## PEER REVIEW HISTORY



## ARTICLE DETAILS

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| **TITLE (PROVISIONAL)** | Determinants of Patient Choice for Hospital Readmission after Township Hospitalisation: A Population-Based Retrospective Study in China |
| **AUTHORS** | Zhang, Yan; Yadong, Niu; ZHANG, LIANG |

## VERSION 1 – REVIEW

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| **REVIEWER** | Wolfgang Hoffmann<br>Institute for Community Medicine, University Medicine Greifswald, Greifswald, Germany |
| **REVIEW RETURNED** | 11-Feb-2018 |

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| **GENERAL COMMENTS** | Zhang et al: Determinats for patient choice for hospital readmission after township hospitalization: a population-based retrospective cohort study in China<br>(bmjopen-2018-021516)<br>This is an epidemiology of health care study based on existing routine medical data in one district in the southwest of China. The analysis is based on a population based health utilization database covering the period from 2008-2013. The authors used readmission (a subsequent admission for the same disease within 30 days after discharge from the primary admission) as a model for patient choices and motivations with respect to the level of care for their illness. The authors evaluated determinants for entering the next higher level (county hospital) vs. remaining at the township-level. Primary admissions to township hospitals were prospectively followed for readmissions. In cases of readmissions data on the hospital, the patient, and medical data were abstracted from the health utilization data base and analysed adopting two-level logistic regression models. These account for any systematic differences between the towns which run township hospitals that the authors had anticipated and which were actually confirmed in the analyses. The study addresses a fundamental problem in the design of the three-tiered Chinese health care system based on population-based prospective data. The analysis is important with respect to fostering continuous pathways for patients, to assure provision of adequate medical and nursing care to each patient and for the further planning of resources, educational, and financial frameworks.<br>The manuscript should be considered for publication, but it requires major revision and thorough language editing.<br><br>Major points<br>While most of the manuscript refers to township hospital as an entity, Fig. 1 differentiates 4 levels within this category. How are these defined ? Do these levels have a differential impact on the observed predictors ? Subgroup analyses would allow sensitivity analyses which are likely informative for the problem at hand. |

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| | l 80 is one instance of the connotation of “inappropriate” patient choice (for the higher level hospital upon readmission). The present paper does not provide a clear concept for the determination of inappropriateness in patients’ choices. It is similarly unclear, how the “inappropriate readmission” (l 102- 103) ist operationalized.<br>The authors report that the time interval between discharge and readmission is much lower for the TC group than for the TT group (line 219-221). The authors should discuss how they can exclude that a considerable proportion of very early readmissions are actually referrals.<br>The manuscript requires thorough language editing.<br><br>Minor points<br>line 87: “the same” rather than “once”<br>l 68: 30-days<br>l 73: “rather then” instead of “instead”<br>l 84 “subsequent” rather than “succeeding”<br>l 118 “… more time and cost and may even miss the best kind of treatment…”<br>l 139 “identifies” instead of “makes clear”<br>l 171 “were identified accordingly” rather than “were treated in the same way”<br>l 171 what is meant with “complementally”<br>Tab. 4: “reference” instead of “baseline”<br>l. 253 “… patient choice, is often an inefficient utilization”<br>l 255 “have” instead of “has”<br>l 263 “and have different medical capabilities” |

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| **REVIEWER** | Dr Honora Smith<br>Southampton University |
| **REVIEW RETURNED** | 12-Mar-2018 |

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| **GENERAL COMMENTS** | This is an interesting study looking at choice of hospital for readmission, in a province of rural China. Out of a database of all hospital admissions from 2008 to 2013, cases were identified that were readmissions within 30 days, after first admission in a township hospital. In such rural areas, patients may be referred by a physician for readmission, or they may choose a hospital for readmission. Readmission may be costly to the patient and is also a burden to the health system.<br><br>Of interest in this study were the factors determining readmission to a county hospital, rather than a township one. A statistical comparison was made between readmissions to township and county hospitals. Bilevel binomial logistic regression modelling was used to find determinants of county rather than township readmission, the two levels being town of residence and patient. Factors considered were year of admittance, gender, age group, travel distance/time to the county hospital, capability of the township hospital, lengths of stay (LOS) and expenses of admissions, interval (group) between admissions, and disease category (whether cancer, ENT, respiratory, circulatory, digestive, urinary, blood, orthopaedic, obstetics/gynaecology). Many determinants of choice for county admission were found to be year of admittance, travel time to county hospital, interval between admissions, first LOS and disease category. Patients more likely to be readmitted to county hospital were in the 40-59 age group, with shorter travel time to |

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| | county hospital, shorter first LOS, shorter interval between admissions, admitted in a more recent year, with urinary disease. Patients with cancer were more likely to be readmitted to county hospital than obstetrics/gynaecology patients.<br><br>In general, the descriptive statistical analysis and multilevel modelling have been carried out appropriately, but there are some areas for improvement. The written English can be understood, but there are frequent grammatical errors and inappropriate words that need correcting. Importantly, there is some lack of accuracy in writing that leads to a lack of clarity and the discussion and suggestions do not clearly follow from the results.<br><br>Detailed comments follow.<br><br>**Abstract**<br><br>Line 42. Results: “TT group accounted for 62.5%”: 62.5% of what? Of readmissions? Similarly for the TC group.<br><br>Line 45. It would be clearer to say “average interval between admissions”, here and throughout the document.<br><br>Line 46. “travel time to county hospital” would be clearer than “arrival time to county hospital” (which appears, wrongly, to be the time of day patients arrive at the county hospital), here and throughout the document.<br><br>Line 49. The conclusions drawn do not seem appropriate. I agree that year of admission is a positive determining factor in readmission to a county hospital, but in fact the proportion of readmissions to county hospital out of all admissions is remarkable stable, at about 1.8 – 1.9%. The need for reducing the incidence (of readmission?) was known without this study, and patient dissatisfaction is not directly studied in this research, although its effects are implied.<br><br>**Article Summary**<br><br>Line 55 No justification is given for town-county readmission being “unique” to rural China – suggest “a feature”.<br><br>Line 60/61 “Findings in this research reveal the dissatisfied township-county readmission is a probable cause of inappropriate level of hospitalisation for the first time” – I don’t see proof of this in |

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| | the analysis carried out in this research.<br><br>Line 64, It is unclear what “referral status” means, as this is not mentioned in the description of variables.<br><br>**Background**<br><br>The organisation of the written content of the background section could be improved.<br><br>Line 71 What is meant by “disease variability”?<br><br>Line 78 “accounts for approximately 4.0% of all inpatient services” – is this nationally?<br><br>Line 88 Suggest “the longer the distance travelled”.<br><br>Line 93 What is meant by “disease varied”? This needs rewording throughout the paper.<br><br>Line 128 no justification is given for “as proven by medical practices around the world”.<br><br>**Study setting**<br><br>L 144/145 “between county and township hospitals” – but there are also township to township readmissions?<br><br>L156 Suggest “quality” rather than “quantity”? Figure 1 does not indicate which level (1 or 4) is the highest quality service.<br><br>L170 “TT and TT”?<br><br>L176 “which may improve accuracy of readmitting patients”<br>– do you mean “which may improve the accuracy of finding readmitted patients”? |

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| | **Statistical analysis**<br><br>L192 Suggest giving the regression model details later, under **Determinants of choice for hospital readmission after township hospitalisation.** Then the reader would know what levels<br><br>1 and 2 represented.<br><br>Were other multilevel models fitted? A model has been chosen where only the constant term varies with different towns, and not the beta parameters.<br><br>**Results**<br><br>L198 Do you mean “6,764 first readmissions in township hospital” or “6,764 readmissions after first hospitalisation in a township hospital”?<br><br>Table 1 appears to have several arithmetic errors.<br>Please check the overall total and percentages for the TT and TC groups.<br><br>Table 3 is confusing, having a different format for LOS and expense. Consider putting this part at the end of the table with new headings.<br><br>**Determinants of choice for hospital readmission after township hospitalisation**<br><br>L237 There is a problem with including both travel time and distance to county hospital. Were these investigated for correlation? With the likely high correlation, it can become difficult to attribute the effect of either variable. The anomalous situation in these results of a positive coefficient for distance and a negative one for travel time seems to result from having both in the model.<br><br>L240 It would be more accurate to say “the 40-59 yr” age group, rather than “more than 40-year-old groups”. |

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| | L269 “LOS in first admission” rather than “inpatient”.<br><br>L274 “readmission is inescapable under the same OR” – meaning unclear. OR has not been defined and why should it be inescapable?<br><br>**Discussion**<br><br>L284/5 what reference source do you have for “9.7 days, the standard LOS in township hospitals”<br><br>The discussion under **Amendments of TC readmission** is difficult to follow and needs improving. Firstly, would a better title be **“Reducing TC readmission”?**<br><br>L305, “According to the results” – which results? Those in Table 3? It appears that the regression results have been ignored in this part of the discussion, although the regression can take multiple factors into account at the same time.<br><br>L305, “we could identify … in preliminary” – do you mean “we can differentiate TC admission from TT admission by the first LOS and interval between admissions.” L306 “in preliminary” – what does this mean?<br><br>L311 “as suggested by doctors” – you have not presented any evidence about whether patients were referred by doctors. Do you mean that patients readmitted after a shorter first LOS and after a shorter interval could be assumed to have been referred by doctors?<br><br>L311 Can you further elaborate why “Longer first LOS and longer interval are more likely to conversely cause an inappropriate level of care of readmission”? Would “indicate” rather than “cause” be more appropriate? The regression model suggests that longer first LOS and longer interval indicates a low probability of TC admission and thus a higher probability of TT admission. Can you explain why this is inappropriate?<br><br>L314/316 “TC readmissions caused by doctor incorrect assessment was approximately 70.7%, and those caused by patients probably accounted for 29.3%.” – how were these figures derived? |

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| | L316/317 “we can develop different interventions based on the different types of TC readmission.”. Firstly, from what has been said before, it’s not clear what are the different types of TC readmission. Secondly, what might different interventions look like?<br><br>L322 – 331 The suggestions for decreasing TC readmissions are not based on the results of this study – these should form the major part.<br><br>**Conclusion**<br><br>A discussion of the generalisability of this study is missing. |

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| **REVIEWER** | Zhiyuan Hou<br>Fudan University, China |
| **REVIEW RETURNED** | 16-Mar-2018 |

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| **GENERAL COMMENTS** | Although this topic is very important, the authors does not clearly state the significance of this study, and the conclusion cannot be supported fully by the analysis.<br>Abstract: conclusion “Patients whose first admission was in a township hospital were more likely to be readmitted to a county hospital year by year” cannot be got from results. It is steady around 1.8% in recent years.<br><br>I don’t think that township-county readmission is the unique form of hospitalisation in rural China, but it should happen in other countries either.<br><br>Why TC readmission happen? Is it because of the fragmented healthcare delivery system or poor quality of township hospitals?<br><br>The authors statements are inconsistent and confusing. For example, according to the ideas of authors (third and fourth paragraphs), patients with TC readmission should be admitted at county hospitals because of the severity of diseases which township hospitals cannot deal with, and therefore, TC readmission will not result in patient admission to a higher-level hospital than necessary leads to significant waste. The authors should clearly and rightly state their theory and perspectives.<br><br>according to the ideas of authors, guiding patients to choose the correct hospital for “first admission instead of readmission” has rationally been a necessary consideration.<br><br>Study setting should introduce the site of study (qianjiang), rather than the sample.<br><br>Statistical analysis are not clearly stated, such as, which levels of multi-level analysis, and the model only show one level instead of multi-level.<br><br>What does it mean P value in table 1<br><br>Distance and time are the different measures for the same indicator, |

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| | and so they cannot be included in the multilevel analysis at the same time.<br><br>How to measure the admitted years, it should be a category variable.<br><br>How to get conclusion “one third of the readmission cases had first inpatient admission was in a township hospital” in page 14.<br>The conclusion section included too much parts of results. |

**VERSION 1 – AUTHOR RESPONSE**

Dear professors Wolfgang,
Our responses to your comments are below:
1. While most of the manuscript refers to township hospital as an entity, Fig. 1 differentiates 4 levels within this category. How are these defined? Do these levels have a differential impact on the observed predictors? Subgroup analyses would allow sensitivity analyses which are likely informative for the problem at hand.
Response: (1) We agree it’s necessary. We’ve added the classification standard, which is determined by the health bureau of Qianjiang, including the number of beds, capability for abdomen operation, and the amount of the discharged patients.
Line139-143: First-level township hospitals are allocated more than 30 beds and may perform abdomen operations; these hospitals had more than 1,200 discharged patients in 2013. Second-level township hospitals cannot perform abdomen operations of the same scale. Third-level township hospitals have fewer than 30 beds and around 600~1,200 discharged patients. All other township hospitals belong to the fourth level.
(2)We have considered these levels have a differential impact on the observed predictors, so we carried out a multilevel binomial logistic regression analysis to eliminate these effects. And the results (Table 4) indicates 6,764 records were aggregated by town level, associated with capability of township hospitals.
Line180-185: The treatment capacity of township hospitals and the travel time to a county hospital from different towns have differential impacts on the observed predictors. Therefore, we assumed that the obtained data indicated a hierarchical structure, and the 6,764 records could be aggregated by town level. The determinants of choice for hospital readmission were examined using multilevel binomial logistic regression analysis.
2. It is one instance of the connotation of “inappropriate” patient choice (for the higher level hospital upon readmission). The present paper does not provide a clear concept for the determination of inappropriateness in patients’ choices. It is similarly unclear, how the “inappropriate readmission” is operationalized.
Response: Yes, we recognized it, we have added one paragraph to clarify the definition and procedure of inappropriate choices, and cleared out the relationship between inappropriate choices and TC readmission, in response.
Line119-125: As noted, TC readmission from individual choice belongs to the inappropriate level admission, and TC readmission recommended by doctors can also result in inappropriate level admission for subsequent hospitalisation. Inappropriate level admission means patients seek healthcare in a higher-level hospital than necessary. This may result from patients’ intentional institution selection and distrust of the capability of township hospitals; such patients prefer to spend more money on healthcare to avoid the risk of needing referral. Inappropriate level admission is a major form of excess service demand, and an important determinant of increasing health expenditure that leads to significant waste.
3. The authors report that the time interval between discharge and readmission is much lower for the TC group than for the TT group (line 219-221). The authors should discuss how they can exclude that

a considerable proportion of very early readmissions are actually referrals.
Response: Yes, it's a good question. Here we say the TC group is composed of two types: (1) recommended by doctors and (2) caused by individual choices, but we really don't clear the accuracy proportion of these two forms in deed. And we have discussed them in the identification the forms of TC readmission.
Line318-328: A considerable proportion of early readmissions might be referrals; patients readmitted after a short first LOS with a short interval may be assumed to have been referred by doctors. A long first LOS and long interval were more likely to indicate an inappropriate TC readmission. Therefore, a combination of first LOS and interval may be an effective identification index; we used 1 week as the cut-off value (Table 3). TC readmissions based on a doctor's incorrect assessment accounted for approximately 70.7% of admissions (interval between admissions <7 days), and those caused by patients accounted for 29.3% (interval between admissions >7 days).
4. The manuscript requires thorough language editing.
Response: Thank you for this, as you recommended, we have got a professional editing service from a professional editing company to improve the readability of the manuscript. We thank Audrey Holmes, MA, from Liwen Bianji, Edanz Group China (www.liwenbianji.cn/ac), for editing the English text of a draft of this manuscript.
5. Minor points: "the same" rather than "once"; 30-days; "rather than" instead of "instead"; "subsequent" rather than "succeeding"……
Response: Much appreciate for your specific minor points, and we've adjusted all of these as you recommended.
Dr. Honora Smith
Our responses to your comments are below:
1. Line 49. The conclusions drawn do not seem appropriate. I agree that year of admission is a positive determining factor in readmission to a county hospital, but in fact the proportion of readmissions to county hospital out of all admissions is remarkable stable, at about 1.8 – 1.9%. The need for reducing the incidence (of readmission?) was known without this study, and patient dissatisfaction is not directly studied in this research, although its effects are implied.
Response: We very much agree with your concern, another expert raised the issue too. So, we have deleted the discussion about the amendments of TC readmission, they are really not directly studied in this research.
2. Line 60/61 "Findings in this research reveal the dissatisfied township-county readmission is a probable cause of inappropriate level of hospitalisation for the first time" – I don't see proof of this in the analysis carried out in this research.
Response: Yes, we recognized it, and we have deleted it in response, and the editor also pointed out the bullet points included in 'Strengths and limitations' should only relate specifically to the methods of the study (Line50-58).
3. The organization of the written content of the background section could be improved.
Response: Thanks for your excellent concern. We improved much in the background section, as the follow research points: (1)TC readmission;(2)forms of TC readmission; (3)effects of TC readmission; (4) TC readmission and inappropriate level admission; (5) significance; (6)research aim (Line 60-126).
4. L192 Suggest giving the regression model details later, then the reader would know what levels 1 and 2 represented.
Response: It's a question. Here we added the regression model details after the regression model in the section of "Statistical analysis", especially the meaning of level and level 2.
Line185-186: Patients were identified as level 1 and town as level 2. The regression model was as follows.
5. Were other multilevel models fitted? A model has been chosen where only the constant term varies with different towns, and not the beta parameters.
Response: in fact, we ran the multilevel regression models 3 times, we choose this model finally because of its stronger explanatory power. The two-level logistic regression showed an evident

hierarchy in town level, patients' choice for hospital readmission varies with different towns, so there is no beta parameter for different towns.
6. Table 1 appears to have several arithmetic errors. Please check the overall total and percentages for the TT and TC groups.
Response: it's our mistake, thank you for pointing this out. We have corrected it (Line:205-208).
7. L237 There is a problem with including both travel time and distance to county hospital. Were these investigated for correlation? With the likely high correlation, it can become difficult to attribute the effect of either variable. The anomalous situation in these results of a positive coefficient for distance and a negative one for travel time seems to result from having both in the model.
Response: Good point – we agree. Both travel time and distance to county hospital were correlation indeed, so we rerun the multilevel binomial logistic regression by introducing travel time only (Line248-250).
Line175-177: Because traffic conditions are different in different towns (e.g. national roads, provincial roads or county roads), both the distance and travel time were captured.
8. L284/5 what reference source do you have for "9.7 days, the standard LOS in township hospitals"
Response: It referred from the 2017 China Statistics Yearbook of Health and Family Planning, produced by National Health Commission of People's Republic of China, 2018. We have added the reference for it (Line293,401-402).
9. The discussion under Amendments of TC readmission is difficult to follow and needs improving. Firstly, would a better title be "Reducing TC readmission"?
Response: Yes – this is an excellent concern, we have changed it.
Line313: Identifying forms of TC readmission
10. L305, "According to the results" – which results? Those in Table 3? It appears that the regression results have been ignored in this part of the discussion, although the regression can take multiple factors into account at the same time.
Response: We have deleted "According to the results". As for the regression results, we made a deep discussion on it in "Determinants of the choice for hospital readmission" (Line 284-312).
11. L311 Can you further elaborate why "Longer first LOS and longer interval are more likely to conversely cause an inappropriate level of care of readmission"? Would "indicate" rather than "cause" be more appropriate? The regression model suggests that longer first LOS and longer interval indicates a low probability of TC admission and thus a higher probability of TT admission. Can you explain why this is inappropriate?
Response: Yes, we agree it's helpful to change "cause" to "indicate". The further elaborate was added in the discussion.
Line321-324: A long first LOS and long interval were more likely to indicate a TC caused by individual choice, means an inappropriate TC readmission. Longer first LOS means a complete treatment in township hospital, and longer interval indicates readmission maybe been caused by poor compliance on medicine and after-cure from patients themselves or a normal disease recurrence.
Line87-93: Some readmissions are influenced by quality concerns with township hospitals, poor patient compliance on medicine and after-care or from a normal disease recurrence. However, patients often do not acknowledge the real readmission reason and transfer responsibility for readmission to the township hospital doctor (e.g. considering readmission as a result of failed treatment) and consequently decide to be readmitted to a county hospital. This situation often represents inappropriate readmission.
12. L316/317 "we can develop different interventions based on the different types of TC readmission". Firstly, from what has been said before, it's not clear what the different types of TC readmission are. Secondly, what might different interventions look like?
Response: Here we made a deep discussion on the identification of the TC readmission forms. Meanwhile, we deleted "we can develop different interventions based on the different types of TC readmission", because we think it is not the directly result in this research.
13. L322 – 331 the suggestions for decreasing TC readmissions are not based on the results of this study – these should form the major part.

Response: We very much agree with your understanding, and we deleted this part here. And make a depth discussion on the Identifying forms of TC readmission (Line 313-329).
14. A discussion of the generalisability of this study is missing.
Response: Yes, it's a good suggestion. We've added it in the last of the discussion. Line87-93:The sample county is a typical rural area, and this research is a population based study, so the results could present the TC phenomenon in all rural China, and data process technical can also be used to different counties.
15. Minor points: Suggest "the longer the distance travelled"; Line 93 What is meant by "disease varied"? This needs rewording throughout the paper……
Response: Much appreciate for your specific minor points, and we've adjusted all of these as you recommended.
Dr. Zhiyuan Hou
Our responses to your comments are below:
1. Although this topic is very important, the authors does not clearly state the significance of this study, and the conclusion cannot be supported fully by the analysis.
Response: Thank you for this comment. And we improved much in the background section, further clearly state the significance of this study. And we have deleted the discussion about the amendments of TC readmission, they are really not directly studied in this research (Line 126-129).
2. Abstract: conclusion "Patients whose first admission was in a township hospital were more likely to be readmitted to a county hospital year by year" cannot be got from results. It is steady around 1.8% in recent years.
Response: It's a good question, and in fact, the year of admission is really a positive determining factor in readmission to a county hospital. The prevalence of TC is steady around 1.8% in recent years but meanwhile shows an obvious increase trends.
Line202-204: The TC group increased from 1.66% in 2008 to 1.89% in 2013, with the annual growth rate of the TC group being 28.55%, which was higher than that of the TT group (22.38%).
3. I don't think that township-county readmission is the unique form of hospitalisation in rural China, but it should happen in other countries either.
Response: Yes, thank you for pointing this out, and we have adjusted "unique" to "feature" (Line 50).
4. Why TC readmission happen? Is it because of the fragmented healthcare delivery system or poor quality of township hospitals?
Response: Our conception is TC caused by the three-tier healthcare delivery system, no matter the system is fragmented or not. But under the fragmented healthcare delivery system, no GPs or consultants are available for patient choice, county doctors do not deliver continued care for readmitting patients, TC readmission would easily result in inappropriate level admission for subsequent hospitalization (Line 73-93).
5. The author statements are inconsistent and confusing. For example, according to the ideas of authors (third and fourth paragraphs), patients with TC readmission should be admitted at county hospitals because of the severity of diseases which township hospitals cannot deal with, and therefore, TC readmission will not result in patient admission to a higher-level hospital than necessary leads to significant waste. The authors should clearly and rightly state their theory and perspectives.
Response: Yes, we recognized it, we restate the relationship between TC readmission and inappropriate level admission. TC readmission caused by individual choices belongs to inappropriate level admission, and TC readmission as suggested by doctors can easily result in inappropriate level admission for subsequent hospitalization. And Identifying the forms and determinants of TC readmission are our objective (Line 177-129).
6. According to the ideas of authors, guiding patients to choose the correct hospital for "first admission instead of readmission" has rationally been a necessary consideration.
Response: No, the first point of contact at primary medical institutions is the most efficient supply model, as proven by medical practices around the world, such as GP in Europe, clinic before hospital in USA. Guiding patients to choose the correct hospital for first admission is impossible to achieve.
7. Study setting should introduce the site of study (qianjiang), rather than the sample.

Response: Thank-you for this, we have adjusted it as you recommended. (Line 131-173).
8. Statistical analysis are not clearly stated, such as, which levels of multi-level analysis, and the model only show one level instead of multi-level.
Response: Yes, we agree it's helpful. We advanced the regression model details in the statistical analysis section. And table 4 is a two level regression result, the random part reflected the variance of town level. (Line 179-190, 248).
9. What does it mean P value in table 1
Response: it's our negligence, thank you for pointing this out. We have added note under the table.
Line208: *** Pearson's chi-square test.
10. Distance and time are the different measures for the same indicator, and so they cannot be included in the multilevel analysis at the same time.
Response: Good point – we agree. Both travel time and distance to county hospital were correlation indeed, so we rerun the multilevel binomial logistic regression by introducing travel time only (Line248-250).
Line175-177: Because traffic conditions are different in different towns (e.g. national roads, provincial roads or county roads), both the distance and travel time were captured.
11. How to measure the admitted years, it should be a category variable.
Response: It's a good suggestion.TC shows a stable increase in recent years, so admitted year was included in the analysis by order of ranked data (Line249).
12. How to get conclusion "one third of the readmission cases had first inpatient admission was in a township hospital" in page 14.
Response: That's not what we meant, here we want to express that the TC readmission accounts for one third of the readmissions whose first inpatient is in township hospital. We have adjusted my expression.
Line256-257: TC Readmission accounts for one-third of readmission cases had a first inpatient admission in a township hospital, which is common in rural China.
13. The conclusion section included too much parts of results.
Response: Yes, This is our carelessness, we have corrected it. And we have deleted the discussion about the amendments of TC readmission, they are really not directly studied in this research.

Dear editors:
Our responses to editor's comments are below:
1. Please rename the 'Article summary' section of your manuscript to 'Strengths and limitations'. The bullet points included in this section should relate specifically to the methods of the study.
Response: Yes, This is our carelessness, we have corrected it, and we have adjusted bullet points as you recommended (Line 49-58).
2. Please include a statement relating to the ethical approval obtained for your study.
Response: OK, as you recommended, we added the ethical approval section, and provided the Chinese Clinical Trial Registry (ChiCTR-OOR-14005563) (Line 191-195).
3. Please update the STROBE checklist indicating the page/line numbers of your manuscript where the relevant information can be found
Response: OK, we have adjusted the STROBE checklist.
4. Please ensure that you improve the quality of language in your manuscript, either with the assistance of an English-speaking colleague or with a professional copyediting agency.
Response: Thank you for this, as you recommended, we have got a professional editing service from a professional editing company to improve the readability of the manuscript. We thank Audrey Holmes, MA, from Liwen Bianji, Edanz Group China (www.liwenbianji.cn/ac), for editing the English text of a draft of this manuscript.
5. Please provide another copy of your figures with better qualities and please ensure that Figures are of better quality or not pix-elated when zoom in. NOTE: They can be in TIFF or JPG format and make sure that they have a resolution of at least 300 dpi. Figures in PDF, DOCUMENT, EXCEL and

POWER POINT format are not acceptable.
Response: OK, we have remade the figure, it has a resolution of 800*800 dpi as your requirement.

**VERSION 2 – REVIEW**

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| **REVIEWER** | Wolfgang Hoffmann<br>Institute for Community Medicine, University Medicine Greifswald |
| **REVIEW RETURNED** | 23-Apr-2018 |

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| **GENERAL COMMENTS** | In their revision, the authors have carefully, and convincingly, addressed all concerns and criticism raised in my first Review. I have no further comments and congratulate to this impressive work. (small Point: typo in line 325: should read after-care instead of after-cure) |

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| **REVIEWER** | Zhiyuan Hou<br>Fudan University, China |
| **REVIEW RETURNED** | 24-Apr-2018 |

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| **GENERAL COMMENTS** | all my comments have been solved. |

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| **REVIEWER** | Dr Honora Smith<br>University of Southampton, UK |
| **REVIEW RETURNED** | 03-May-2018 |

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| **GENERAL COMMENTS** | **Bmjopen-2018-021516.R1**<br><br>This is an important and interesting study of readmission from township hospitals in rural China. It enables potentially inappropriate readmissions to county hospitals to be identified, a persistent problem in China's health service.<br><br>This manuscript is now much improved but there are some inaccurate or imprecise passages and English wording that needs improvement.<br><br>P2, L23 Abstract: "more patients" – the word "more" involves a comparison, but we do not know what comparison you are making. Is it more patients readmitted to county hospitals from township hospitals? Or more patients admitted to county hospitals in general? Over what time period? Is it in the whole of China?<br><br>P2, L37 full stop at end of sentence.<br><br>P3, L50. "to introduce" is rather weak – be more specific on what you have done that's novel, as there have been many studies on this subject that you have referenced.<br><br>P5, L86 Would it be more appropriate to say "may occur" rather than "occurs", since in L93 you state that "this situation **often** represents …".<br><br>P5, L102/4, "communication ….**is** limited" and "sharing **or** |

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| | **interaction** …"<br><br>P6, L117, "belongs to the appropriate level admission" – not clear English. Do you mean "may be an inappropriate level of admission"?<br><br>P7, L139 and 140, "abdominal operations" rather than "abdomen".<br><br>P7, L140 "of the same scale" – meaning unclear<br><br>P7, L148 "**township** hospitals"?<br><br>P8, L149 "identified as **having …"**<br><br>P8, L170 – make the new paragraph clear here.<br><br>P9, L173, is it "**from the township hospital** to the county hospital"?<br><br>P9, L181/2, reverse: "**data obtained**"<br><br>P10, L203. It would be more precise to say "**averaging around** 5%".<br><br>Table 2: not sure why there are lines of blanks<br><br>P15, L256, it's **1.66**% in the table now.<br><br>P15, L256/7, " **In the study period**, readmission **accounted** for **more than** one-third of readmission cases **that** had … "?<br><br>P15, L266, reorder "**was clustered at the town level**"<br><br>P16, L282, "prevalence under the same rate" – meaning unclear. Verb missing?<br><br>P16, L292, "can be" rather than "need to be"<br><br>P17, L296, "A shorter first LOS" – delete "the"<br><br>P17, L 297, "a shorter interval" – delete "the"<br><br>P17, L308, "usually" or "often"?<br><br>P17, L310, do you mean "more likely to choose **township** hospitals" after failed treatment outcomes? The logic is unclear.<br><br>P17, L311, do you mean "year" rather than "urgency"?<br><br>P18, L322 "meaning" rather than "means"<br><br>P18, L324, "may have" rather than "maybe"<br><br>P18, L332, "data process technical can also be used to different counties" – incorrect English and doesn't seem worth saying.<br><br>P18, L335. The statement "Patients were more likely to choose a county hospital for readmission in each study year" is incorrect – in each year there were more TT than TC readmissions, according to Table 1. |

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| | P19, L358, “Youth” – capital “Y”? |

**VERSION 2 – AUTHOR RESPONSE**

Dear professors Wolfgang,
Our responses to your comments are below:
1. Small Point: typo in line 325: should read after-care instead of after-cure
Response: Thanks for this, we agree it’s helpful to change “cure” to “care” (Line 325)

Dr. Honora Smith
Our responses to your comments are below:
1. P2, L23 Abstract: “more patients” – the word “more” involves a comparison, but we do not know what comparison you are making. Is it more patients readmitted to county hospitals from township hospitals? Or more patients admitted to county hospitals in general? Over what time period? Is it in the whole of China?
Response: Thanks for your excellent concern. The “more” here means more patients admitted to county hospitals in rural China. We provided the specific proof in the background section. (Line 115-116)
Line115-116: The annual growth rate of inpatients in county hospitals from 2010 to 2016 was 6.75%, whereas that of township hospital inpatients was 0.63% in rural China.
2. P3, L50. “to introduce” is rather weak – be more specific on what you have done that’s novel, as there have been many studies on this subject that you have referenced.
Response: We very much agree with your concern, we changed “introduce” to “focus on”. (P3, Line50)
3. P6, L117, “belongs to the appropriate level admission” – not clear English. Do you mean“may be an inappropriate level of admission”?;
Response: Yes, it’s that means. We have adjusted the statement. (P6, Line117)
4. P9, L173, is it “from the township hospitalto the county hospital”?
Response: No, it means travel time from home to the county hospital, we amended the statement. (P9, Line173)
5. Table 2: not sure why there are lines of blanks
Response: Yes it’s a question. Since there are a total of 30 townships in the Qianjiang District, it will be a very large table if all results were put up, so we figure a few results that need to be discussed in the table.
6. P18, L332, “data process technical can also be usedto different counties” – incorrect English and doesn’t seem worth saying.
Response: Good point – we agree and have deleted it. (P18, Line332)
7. P18, L335. The statement “Patients were more likely to choose a county hospital for readmission in each study year” is incorrect – in each year there were more TT than TC readmissions, according to Table 1.
Response: It’s our mistake, thanks for pointing this out. We have adjusted the statement, use “over time”. (P18, Line335)
8. English wording that needs improvement: 1)P2, L37 full stop at end of sentence; 2)P5, L86 Would it be more appropriate to say “may occur” rather than “occurs”; 3)P5, L102/4, “communication ….is limited” and “sharing or interaction…” ; 4) P7, L139 and 140, “abdominal operations” rather than “abdomen”; 5) P7, L140 “of the same scale” – meaning unclear; 6) P7, L148 “townshiphospitals”? 7) P8, L149 “identified as having …” 8) P8, L170 – make the new paragraph clear here; 9) P9, L181/2, reverse: “data obtained”; 10) P10, L203. It would be more precise to say “averaging around5%”; 11) P15, L256, it’s 1.66% in the table now; 12) P15, L256/7, “In the study period, readmission accounted for more than one-third of readmission cases that had … ”? 13) P15, L266, reorder “was clustered at

the town level”; 14) P16, L282, “prevalence under the same rate” – meaning unclear. Verb missing? 15) P16, L292, “can be” rather than “need to be” 16) P17, L296, “A shorter first LOS” – delete “the” 17) P17, L 297, “a shorter interval” – delete “the”; 18) P17, L308, “usually” or “often”? 19) P17, L310, do you mean “more likely to choose townshiphospitals” after failed treatment outcomes? The logic is unclear. 20) P17, L311, do you mean “year” rather than “urgency”? 21) P18, L322 “meaning” rather than “means” 22) P18, L324, “may have” rather than “maybe” 23)P19, L358, “Youth” – capital “Y”? Response: Very very thank you for such detailed advice, we’ve adjusted all of these as your recommend.