Author’s response to reviews

Title: Risk Factors of Health Care-Associated Infection in Elderly Patients: A Retrospective Cohort Study Performed at a Tertiary Hospital in China

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Responds to reviewer's comments

All the revisions in the revised manuscript have been highlighted.

M Haque (Reviewer 1) :

Good Work

Please add reference no (Memo No.) of the ethical approval.

Answer: In the declarations section I have shown that the study design was approved by the ethics review board of Xuanwu Hospital, Capital Medical University and the Memo No. is No.LYS[2018]076. (Declarations section, line207-211, page 10)

Enric Limon, PH.D (Reviewer 2) :

Our congratulations to the authors for having done a research with a significant sample of patients in a hospital of high complexity. Having data on HAIs in a population of patients over
65 years old in a country like the Republic of China where the aging rates are among the highest in the world is of great value. This work provides relevant information to know the risk factors for HAIs and how to prevent them in this age group. On the other hand, in your text, you have cited the results of some unpublished work that you have achieved, which is not recommended. There is a very important factor which is the inclusion of body weight as a factor to consider that deserves to deepen with such an important sample.

Answer:

I have deleted the unpublished data in the revised manuscript. (Discussion section, line 131-133, page 6)

Abstract:

* The method section (Design, setting, and participants) of the abstract is somehow more specific than the main text.

Answer: I have added the content of the method section in the main text and explained the specific method in detail. The revisions in revised manuscript have been highlighted. (Method section, line 92-106, page 5)

* What do you mean by "body weight and operation decreased OR…"? If they are protective factors, it must be specifically indicated

Answer: Yes, I mean the body weight and operation were the potential protective factors in this study by the results that body weight and operation decreased OR. I have specifically indicated in the discussion and conclusion section in the revised manuscript. (Abstract section, line 44-45, page 2 ; Discussion section, line 163-185, page 8)

* The conclusion must be based on the findings. In the summary, body weight is not inserted as a relevant conclusion, but it deserves a paragraph in the conclusion section (164).

Answer: I have specifically indicated and analyzed the body weight is one of the protective factors in the Abstract, Conclusion and Discussion section in the revised manuscript. (Abstract, and Discussion section, line 12, page 5) (Abstract section, line 44-45, page 2 ; Conclusion section, line 192-197, page 9; Discussion section, line 163-185, page 8)
Background/literature

* The gap in knowledge is not stated clearly. More studies on this issue need to be reviewed. Multiple variables have been introduced into the study but the system for choosing these variables based on relevant studies is not clear. The most relevant works should be cited based on the different categories of extrinsic risk factors of the patient, invasive procedures, medication and stays in risk units, intrinsic comorbidities, immunological factors and body weight.

Answer: I have reviewed more relevant study reports and analyzed the gap in knowledge about the risk factors of HAI in elderly. And I have analyzed the different categories of extrinsic risk factors and the conditions of the patient's own condition on the basis of some references and clinical experience of senior doctors in background section in the revised manuscript. (Background section, line 61-68, page 3, line 73-75, page 4)

Methods

* The method is not clearly explained. So that you mentioned only some parts of the data gathering in the sentence: "the data were collected using an automatic online HAI surveillance system."

Answer: We collected the data based on an automatic online HAI surveillance system named real-time nosocomial infection surveillance system (RT-NISS, 12.8.2.1). The hospital has the most advanced computer information system including integrated hospital information system (IHIS), laboratory information system (LIS), imageology achieving system (RIS), and an anesthesia operation system (AOS) to record clinical information of the inpatients. And the RT-NISS automatically download data from the hospital information systems (e.g. IHIS, LIS, RIS, AOS) and screen the potential HAIs according to the Chinese NI diagnosis criterion published by the Ministry of Public Health in 2001 automatically. The screening algorithm used in RT-NISS included microbiological reports, antibiotic usage, serological and molecular testing, imaging reports, and fever history. I have explained the specific method and operating mechanism of the automatic online HAI surveillance system about the data gathering in detail in the method section in the main text in the revised manuscript. (Method section, line 92-107, page 5)

* It is not clear that how each data is treated. What is the aim of gathering each data? It is not clear that each data is collected from which participants and how many of them.

Answer: We collected 5 categories including 22 kinds of information of each participant including demographic characteristics, hospitalization days, diagnoses, operations, and specific device days using RT-NISS to take them to be included variables to screen the risk factors of
HAI. All collected data was checked by the infection control team and removed invalid data. I have showed the aim, source and number of the data which collected from participants and explained the method of treating the data. (Method section, line 92-107, page 5)

* No representative of the infection control team that has collected the infections’ data is included in the authors.

Answer: In fact, all the authors were included in the infection control team that has collected the infections’ data which I have shown in the Authors' contributions and Acknowledgements section in the revised manuscript. (Authors’ contributions and Acknowledgements section, line 228-232, page 11)

* What is the instrument for gathering data about diagnostic of infection? What about their validity and reliability? What is the difference between nosocomial infection, community infection and Health care-associated infection (HCAI)?

Answer:

We collected the data based on an automatic online HAI surveillance system named real-time nosocomial infection surveillance system (RT-NISS, VERSION:12.8.2.1) which automatically download data from the hospital information systems (e.g. IHIS, LIS, RIS, AOS) that record clinical information of the inpatients. And the data was checked by the infection control team and removed invalid data. And the RT-NISS preliminarily screen the potential HAIs according to the Chinese NI diagnosis criterion published by the Ministry of Public Health in 2001 automatically. The screening algorithm used in RT-NISS included microbiological reports, antibiotic usage, serological and molecular testing, imaging reports, and fever history. Then All the potential HAIs were identified by infection control practitioners and doctors according to the definitions published by Ministry of Health, the People’s Republic of China in 2001. So the data we collected was validity and reliability. I have explained the specific method and operating mechanism of the automatic online HAI surveillance system about the data gathering in detail in the method section in the revised manuscript. (Method section, line 92-107, page 5)

About the difference between nosocomial infection, community infection and Health care-associated infection (HCAI):

Community infection refers to the infection acquired outside of the health care facility that not related to health care.

Nosocomial infection is explained as any infection which a patient contracts in a health-care institution in MESH dictionary.
The meaning of health care-associated infection is similar to nosocomial infection that refers to the infection which occur in patients under medical care in hospital or other health care facility and the abbreviation is HCAI or HAI. HAI has been widely used in recent publications.

In China, the HAI was defined as infections occurred 48 hours after admission in inpatients according to the Chinese NI diagnosis criterion published by the Ministry of Public Health in 2001 as I mentioned in the manuscript.

* The definition of infection is based on the definitions of the Chinese Ministry of Health but the reference provided is that of the CDC, which means that there is an adaptation of the definitions in an unpublished document.


Results

* Table 1 includes results related to the person's own data and data on hospital stay. While the rest of the variables studied are included in table 2. It must be explained why the sums expressed in table 2 do not correspond to the 60,332 (age sum 61912. You are using some elements of exclusion that are not present in the methodology.

Answer: In table 2, the number of column “No. of HAIs” is included in the number of column “No. of subjects”, so the sums of “No. of subjects” of any variable is correspond to the 60,332 but the sums of “No. of subjects” + “No. of HAIs” are more than 60,332. For example, age sum of “No. of subjects” is 60332 but age sum of “No. of subjects” + “No. of HAIs” is 61912. (Tables 2, line 317, page 15)

* When using a single table 2 to present all the results without differentiating the presentation criteria. Have they only been presented based on the significance of p?

Answer: Considering that statistical methods and results are presented in the same form I take all the results of statistical analysis of category variables into table2 and show the χ2 and P value in the table. We can differentiate whether the difference is statistically significant based on the p value. Statistical testing was performed at the conventional 2-tailed α=0.05. (Tables 2, line 317, page 15)
Discussion
* The discussion must be focused on the current findings, and the comparison with the findings of previous studies should be made. Much of the text under discussion in this manuscript are about the problem statement and are more suitable for the introduction.

Answer: I have added some references of previous studies and compare the findings with other similar study and previous reports in the discussion in the revised manuscript. (Discussion section, line 141-147, 153-158, page 7)

* The limitations must be revised.

Answer: There were some limitations in the present study including the lack of analysis of special risk factors of special infections such as pneumonia, urinary infection, bloodstream infection and SSI in elderly. There are probably some special risk factors in a special infection attribute to the characteristics of different infection sites. We will think highly of this limitations and make an effort to reveal in our following study. I have added the limitations in the revised manuscript. (Discussion section, line 186-190, page 9)

Conclusion
* The conclusion must be based on the findings. The authors should differentiate between extrinsic and intrinsic risk factors and be prudent with protective factors without specific research on the subject based on a retrospective study.

Answer: I have revised the conclusion and shown the factors in differentiation between extrinsic and intrinsic. In this study the body weight and operation are the potential protective factors by the results that body weight and operation decreased OR. (Conclusion section, line 192-197, page 9)