Author's response to reviews

Title: Hip fracture in hospitalized medical patients

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Author's response to reviews: see over
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Author’s response to reviews: see over
**Referee 1:**
The authors adequately answered all of my inquiries

**Referee 2:**
Reviewer’s report

The authors have revised the manuscript according to the comments and suggestions from the reviewer and improved it substantially. However, some problems still remain unsolved. The reviewer gives some additional comments written in blue font for the convenience for the editor and the authors. The authors should put page numbers and line numbers in their text, and also, they should change the font color of the revised part of the text for the reviewer to recognize the revision easier.

**Major Compulsory Revisions**

**Methods**

1. P5 1st paragraph: The inclusion criteria should be clearly defined in terms of age at admission or discharge, diseases which ensure “acutely ill” status stated in the title, and so on.

   We analyze patients who develop as a complication of admittance hip fracture in Spanish internal medicine services. Methods: we include exclusion and inclusion criteria. The title has been corrected following your instructions.

   The reviewer did not find the inclusion criteria in the text. It should be placed just after the explanation of the database analyzed.

   **Author’s response:** The inclusion criteria placed just after the explanation of the database has been marked in the text

2. P5 2nd paragraph: The authors should state how to specify the time when each hip fracture occurred. Otherwise, they cannot decide the index hip fracture occurred during the admission or before the admission.

   The main outcome was a diagnosis of hip fracture during admission. Patients with a hip fracture at admission were excluded

   The authors stated in the text (P5, L7) that BMDS contains sociodemographic and clinical data for each documented hospital discharge including: gender and age, primary and secondary diagnoses, primary and secondary procedures; discharge status; length of stay; and hospital characteristics. There is no statement for diagnosis at admission or diseases having occurred during hospital stay being included in the database. Therefore, the reviewer asked how the authors specify the index hip fracture occurred during the admission. Most readers of the BMC including the reviewer do not know the construction of the BMDS and, therefore, the authors should explain clearly how they extracted the outcome variable from the database.
Author’s response: The BMDS assigns a main diagnosis related to cause of admission to hospital. Besides, it is possible to add up to 12 secondary diagnosis including complications occurring during hospitalization, recurring of previous diseases or new diagnosis arising from studies performed during admission. I.e.: if a patient is admitted for dyspnea and the diagnostic work up shows pulmonary thromboembolism and breast cancer with hepatic metastases, the main diagnosis will be pulmonary thromboembolism while among the secondary diagnosis we will place breast cancer and hepatic metastases among others.

In summary, the main diagnosis should always be related with the main symptom initiating admission following ICD-9-CM coding system. That is the reason why a patient with hip fracture will have a main diagnosis of hip fracture and a patient with a hip fracture occurring during admission will have hip fracture as a secondary diagnosis. We did not include the BMDS of patients with hip fractures occurring on previous admissions.

We have included in the text an explanation of this concept for those not familiarized with the BMDS.


Results

3. Emergency admission accounted for more than 90% of admissions analyzed in this paper which is very high. The data analyzed in this study may not be representative of the total admissions in internal medicine wards even though the authors stated that the database covered 90% of population. The authors should give distinct explanation for it.


We did not include this reference nor the data contained in it (the high percentage of emergency admissions for Internal Medicine patients in Spain vs the low percentage of elective admissions) so as not to confuse the readers with more information.

No explanation does not solve the problem. The authors should give the definition of emergency admission.

Author’s response: We have included the definition of emergency admission.

Page 4. Line 95.

Discussion

4. The authors used any hip fracture listed in secondary diagnosis field as hip fracture which occurred during the admission. Such hip fractures may have been contaminated with those which had already existed at the admission. The authors should discuss this, and add this problem in limitations if they fail to solve it.
We think it is already explained in methods. All patients with a prior fracture on admission were excluded from the study and therefore are not listed.

As the pointed out in the previous comment, the authors should make it clear how they distinguished a hip fracture having occurred before admission from a hip fracture occurred during the hospital stay from the restricted data from the administrative database. This is not clear in the present description of database and definition of outcome.

Author’s response: As explained above, if the hip fracture is the cause of admission it will appear as the main diagnosis. When the hip fracture occurs during admission, as a complication of hospitalization, it will appear as a secondary diagnosis. Hip fractures occurring on other admittances were not recorded.

5. It may not be clear whether risk factors analyzed in this paper preceded the occurrence of hip fracture or not. Temporal relationship of the association should be discussed. The authors should add this problem in limitations if necessary.

It is already listed in the text, first line of the limitations of the study: The limitations of our study are related to the use of an administrative database as the source of data and some risk factors of hip fracture can be not well documented. In other cases of hip fracture information may not have been entered in an effort to protect the reputation of physicians or the hospital center, or simply because the description of the complication is not very specific and cannot be properly interpreted. Nevertheless, given the clinical importance of hip fracture, it is unlikely that it will be omitted from the hospital discharge report. Another noteworthy limitation is that the administrative database used did not include the treatments received by patients during admission.

The authors did not mention the temporal relationship in the discussion.

Author’s response: The characteristics of the data base limit the clinical information to events happening only during admission. This is a limitation of the study as we ignore evolution time o diseases and risk factors and thus cannot establish a temporal relationship between hip fracture and this information.

Page 8. Line 252.

6. The authors should discuss how the results from the present study can be used to prevent patients from hip fracture or promote patient safety.

Included in discussion in an abbreviated manner.

The authors should point out where they stated it.

Author’s response: Even with the aforementioned limitations, the results of our study suggest that patients admitted to medical services with some of the risk factors identified should prompt the implementation of an individual programme of early detection of falls during admission. Fall prevention requires multidisciplinary strategies, which should first include adequate screening of patients to identify those at risk, a suitable protocol for the prevention of falls during admission, early intervention of delusional syndrome and proper drug prescriptions in these patients. Structural measures, such as adjusted bed height, antislip stockings,
appropriate lightning, pressure mats, and hip protectors, changes in room and bath furnishings, should also be implemented, and it is important to train nursing and medical personnel to recognize the risk factors for this complication.

Minor Essential Revisions

Methods

18. P5 1st paragraph: It should be defined how to calculate medical cost of each patient.

The cost in our country is defined by the Spanish Ministry of Health based on DRGs. Reference added.

The reviewer did not find where the authors cited the reference. The authors should describe the method of calculation of medical cost for a patient clearly since the cost is one of the outcome of the present study. It is not enough to cite a reference.

Author’s response: Hospitalization cost estimation in Spain has been developed by the Spanish Ministry of Health and it is basically based on DRG coding system. DRGs are a way of classifying patient hospitalisations by diagnosis and procedure on the assumption that similar costs (direct, indirect and structural), are expended on patients allocated similar resources.

Page 5. Line 135

23. P5 2nd paragraph: The exclusion criteria included stroke, delirium and metastatic cancer which are included in risk factors analyzed in this study. Items excluded from the analysis cannot be analyzed. The authors should solve this discrepancy.

As explained in methods, these diagnoses have been excluded as principal diagnosis, but remain as secondary diagnosis and are therefore used for analysis such as risk factor. Corrected in the text.

The reviewer can follow the description of risk factors, but the description of exclusion criteria in page 5 is still misleading and should be revised.

Author’s response: As explained above, the diagnosis with principal diagnosis of hip fracture or secondary diagnosis present on admission, cases with diseases and disorder of the musculoskeletal system and connective tissue (MCD 8), with principal diagnosis of seizure, syncope, stroke, coma, cardiac arrest, poisoning, trauma, delirium and other psychoses or anoxic brain injury, cases with diagnosis of metastatic cancer, lymphoid malignancy or bone malignancy or self-inflicted injury, discharges in MDC 8 (disease and disorders of the musculoskeletal system and connective tissue) and MCD 14 (pregnancy, childbirth an puerperium,) were excluded as not being the cause of admittance. However, they were included in the analysis when they appear as secondary diagnosis occurring during hospitalization.

Page 9 Line 268
Page 9 Line 275

26. P6 3rd paragraph: The authors should specify a selection method of independent variables used in the logistic regression analysis. It seems strange to the reviewer that
all the variables in Table 4 are highly significant (p<0.004 or less) even though the authors stated that variables with statistical significance (p<0.1) in the univariate analyses were introduced in the logistic regression analyses. 6

The significances has been revised and confirmed

The authors should specify the method of selection of independent variables in the logistic regression analysis since Charlson index, chronic cerebrovascular disease, chronic pulmonary disease are significant in Table 1 but are missing in Table 3. These three variables must have been eliminated from the logistic regression equation by a certain method of viable selection. The authors should specify the selection method.

Author’s response: A logistic regression analysis with backward stepwise procedure and p>0.10 as the criterion for exclusion was used to find the best model. Cerebrovascular disease, Charlson index and chronic pulmonary disease loss de significance in the multivariable analyses, and were drop of this.

Page 5 line 152

Results

32. Effects of in-hospital hip fracture on mortality, length of hospital stay and medical cost should be adjusted for age, co-morbidities and potential confounders by logistic or linear regression models.

The effects of in-hospital mortality, length of stay and cost have been adjusted for age, gender, comorbidities an potential confounders (anemia, dementia, delirium) and the results has been included in the text.

The reviewer did not follow the reply from the authors. The reviewer did not find where the authors stated the effects of in-hospital hip fracture on mortality, length of hospital stay and medical cost adjusted for age, co-morbidities and potential confounders.

Author’s response: In the text we have included the adjusted mortality (The mortality risk was more than double in patients with hip-fracture after adjustment for age, gender and comorbidities (OR 2.66 CI 95% 2.34-3.02). We now included the adjusted length of stay and cost (Eighty-five percent of patients with in-hospital hip fracture have a length of stay over median (OR 1.85 CI 95% 1.56-2.28) and cost was 13 times over median cost (OR 13.9 CI 95% 9.9-19.8) in patients with hip-fracture, even after adjustment for age, gender and comorbidities, if we compared with non hip-fracture patients).

Page 6. Line 190

Discussion

34. The authors did not analyze well-documented risk factors of hip fracture since the data were extracted from the administrative database. This should be added in limitations.
OK, added in limitations

The authors should specify the revised part. The reviewer did not identify a remarkable change.

**Author’s response** Falls during hospitalization are not recorded in the data base although it is a well known fact their direct association with fractures."

**Pag 8. Line 263.**

**OTHERS:**

The text has been revised by an English spoken doctor.

We have put page numbers and line numbers in the text, and we also have changed the font color of the revised part of the text.