Author’s response to reviews

Title: Disaster resilience in tertiary hospitals: A cross-sectional survey in Shandong Province, China

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Author’s response to reviews: see over
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Dr Nicole Huang
Associate Editor
BMC Health Services Research

RE:
Manuscript ID: 5957558541110736
Title: Disaster resilience in tertiary hospitals: A cross-sectional survey in Shandong Province, China

Dear Editor,

Thank you for your email dated on 23rd December 2013 and the enclosed valuable comments from the reviewers. We have taken this opportunity to improve the article. The final version of the document with text highlight colour has been attached, and below we have responded specifically to the comments made.

Sincerely,

Shuang Zhong, Xiang-Yu Hou, Michele Clark, Yu-Li Zang, Lu Wang, Ling-Zhong Xu and Gerard FitzGerald
Response to Reviewer #1: Prof Guangwen Cao

**Comment 1:** This study was designed to explore the status of resilience among tertiary hospitals in Shandong Province of China. In this study, authors investigated the current status of hospital disaster resilience in Shandong Province using a questionnaire composed by 8 key domains. It is a well designed descriptive study. The result of this study will be helpful for improving the disaster rescue system of tertiary hospitals.

**Response:**

We are grateful that the reviewer considered our study well designed and the results of this study will be useful.

**Comment 2:** There are several aspects need to be improved:
1. Selection bias: There are 96 tertiary hospitals including 82 Grade A, and 11 Grade B hospitals, 50 were randomly selected. Of the 50 selected hospitals, 41 (82%) responded to this survey. The hospitals responded to this survey might have a relative good backgrounds of disaster rescue.

**Response:**

We apologise for our lack of clarity. We have added further explanation to the relevant sampling details in the method section. In this study, to reduce the selection bias, we selected 50 hospitals using a stratified random sampling method from tertiary A, tertiary B and tertiary C hospitals (Lines 92-98, Page 6).

However, the likelihood of non-response bias was likely to exist. As relatively larger percentage of tertiary A hospitals replied to the survey than the tertiary B and tertiary C hospitals. Although two reminders were sent to the hospital coordinators, there were still 9 hospitals who failed to attend the survey. The follow-up telephones demonstrated that they could not assign the responsible staff to fill the survey, or they are lack of relevant data. Thus it is very possible that the 41 participating hospitals may have relatively good backgrounds of disaster rescue than other 9 nonparticipation hospitals. Also, we suspect that the participating hospitals are better prepared in terms of disaster management than the non-participating hospitals.

We have added some discussion on this issue (Lines 451-459, Pages 20-21).
Comment 3: The author mentioned that different levels or types of hospitals varied in the investigated 8 domains. As different levels or types of hospitals may exert divergent functions in the disaster rescue, it might be improper to mix all the hospitals together.

Response:

We agree with the reviewer that different levels or types of hospitals may have divergent functions in disaster rescue. We have now stratified our analyses by different levels of hospitals. It is showed that there is difference in the percentages of essential indicators between different hospital categorizations (i.e., tertiary A and tertiary B hospitals), and highlighted the different percentages within tertiary A and tertiary B hospitals in each factor of the result section (Lines 139-140, 191-193, 200-202, 207, 228-237, 251-258, 269-272, 296-305, 320-323). We also added a paragraph into the discussion section (Lines 342-350, Page 16).
Response to reviewer #2: Prof James Paturas

Comment 1: The article was well written and the only comment relates to the survey that was included. While the information contained in the survey (assessment) was accurate, it seemed to lack the depth of other issues or activities that could be considered when assessing a hospital's ability to ensure organizational or enterprise resiliency

Response:

Thank you for the insightful comments. In order to offer a method to assess hospitals’ resilient ability and to identify their vulnerability areas to improve future resiliency, we have added a four-factor structure as a way of modelling the overall level of hospital resilience. A modelling process through factor analysis was used to calculate the overall level of hospital disaster resilience.

We have added the following details in the manuscript:

After analysis, a four factor solution was identified that can be used to represent all the domains. The four factors were identified by regression analysis though a new Table 2. The four factors are: hospital disaster medical care capability (F₁), disaster management mechanism (F₂), disaster resources (F₃) and hospital safety (F₄). Then the evaluation model of hospital resilience can be established, and the overall level of hospital disaster resilience (F) can be calculated using the model:

\[ F = 0.615F_1 + 0.202F_2 + 0.103F_3 + 0.080F_4 \]

We also added Table 3 to list the score of disaster resilience (F) for each sample with their relative ranks. Similarly, the score of each four factors (F₁, F₂, F₃, and F₄) can be calculated and ranked respectively according to Table 2, and thus to identify the score of hospital disaster management mechanism (F₂) was relatively lower than the other three factors and should probably be the highest priority for strengthening resilience in the province (result section: 147-180, pages 8-9). Thus the questionnaire can be used to provide a helpful and comprehensive instrument for assisting hospitals to assess their level of resilience at a regional level in regard to disasters, and assist them in identifying areas for further strengthening their resilience capability through comparison with similar components of other hospitals (discussion section: 352-357, pages 16-17).