kindly review the references list for conformity.

Response: It's our negligence. We did find the errors cited in the references and modified them.

Dear professor Sajad Khosravi,

Our responses to your comments are below:

1. Overall, the paper requires revisions in terms of language, structure and narrative.

Response: Thank you for this, as you recommended, we have modified the language in which the article was inappropriate and adjusted some of the narratives to make them clearer and more concise. We also made some adjustments to the structure of the article.

2. The introduction is very long and tedious. It's better to summarize

Response: Yes, it's a good suggestion. We removed some of the extra sentences from the introduction and re-summarized the relevant research, retaining some of the necessary introductions to the study, making this part more complete and concise.

3. In the methodology section, some of the content is non-relevant, and it's best to move it to the introduction section, or delete it. (For example, figure 1 and table 1).

Response: Yes, we recognized it. We have removed figure 1 and introduction of the regional health insurance reimbursement policy. Table "the NRCMS reimbursement policies in the survey areas in 2017" has been added as additional file 2 to the relevant discussion for details.

4. Explain the way of doing the work more clearly and concisely. In general, the method section needs to be reformed and should be written more regularly;

Response: it's a good suggestion. In the method section, we have deleted some irrelevant content. We gave the further explanation of the analysis perspective of the variables. (line 160-164) and added "additional file 1" for the details of R-AEP. we have given the details about the experience of trained personnel and the specific case evaluation process to prove the prove the consistency and validity of collected data(line 171-184). We have also changed the order of section of "Records appropriateness evaluation" and "Variables", to make the structure more appropriate.

5. In discussion section, it is expected to explain what problems might be solved by this paper.

Response: Good point – we agree. We have added this section at the start of the discussion (line 287-294).

line 287-294: By the descriptive analysis and logistic regression analysis, we studied the characteristic and determinants of inappropriate admission of elderly people in rural China. According to our results, we would try to find out the reasons for the inappropriate admission of the elderly people in rural China from the perspective of supply and demand by discussing the determinant factors of it. And our study would also try to give some suggestions for the Chinese government to control the inappropriate admission of the elderly, and provide the new observations for researchers in this field.

6. it is not obvious how the conclusions emerge from the study result? In conclusion should be mentioned how the policy makers could use the results provided by this study and how they could overcome the problem

Response: it's a good suggestion. We have revised the summary section. From the research results, we have given relevant factors that policy makers need to pay attention to, and put forward relevant policy recommendations to control the inappropriate admission of elderly people in rural China (Line 393-409).

Dear professor Teh-Fu Hsu,

Our responses to your comments are below:

1. In Line 139. "This cross-sectional study was conducted in 2017, and cluster random sampling was adopted." And in line 223. "The study included 652 admitted patients." What's the number of annual hospitalizations in each county-level general hospital in the study period (i.e. in 2017)? What's the sampling rates in each hospital? Please add relevant descriptions in the Result section.

Response: Thank you for this, as you recommended, we have add relevant descriptions in the result section (line 220-223).

line 220-223: The sampling rates in each hospital were 0.53% in Yilong (samplers in annual hospitalizations in 2017: 157 in 29461), 0.54% in Huining (153 in 28101), 0.28% in Dingyuan (176 in 62096) and 1.41% in Weiyuan (166 in 11734).

2. In line 181. "The evaluation was performed by professionally trained personnel. The R-AEP criteria are based on the value of the medical record." How to train data collectors or what's the experience of trained personnel?

Response: it's a good suggestion. We have given the details about the experience of trained personnel (line 171-174).

line 171-174: The evaluation was performed by professionally trained personnel. These highly trained personnel were professionals in health policy research, all of whom received Ph.D. degrees and committed to making fair judgments on records in a strictly standard manner.

3. Following question 2. Is there any procedures to prove the consistency and validity of collected data? For example, two independent data collectors to ensure the correctness of data.

Response: It's a question. We have added the specific case evaluation process to prove the consistency and validity of collected data (line178-184).

line178-184: The specific case evaluation process was as follows: 1) Evaluating each medical record by two experts; 2) Comparing the consistency of the results of the two experts; 3) Cases with inconsistent results from two experts were sent to a third party and were evaluated by a third party; 4) Comparing the results of admission appropriateness made by a third party with the previous results and making the final judgment about appropriateness of patient admission.

4. Was the final judgement of inappropriate admission made in personal decision or in consensus meeting?

Response: It's a question. The answer is negative. First of all, The R-AEP criteria were are based on the value of the medical record. Second, we have at least two evaluators to guarantee the objectivity of their judgment.

5. In line 237. "which was lower than that of non-elderly patients (40.7%)." According to Table 2 (data line 1), the percentage is 40.8%. (minor typing error).

Response: Yes, we recognized it, and we were sorry for our negligence. We have corrected the error (line 234).

6. In line 256. "Elderly patient who can fully afford the hospitalization cost had the highest inappropriate admission rate (37.8%)." According to Table 3 (data Affordability line 3), the percentage is 39.9% in the elderly group and 37.8% is the percentage of non-elderly group. (error)

Response: we were sorry for our negligence. We have corrected it to be "Elderly patients who affords the hospitalisation cost difficult had the lowest inappropriate admission rate (38.3%)."(line252-254)

7. Following question 6, the corresponding discussion on lines 314 to 319 should be revised. According to Table 3, the inappropriate admission rates of difficult affordability and fully payable in the elderly are 38.3% and 39.9% respectively. The non-elderly counterparts are 16.4% and 37.8%. The discussion in your manuscript seem to be applicable to non-elderly populations.

Response: It's a question. We have revised the corresponding discussion (line 313-315).

line 313-315: Elderly patients who affords the hospitalisation costs difficult had the lowest inappropriate admission rate. It may be caused by economic difficulties that restrict the utilization of health services for elderly patients in rural areas in China.

8. In Table 3. Data - Comparison of RO and RI line 2 should be "RI>RO". (greater than, NOT lesser than, typing error)

Response: Yes, we recognized it. Comparison of RO and RI line 2 have been corrected to be "RI>RO" in table 2 (line 264-265).

9. In line 305 to line 307. "Moreover, an elderly person presents more obvious and serious symptoms at the onset of a disease and is thus more likely to be inappropriately admitted." According to line 302 to line 304, "The inappropriate admission rate of elderly patients (30%) was lower than that of non-elderly patients (40.8%)" The conclusion should be revised from "more likely" to "less likely".

Response: we were sorry for our negligence. The conclusion has been revised from "more likely" to "less likely"(line 307).

VERSION 2 – REVIEW

REVIEWER	Mingsheng Chen Nanjing Medical University, China
REVIEW RETURNED	19-Feb-2019

GENERAL COMMENTS	The authors have carefully revised the manuscript. I am satisfied with the revised version.

REVIEWER	Sajad Khosravi Bam University of Medical sciences, Bam. Iran.
REVIEW RETURNED	19-Feb-2019

GENERAL COMMENTS	Accept

REVIEWER	Teh-Fu, Hsu
	Department of Emergency Medicine, Taipei Veterans General Hospital, Taipei City, Taiwan, ROC.
REVIEW RETURNED	01-Mar-2019

GENERAL COMMENTS	This revised manuscript was properly respond to previous reviewer comments.
	But, there are some typing errors should be corrected. For example but not limited in Line 174 ("The R-AEP criteria were are based on the value of …", duplicate verbs, "are" should be deleted) Line 189 ("Person's chi-square test …", Pearson's chi-square test), and so on.