Reviewer's report

Title: Injury coding in a national trauma registry: A one-year validation audit in a Level 1 trauma centre

Version: 0 Date: 18 Jul 2019

Reviewer: Belinda Gabbe

Reviewer's report:

Thank you for the opportunity to review this very interesting paper which sought to assess the reliability of AIS coding in the Norwegian Trauma Registry. The study premise is strong as reliable coding is important in clinical registries. The AIS is the fundamental coding system for trauma registries and therefore the study has the potential to inform coding practice and raise awareness of an important issue. My concerns about this paper are really a lack of detail provided that would allow assessment of whether the comparison was fair, and whether the study was adequately powered to address the questions investigated. My comments are provided below for the authors to consider:

1. Registrars in many countries mean medical or surgical clinicians. The term registrar in this paper is not made fully clear. Are the "three registrars" performing registry duties as part of their clinical role?

2. When are the registrars doing the AIS coding? Are they doing this prospectively and only during the patient's stay? If this is the case, then I am concerned that you are not really comparing like with like. AIS coding is meant to be done retrospectively when ALL information is available to the coder. If the registrars are coding outside the conventions of AIS, it would not be surprising that errors are made. I would like to see some context added to the paper and this has implications for the conclusions and recommendations for the paper.

3. AB and IL clearly coded at a later date, and likely after the patient was discharged and the admission complete. Could you confirm this?

4. AB is a radiologist and the wording used suggests that they reviewed the actual images rather than just the reports. The AIS standard is to code from the report - and this is third on the hierarchy of data sources for coding after autopsy and operation report. If AB reviewed the images and amended or coded from these, then this is not consistent with AIS procedure at all. Please review the language used and clarify if I have misinterpreted but it does say "new interpretations of all diagnostic imaging".
5. Where is the a priori sample size calculation for this validation study?

6. "Lacking" should be changed to "missing" throughout. It is not defined at all and from what I can gather you are referring to codes allocated by the reference standard which were not coded by the registrars. Is that correct? If so, missing would be better terminology.

7. The statistical analysis is a little confusing. What is the rationale for categorising the ISS to apply kappa statistics when you are performing a Bland-Altman analysis which is an appropriate method? It is not explained.

8. Similarly, the statement on p7 lines 7-10 implies that differences in the total number of AIS codes per patient is being assessed with Kappa but this must be incorrect as Kappa is for categorical data.

9. p7 line 23-25 - this sentence needs to be reworded. As written, it implies that all patients died.

10. Table 1 - why is age presented as the median and IQR and then again as a categorical variable with very blunt categorisation - i.e. children in two groups and all adults in one?

11. Table 1 - please remove the word "accident" - it is not recommended language in injury research. Crash, collision or incident would be more appropriate.

12. Table 1 - "hit by object/explosion/fire" are vastly different mechanisms of injury. It is unclear why these have been included in one category. Two are burn related and the other blunt trauma.

13. Throughout, the interpretation is that the new coding is "correct" but there is no guarantee of this. The language should be softened throughout. Concordant for agreement and discordant for disagreement codes would be better as it implies no confirmation of "accuracy" or "correctness". For example, if the original coders coded from the radiology report and the disagreement was because the new coding was done from the imaging, this does not make the original coding incorrect. The original coders have complied with AIS rules.

14. Page 8 line 12 to Page 9 line 2 - These sentences are unclear. "..... the proportion to 62.5%" - what is this proportion?
15. Page 9 line 13 - what are "complementary radiology exams"? Did the original coders have access to these?

16. Page 9 line 17 - Please change "incorrect" to discordant coding.

17. Page 10 line 10 and Page 11 lines 1 and 2 - the ISS and NISS have a VALID range of 1-75. Why is the floor of your range 0?

18. Page 12 lines 10-12 - there must be 95% CI presented for the kappa values.

19. Given the queries above, it is difficult to assess the robustness of the conclusions. The statement "is incomplete and inaccurate injury coding" is clearly an overstatement. In many patients, there was complete agreement. The conclusions appear very biased and not well supported by the data presented. In the vast majority of cases, the coding differences did affect major trauma status, and the overall mean ISS and NISS scores were not impacted by the disagreement. While the argument that incorrect AIS coding can influence mortality risk prediction, most of the disagreement observed in this study was at the lower injury severity, and key triplets were not assessed. I would like to see a balanced discussion presented.

20. A limitation of this study is likely to be power and this is not addressed. Also, as different registries have different patient profiles and different injury patterns, the capacity to generalise to all trauma registries warrants noting as a limitation. For example, North American trauma registries have much higher rates of penetrating trauma - there were only 5 cases in this study - less than 4%.

Some minor edits and clarifications need to be made also:

1. p3 line 17 - minimize instead of minimalize
2. p3 line 18 - "continuous improvements of" should be continuous improvement of
3. p4 line 2 - what type of registrars?
4. p4 line 7 - what is an "audit registrar"?

Overall, the premise for this paper is sound and it is an important area of study. Further clarification, and a more balanced discussion of the findings, is needed to improve the usefulness of this paper.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
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