Author's response to reviews

Title: Do Male and Female Trauma Patients Receive the Same Prehospital Care?: An Observational Follow-Up Study

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Author's response to reviews: see over
Dear Editor,

Thank you for the valuable reviewers’ comments regarding our paper. MS: 1994755111736557 Do Male and Female Trauma Patients Receive the Same Prehospital Care?: An Observational Follow-Up Study

We have revised the manuscript as suggested by the reviewers. Our responses to all points raised are commented on in this cover letter and all changes are marked with bold letters in the revised manuscript. Since English is not our native language the manuscript has been overseen by an English speaking person (as requested by one reviewer).

We hope the changes made in the manuscript are satisfactory and you will consider our paper for publication.

Stockholm, November 5th, 2015

Yours sincerely

Rebecka Rubenson Wahlin, for all authors

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Reviewer: Gerry FitzGerald

Comment 1: The paper is well structured with well detailed methods and findings. I do find the results a little surprising. If there was an association between gender and standards of care then I would have suspected the alternative; namely higher levels of concern for women.

Response to comment 1: Thank you. However, our data showed that male patients were more often transported to the trauma center.

Comment 2: The authors may wish to clarify the pre-hospital system in Sweden as it appears that at least some of the responders are "nurse anesthetists" who if women, increases the puzzle. Why should women evaluate women with less diligence? Perhaps the authors may wish to provide a rationale that may help others understand the observations.

Response to comment 2: Thank you for the comment. It is true that some of the responders are nurse anesthetists as described in the settings section, they are however both men and women. In our EMS system it is in general more male nurse anesthetists. In our study we did not aim to evaluate the impact on the care providers gender on the care but it is a good point and might be worth exploring further in studies to come.

Reviewer: Shelley Cox

Major Compulsory Revisions

1. The hypothesis could benefit from being phrased differently. There is no obvious reference to ‘differences in presentation’ or ‘subtleties in symptoms’ throughout the paper. It is unclear what the authors mean here. Without knowing what pre-hospital trauma triage criteria are used (see comment #2 below), it is difficult to know what constitutes ‘correct’ triage and ‘incorrect transport decisions’. In the Victorian (Australia) system, trauma patients who meet the pre-hospital trauma triage criteria are to be transported to the highest level of trauma service within 45 minutes of the scene. If a specialised trauma service is further than 45 minutes away and aeromedical transport is not available, the trauma patient should be transported to an appropriate hospital within the 45 minute time frame. Therefore, transport to a hospital other than a specialised trauma service does not necessarily represent an incorrect triage / transport decision. It is likely that correct and incorrect triage mean different things within different trauma systems. The paper would be strengthened by having clear definitions of ‘correct triage’ and ‘incorrect transport decisions’, or the authors could consider rewording the hypothesis to improve clarity.

Response: We have reworded the aim as suggested and excluded the hypothesis. We are aware that the circumstances differ widely between countries. The transport time is not a real issue in Stockholm area since the distances in most cases are relatively short (at most 1 hour drive to trauma center) and therefore this aspect is not included in the criteria of the trauma protocol.
The “correct triage” studied in this paper is, as stated in the manuscript (page 5) i.e. based on following parameters: systolic blood pressure less than 90 mmHg, the respiratory rate below 10 or higher than 29, or the Glasgow Coma Scale (GCS) score less than 14 - and if these parameters are normal, the injuries and the injury mechanism should be regarded as part of the criteria. If the injured patient had any of these criteria she/he should be transported as priority 1 to the only trauma center of the area i.e. if not following these criteria the transport decisions would be regarded as incorrect.

However, since our aim was to study gender differences and not validate the actual triage protocol we have reworded the aim and tried to clarify this aspect in the manuscript and added a figure of the triage protocol (Figure 2).

2. The paper lacks detail about the emergency medical service(s) (EMS) in Stockholm, other than to say the Stockholm County Council (SCC) is responsible for the EMS and seven emergency hospitals. It is not clear to the reader how this system works or whether there is an integrated trauma system. It is also unclear how many of the seven emergency hospitals are considered equivalent to a level 1 specialised trauma service. A trauma triage protocol, derived from the American College of Surgeons field triage criteria is noted but not described. Similarly the EMS levels of priority for patient transport are not defined in terms of the trauma triage protocol upon which they are based. The authors state that all patients met the major trauma criteria ISS > 15, however it is not known whether all of the study participants met the pre-hospital field triage criteria.

Response: Only one of the 7 hospitals, Karolinska university hospital in Solna (as stated on page 4, row 7) has a level 1 trauma service.

We have now included information on the triage protocol as a figure (Figure 2) and we have tried to clarify the triage level in text (last sentence in study setting page 5).

3. The lack of background detail makes it difficult to properly evaluate the results the authors have presented. Part of this difficulty arises from not having any information about the prehospital trauma triage criteria used. It would be useful for the reader to see some summary statistics showing how the patients met the trauma triage criteria (e.g. vital signs, specific injuries, special considerations or modifying factors).

Response: We have now described the prehospital trauma triage criteria more clearly (page. 4, 5) and also added Figure 2.

We have summarized how the patients met this criteria for the year studied in Table 1, vital signs (RTS categories), injury mechanisms and type of injury.

4. Although the authors have chosen their data variables based on the Utstein template, the inclusion of specific traumatic injuries (e.g. head, chest, abdomen, spinal, significant penetrating etc.) rather than predominant injury (blunt or penetrating) would be more informative (especially when over 90% of the sample sustained blunt trauma). The specific injuries sustained may well have some association with outcome variables. If available, hospital AIS body region data may also be worth exploring.

Response: Thank you. We agree that the AIS body region data would have been interesting to include. Unfortunately, when the ISS was calculated the AIS was not noted in the dataset and
Cover letter

we have not the possibility to go through this data again However, we have included information about the anatomical injuries according to the ICD diagnosis p. 6 row 1 and p. 9 row 13 we have also displayed the injuries in Table 1.

5. Comorbidities are generally included in trauma studies. Was this data available, and if it was, what was the reason for excluding it from the analyses?

Response: Yes, we agree that comorbidity is a very useful when included and we are sorry but for the year studied comorbidity data was not available.

6. The statistical methodology looks very similar to that of Gomez et al. (2012). It may be worth mentioning this in the ‘Statistics’ section (e.g. Data analyses followed a similar methodology to that employed by Gomez et al. etc. etc.)

Response: Thank you for your suggestion, we have now included this information. P. 8, under statistics section row 15.

7. The stratification of covariates requires further explanation.

Response: Thank you. We have added information about the stratification of the variables p.6 row 9.

8. After adjusting for age, predominant injury, intentional injury, injury mechanism, prehospital cardiac arrest and RTS, the odds of being allocated pre-hospital priority one was higher for males compared to females (adjusted OR, 2.75; 95% CI, 1.2-6.2; p = .015). What was the rationale for not adjusting for pre-hospital competence in this regression model?

Response: Thank you. Since the prehospital competence of the staff was regarded as one of the outcome variables it was not used for adjustment in the model. Prehospital competence is presented in Table 2. The prehospital competence did not differ within each group. We have now defined the competence levels in the text.

9. What was the rationale behind using pre-hospital priority as the outcome variable in the multivariable regression analyses? Males were also significantly more likely to be transported to a specialised trauma service than females. Destination compliance /transport to a major trauma service are commonly used in regression models to evaluate pre-hospital protocols. This query relates back to the lack of detail the authors have provided around EMSs in Stockholm – there may be a good reason why the authors chose to focus on pre-hospital priority rather than transport to a specialised trauma service, but this is not immediately obvious to the reader and needs to be defined.

Response: Thank you for the comment. In our system it is stated that if a trauma patient is considered as a priority 1 case the EMS should transport the patient to the trauma center in accordance with the trauma triage protocol. We have chosen to focus on the priority since it can be considered as a sum of both triage and need of care i.e. as a sum and a measure of the
total prehospital assessment rather than just focusing on either triage or trauma destination compliance. We have tried to clarify the rationale behind the outcomes on page 6 row 12. As stated in previous responses we have also added a figure of the triage protocol Fig 2.

10. The stratified analyses showed findings for low falls similar to those reported by Gomez et al., yet these findings are not mentioned at all in the discussion. It would be worthwhile for the authors to consult the literature around falls and trauma triage.

Response: Thank you for your suggestion. We have now added this aspect in the discussion.

11. For the opening statement in the Discussion to be accurate, the authors need to more clearly state their hypothesis. In the absence of clear definitions of ‘correct triage’ and ‘incorrect transport decisions’, it is a stretch to say the findings that female trauma patients were less likely to be allocated pre-hospital priority one, highest level of competence and more commonly required secondary transfer to a specialised trauma service confirm their hypothesis. Further, secondary transfer to a trauma service does not appear to have been included in the statistical analyses. Transport to a non-specialised trauma service and secondary transfer are not necessarily mutually exclusive.

Response: Thank you. We have considered the comment and tried to clarify and just as the case with the aim rephrased the aim and its relation to the findings, p. 11 first paragraph in the discussion.

12. The authors should be careful to maintain accuracy when comparing their findings to previous studies. For example, the authors state that their findings are in line with those of Chang et al. “who reported males were more likely to be transported to a trauma centre than females” (second paragraph of Discussion). In their main analysis, Chang et al reported no association between gender and pre-hospital trauma triage. The association between gender and triage to which the current authors refer, was reported for an analysis of a subset of data pertaining to a particular geographic region, to control for the potential effect of distance from scene to hospital. Chang et al. did not elaborate on this finding.

Response: Thank you very much for the comment and we have elaborated the discussion around the subset of data that was reported by Chang et al. p. 11 second paragraph.

13. The Discussion relies heavily on literature which might be better suited to the Introduction section of the paper. Further, there is limited discussion of the key findings of the paper – that the odds being allocated pre-hospital priority one, highest level of pre-hospital competence and transported to a specialised trauma service are greater for males compared to females. More thought needs to go into discussing these findings. Consider possible reasons for these findings - a starting point might be to consult the literature with regards to falls and trauma triage. Further analyses around specific trauma triage criteria might also be worth exploring.

Response: Thank you for that very useful input on the discussion section. We have tried to clarify and added more body to the discussion as suggested.
**Minor Essential Revisions**

14. *The Aim in the Introduction does not match the Aim in the Abstract. Try to keep terminology consistent throughout the paper.*

Response: Thank you, we have changed this. Last sentence first paragraph, p. 2

15. Last line of ‘Study Setting’ section: *Should ACOS be ACS-COT (American College of Surgeons Committee on Trauma)?*

Response: Thank you, we have changed this. p. 5 row 4.

16. *In the second paragraph of the ‘Statistics’ section, the authors state ‘...adjusted odds ratios (OR) with 95% confidence intervals (CIs) for primary outcomes were derived by multivariable logistic regression analysis and for all models females were used as the reference group’. This implies that more than one multivariable logistic regression analysis was performed using different outcome (dependent) variables. Were other models produced using different outcome variables?*

Response: Thank you for noticing a miss-print the sentence should go; *for both models* not all models. And for answering the question; no, we focused on prehospital priority and analgesics and the models refers to those outcomes. The sentence has been corrected. P. 8, row 8.

17. *The last sentence of the second paragraph in the ‘Statistics’ section refers to ‘multivariate’ models rather than ‘multivariable’ models. These terms are often used interchangeably but the analyses they describe are quite distinct. Multivariate refers to models that have 2 or more outcome (dependent) variables, whereas multivariable refers to models where there is one outcome (dependent) variable and multiple independent or response variables.*

Response: Thank you for pointing this out. In this study we used multivariable models i.e. we used one outcome (dependent) variable and multiple independent response variables. We have corrected the text accordingly. P.8.

18. *Figure 1 requires an X-axis label. The Y-axis label ‘Variables’ could be more descriptive.*

Response: Thank you. We have added an x-axis label and added some more information on the variables on the y-axis.

19. *Suggest removing background shading from Figure 1, and the commas in the ORs values should be replaced with decimal points.*

Response: Thank you for the feedback on the figure layout. We have removed the shading as suggested, but it was not possible to replace the commas with decimal points in the statistic program we have used. Maybe it would be possible to get help from the journal with the layout.
20. Consider revising the length of some sentences (especially those that spread over four lines).

Response: We have revised the sentences.

21. Consider rewording the title of Table 2 – not all of the variables in this table are ‘outcome variables’.

Response: Thank you but we considered all these variables as outcome variables. We have also written out all the primary and secondary outcome variables p. 6, second paragraph row 10.

**Discretionary Revisions**

No differences were observed between males and females for age, however it is interesting to note that the p-value for age is approaching significance (p = 0.05). With a larger sample size, there may well be a significant difference. Of particular interest here is that the largest proportion of males are aged 15-39 years, whereas the largest proportion of females are in the ≥ 65 years age group. Even though this difference did not reach statistical significance, the gender proportions across age categories are very interesting – and not unexpected – something to think about in the overall context of the study. It would also be interesting to see the breakdown of injury mechanisms across age and gender.

Response: Thank you for the good suggestion. We have included a paragraph in the result section p. 10 and a table of gender/blunt trauma/age and trauma mechanism. p. 22. Table 3.