## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

## ARTICLE DETAILS

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| **TITLE (PROVISIONAL)** | Feasibility of administrative data for studying complications after hip fracture surgery |
| **AUTHORS** | Sheehan , Katie; Sobolev, Boris; Guy, Pierre; Tang, Michael; Kuramoto, Lisa; Belmont, Philip; Blair, James; Sirett, Susan; Morin, Suzanne; Griesdale, Donale; Jaglal, Susan; Bohm, Eric; Sutherland, Jason; Beaupre, Lauren; Canadian Collaborative Study on Hip Fractures, The |

## VERSION 1 - REVIEW

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| **REVIEWER** | Martyn Parker<br>Peterborough City Hospital<br>UK |
| **REVIEW RETURNED** | 06-Dec-2016 |

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| **GENERAL COMMENTS** | This article does appear to have appropriate methodology and may be suitable for this journal.<br><br>I have a few small comments<br><br>1.The opening statement of there is limited information of the occurrence of complications after hip fracture surgery does not seem appropriate to me. There are thousands of papers on this topic. There are less papers using administrative database reports though such as this one.<br><br>2. The big limitation of studies such as this is the accuracy of the data collection and for example the definition of pneumonia (which can vary considerable from study to study or person to person). Research papers in which there is a more specific definition of pneumonia will report much lower rates of pneumonia. Sepsis again can be quite variable whilst thrombosis tends to be more accurate using investigative results only. Perhaps this requires more mention in the discussion. |

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| **REVIEWER** | Artur Fedorowski<br>Lund University, Sweden |
| **REVIEW RETURNED** | 24-Mar-2017 |

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| **GENERAL COMMENTS** | This is a retrospective study performed on a large database of Canadian discharge abstracts covering older patients surgically treated for hip fracture over a 9-year period. The authors aimed to explore the incidence of serious post-procedural in-hospital complications.<br>The methodology is sound and the study is well performed. The |

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| | hypothesis is clear although the authors emphasized the feasibility of the procedure, not the data per se, as the main aim of the study. I think that this is a valuable input telling the reader what to expect after hip fracture surgery in older patients. The numbers presented by the authors are convincing and in concordance with similar surveys. What is lacking in this retrospective observational study is a sort of predictive analysis (logistic regression?): which factors are predictive of in-hospital complications as this might have an important practical value for the reader. We are not sure whether the risk of post-procedural complications can be reduced to zero, of course, but it is important to know which characteristics herald the higher risk of pneumonia etc. I guess that this sort of analysis is not possible given what data are available for the authors but I may be wrong. If they are not available, it could be mentioned that risk factor analysis could not be performed due to limited access to clinical information in the database.<br>Minor points:<br>• In-hospital mortality is not mentioned. It could be interesting if possible to report.<br>• Page 4, please explain CIHI abbreviation<br>• Page 4, sentence starting with "We also report …" is redundant.<br>• Page 7, "Age was similarly distributed …" Do the authors mean that the median age was 84?<br>• Page 7, What is "major comorbidity"? Please, define.<br>• Page 7, What is "cardiac dysrhythmia"? Please, define. Atrial fibrillation?<br>• Maybe a table with no complication vs. complication pos individuals would help the reader to understand the study sample?<br>• A diagram (pie chart?) with a distribution of complications would be helpful for the reader. |

## VERSION 1 – AUTHOR RESPONSE

**Reviewer: 1**

**Reviewer 1, comment 1:**

This article does appear to have appropriate methodology and may be suitable for this journal.

**Author's response:**
Thank you for taking the time to review our manuscript and for considering it suitable for this journal.

**Reviewer 1, comment 2:**

The opening statement of there is limited information of the occurrence of complications after hip fracture surgery does not seem appropriate to me. There are thousands of papers on this topic. There are less papers using administrative database reports though such as this one.

**Author's response:**
Thank you for this comment.

We updated the introduction to read:

'*Yet, there is a lack of information in administrative databases on the occurrence of serious but treatable complications after hip fracture surgery.[6-8] This makes it difficult to evaluate the effects of care delivery on the risk of postsurgical complications and ensuing in-hospital death nationally.'*

We also updated the abstract to read:

'*There is limited information in administrative databases on the occurrence of serious but treatable complications after hip fracture surgery.*'

**Reviewer 1, comment 3:**

The big limitation of studies such as this is the accuracy of the data collection and for example the definition of pneumonia (which can vary considerable from study to study or person to person). Research papers in which there is a more specific definition of pneumonia will report much lower rates of pneumonia. Sepsis again can be quite variable whilst thrombosis tends to be more accurate using investigative results only. Perhaps this requires more mention in the discussion.

**Author's response:**
Thank you for this comment. We updated the limitations section of the manuscript to read:

'*Identification of postsurgical complications in administrative databases may vary by the definition of each complication. For example, a search for 'pneumonia' returns over 300 results across 3 medical coding data sets.[19] Whether all these results are applicable to the definition of pneumonia as a complication after hip fracture surgery may be debated. Therefore, we focused on the five postsurgical complications after hip fracture surgery as defined by the PSI-4 to facilitate reproducibility of our results*.'

**Reviewer: 2**

**Reviewer 2, comment 1:**

This is a retrospective study performed on a large database of Canadian discharge abstracts covering older patients surgically treated for hip fracture over a 9-year period. The authors aimed to explore the incidence of serious post-procedural in-hospital complications.

The methodology is sound and the study is well performed. The hypothesis is clear although the authors emphasized the feasibility of the procedure, not the data per se, as the main aim of the study. I think that this is a valuable input telling the reader what to expect after hip fracture surgery in older patients. The numbers presented by the authors are convincing and in concordance with similar surveys. What is lacking in this retrospective observational study is a sort of predictive analysis (logistic regression?): which factors are predictive of in-hospital complications as this might have an important practical value for the reader. We are not sure whether the risk of post-procedural complications can be reduced to zero, of course, but it is important to know which characteristics herald the higher risk of pneumonia etc. I guess that this sort of analysis is not possible given what data are available for the authors but I may be wrong. If they are not available, it could be mentioned that risk factor analysis could not be performed due to limited access to clinical information in the database.

**Author's response:**
Thank you for taking the time to review our manuscript and for agreeing on the clarity of our hypothesis and results. We agree on the importance of identifying factors associated with the occurrence of complications. We added a 'future research' section to the discussion of the manuscript which reads:

'*Here we demonstrated the feasibility of identifying five postsurgical complications in administrative data. Future research should identify additional complications which occur after hip fracture surgery. Future research may also consider a composite outcome of postsurgical complications and intensive care admissions in investigating quality of postsurgical care. Finally, future research should explore*

*the potential associations between patient characteristics, their injury and their care, and the occurrence of postoperative complications and ensuing death*.'

**Reviewer 2, comment 2:**

In-hospital mortality is not mentioned. It could be interesting if possible to report.

**Author's response:**
Thank you for this suggestion. We added the following sentence to the new 'future research' section in the manuscript:

'*Finally, future research should explore the potential associations between patient characteristics, their injury and their care, and the occurrence of postoperative complications and ensuing death.*'

**Reviewer 2, comment 3:**

Page 4, please explain CIHI abbreviation

**Author's response:**
Thank you for pointing out the need to clarify this abbreviation. We updated the text to read:

'*We converted Canadian Institute for Health Information (CIHI) diagnosis and procedure codes..*'

**Reviewer 2, comment 4:**

Page 4, sentence starting with "We also report …" is redundant.

**Author's response:**
Thank you we removed the sentence.

**Reviewer 2, comment 5:**

Page 7, "Age was similarly distributed …" Do the authors mean that the median age was 84?

**Author's response:**
Thank you for highlighting the lack of clarity in this sentence. We updated the text to read:

'*The median age was 84 years (Interquartile range 65 - 110).*'

**Reviewer 2, comment 6:**

Page 7, What is “major comorbidity”? Please, define.

**Author’s response:**

Thank you we clarified in text to read:

‘*Overall 27.0% had at least one major comorbidity (heart failure, chronic obstructive pulmonary disease, ischaemic heart disease, hypertension, cardiac arrhythmia or diabetes). Cardiac arrhythmias including supra ventricular tachycardia (ICD-10-CA 147), atrial fibrillation and flutter (ICD-10-CA 148) and other such as ventricular premature and atrial premature depolarization (ICD-10-CA 149) were the most prevalent (9.4%).’*

**Reviewer 2, comment 7:**

Page 7, What is “cardiac dysrhythmia”? Please, define. Atrial fibrillation?

**Author’s response:**

Thank you we clarified in text to read:

*‘Cardiac arrhythmias including supra ventricular tachycardia (ICD-10-CA 147), atrial fibrillation and flutter (ICD-10-CA 148) and other such as ventricular premature and atrial premature depolarization (ICD-10-CA 149) were the most prevalent (9.4%).’*

**Reviewer 2, comment 8:**

Maybe a table with no complication vs. complication pos individuals would help the reader to understand the study sample?

**Author’s response:**
Thank you for this suggestion. We will follow the Editor’s guidance with respect to the journals preference for inclusion of table by study outcome as there are conflicting guidelines (reviewer and STROBE guideline).

**Reviewer 2, comment 9:**

A diagram (pie chart?) with a distribution of complications would be helpful for the reader.

**Author’s response:**
Thank you for this suggestion we include a new Figure 2 with distribution of complications in the manuscript.

**VERSION 2 – REVIEW**

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| **REVIEWER** | Artur Fedorowski<br>Lund University, Sweden |
| **REVIEW RETURNED** | 29-Mar-2017 |

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| **GENERAL COMMENTS** | Page 7, line 25: please, remove "interquartile". I guess the authors mean "range" only.<br>No other comments. |