Author's response to reviews

Title: High short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan

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Research article

“The high short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan”

Li-Wei Hung, Wo-Jan Tseng, Guey-Shiun Huang and Jinn Lin

Dear Editor-in-Chief:

Thank you very much for the review of our paper (MS: 1102962637115049) entitled “High short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan.”

The Acknowledgements section has been added as suggested. (Page 22, Line 1-4).

The reviewers’ concerns have been addressed point by point and each revision is explained in detail. The manuscript has been prepared as suggested with the revised parts of the text highlighted by underlines. I appreciate your valuable comments very much and hope to hear from you soon.

Yours sincerely,

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Authors’ Response to Reviews

Title: High short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan

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Version: 1 Date: 7 April 2014

Authors’ response to reviews: see over
Reviewer's report

Title: High short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan

Version: 2

Date: 4 February 2014

Reviewer: Takashi MATSUSHITA

Reviewer's report:

This is a very interesting study to clarify the short and long term mortality after hip fracture. The manuscript is well written and I enjoyed reading it. My only concern is the selection bias of the control group.

#1 Selection of control group is a key of this study. The author elected the age and sex matched patients from the geriatric department. Although this reviewer understands that the data of this control group is very reliable because they stayed in hospital, but I wants to know the reasons why the author selected this control as representative of general populations. Is there any evidence that this control group has the same mortality rate with general peoples? In addition, I think it is unreasonable that age difference of less than 6 years regard to be the same age group.

Thank you for your helpful comments. Similar to hip fracture patients, the controls had worse health condition than general population. We talk about this issue in the Discussion section (Page 13, Line 25- Page 14, Line 9). Most of the reported excess mortality studies have compared hip fracture patients with a healthy general population. However, hip fracture patients were supposed to have worse health conditions than general population. The problem with comparing these two groups is that the significance of the hip fracture might be confounded by comorbidities. In our study, hip fracture patients were compared with hospitalized non-fracture patients.
recruited from the geriatric department. The percentage of the patients with comorbidities was similar between these two groups (54.4% vs. 46.5%, \( p = 0.124 \)). By ensuring that the study subjects were relatively homogeneous, we maximized the chance of detecting important etiological factors through multivariate analysis. We have added the sentence “However, the hip fracture patients have worse health conditions than general population.” to clarify that point (Page 14, Line 2-3).

In a total of 215 hip fracture patients, 202 of them were matched to non-fracture controls by age in the range of 4 years. Thirteen were matched in 6 years because they were too old to find controls within 4 years during the study period. Although the age difference between the fracture and non-fracture groups might be up to 6 years in very old patients, this wouldn’t affect the study results significantly. We have changed the wording "< 6 years age difference" to "mostly within 4 years, but up to 6 years in 13 patients older than 90 years for whom it was difficult to find controls" in the Methods section (Page 7, Line 5-6). We also added "Sixth, although the age difference between the fracture and non-fracture groups might be up to 6 years in very old patients, this would not affect the study results significantly" to the paragraph on study limitations (Page 16, Line 4-6).

#2 In Discussion.

The authors stated “In the present study, the short-term and long-term mortality rates in the hip fracture population were 12.4% and 25.3 %, respectively. Both rates were somewhat lower than those previously reported….” This lower mortality rate is not surprisingly, because same lower mortality rate was reported from Japan. For example, Fukui N, Watanabe Y, Nakano T, et al. Predictors for ambulatory ability and the change in ADL after hip fracture in patients with different levels of mobility before injury: A 1-year prospective cohort study. J Orthop Trauma, 26(3), 2012: 163-171.
Thank you for kindly reminding us of the literature also reporting low mortality rate after hip fracture in Japan. The report from Japan attributed the low mortality rate after hip fracture to good post-operative care and long hospital stay. To incorporate this information, we have modified our text: "The difference might be explained by better care in a medical center like our hospital, in which the patients received high quality care given by experts from a wide range of medical specialties. It should be noted that the short-term mortality rate has also been reported to be as low as 9.2%, which may be attributable to long hospital stay." (Page 12, Line 11-15).

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.
Reviewer's report

Title: High short-term and long-term excess mortality in geriatric patients after hip fracture: a prospective cohort study in Taiwan

Version: 2

Date: 6 March 2014

Reviewer: Kristin Taraldsen

Reviewer's report:

Minor Essential revisions

The authors provide an important paper highlighting the excess mortality in older persons after hip fracture. There are some changes that I would suggest and some questions that I have after reviewing the paper:

1. The authors need to describe the sample in more details in addition to the information already included in the text and the number and percentage presented in the cutoff groups in Table 2. This is important to be able to know the pre-fracture as well as the baseline characteristics of the sample.

   Thank you for this suggestion. We investigated 55 variables in our study. Most of them were not significantly different between the two groups. Originally, we showed only age, sex, and the variables with significant differences between the two groups. Now to describe the patients in greater detail, we have added more variables in Table 2, including comorbidity and smoking, that significantly affect the excess mortality (Page 30, Table 2).

2. Is the group recruited a representative sample of the hip fracture patients admitted to your hospital? The authors should state if they did track all older persons with hip fracture admitted during the inclusion period, for example if the 376 hip fracture patients screened is identical to the numbers that underwent surgery during the
inclusion period. If so, this is a strength that should be described. It would also be useful to include this in the discussion, especially because addressing geriatric patients in the title and because of a lower mortality rate than previously reported.

Between April 1, 2004, and January 31, 2006, we recruited 376 consecutive patients with hip fractures in our hospital. These 376 hip fracture patients were identical to the number of hip fracture patients who underwent surgery during the inclusion period. Among them, 262 patients were eligible for inclusion, but only 217 agreed to join the study. These 217 patients were representative of all hip fracture patients in our hospital because the baseline conditions of the 45 patients who refused to join the study were not significantly different from that of the study participants.

We have modified the Study Participants section to read: "Included in the group with hip fractures were patients aged 60 years or older who had a hip fracture. Excluded from the study were patients with pathologic fracture, with previous hip fracture, with previous surgery on the fractured hip, whose fracture was not related to low energy trauma, or who were institutionalized. Low-energy trauma is defined as injury resulting from a transfer of energy that is equal to or less than that of a fall from a standing position" (Page 6, Line 8-13). We also added the following sentences to the Discussion section: “Finally, the study subjects in this study were representative of all the hip fracture patients admitted in our hospital. The patients’ refusal to join the study was based on their personal choice, and their baseline conditions were not significantly different from that of the study subjects” (Page 15, Line 10-13).

3. Include references if standardized tests or questionnaires are used (f.ex description in the methods and/or in Table 1).

The references for special tests including MMSE, ADL, IADL, coordination and mobility function have been listed as indicated. (Page 29, Table 1).
4. It would be helpful to include the research design in first section of the methods where the study participants are described, and perhaps include the length of follow-up period.

   Thank you for your suggestion to provide context and include the length of follow up. We have added the following sentence about our study design: "This prospective observational study included patients with and without hip fractures treated at the National Taiwan University Hospital" (Page 6, Line 7-8). We also added the following sentence: "The mean follow-up period was 46.1 months (range: 35 to 57 months)" (Page 7, Line 15).

5. Describe the Kaplan-Meier as “survival curves” instead of “accumulated mortality rates” and include the length of follow up period in the method. It would be helpful to state how long those who survived where followed, and include this in the Methods for the Mortality data.

   As suggested, our text has been changed to "We used the Kaplan-Meier survival curve to analyze the mortality rates of the fracture and non-fracture patients" (Page 8, Line 8-9).

   The survival times are further specified: "The mean survival times were 21 months (range: 3 days to 52 months) for mortality patients and 45.9 months (range: 35 to 57 months) for the survival patients" (Page 7, Line 15-Line 17).

6. The authors do discuss the lower mortality rate in this study in terms of explained by “better care” in their hospital. Did both groups get the same treatment in the acute phase, f.ex by geriatricians/at the same ward?

   Yes, both groups of patients received the same high quality care in our hospital. We have added the sentence: "The difference might be explained by better care in a medical center like our hospital, in which the patients received high quality care given
by experts from a wide range of medical specialities." (Page 12, Line 11-13)

7. The limited number of deaths is included in the discussion and it would be helpful to also include a discussion of the sample/sample size.

   We have revised the text in the section of limitations to address the sample size:
   "According to a power study for the proportional hazards model, the events per variable should not be less than 10 [35]. In our study, the number of short-term deaths in the first year was 35, and only three risk factors were identified. For long-term death, the number of deaths was 58, and six factors were identified" (Page 15, Line 19-22).

8. I suggest that the wording “cause of” is changed in the second aim of the study.

   As suggested, “cause of” has been changed to "explore the risk factors of excess mortality" (Page 5, Line 19).

9. Distinguish between pre-fracture and baseline assessments.

   Since the non-fracture patients did not have "pre-fracture" condition, we have changed the term “pre-fracture" to "baseline" for clarity (Page 2, line 11; Page 15, Line 13; Page 17, Line 3).

10. Correct the numbers describing the follow-up time in the abstract.

    To describe follow-up time, we now say: "The mean follow-up time was 46.1 months (range: 35 to 57 months)" (Page 2, Line 10-11). This follow-up time is explained in the Materials section (Page 7, Line 15).

11. Include the min-max or standard deviation of days after the fracture when interview took place. I also have a question about how you decided that their conditions were stabilized? (all were able to perform the MMSE early after surgery?)

   We interviewed the patients in an average of 6.2 days, with a range from 1 to 27 days. We defined the time at which a patient’s condition was stable as being when the
patient was began to be mobilized. We have clarified this point by adding the sentence "All patients in the study group were interviewed for demographic and clinical data when their condition was stable, usually within 6 days on average (range: 1 to 27 days) after the fracture. Stable condition means that the patient has begun to be mobilized and can respond to questions." (Page 6, Line 23-Page 7, Line 1)

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests: I declare that I have no competing interests