PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Trauma teams and time to early management during in-situ trauma team training
AUTHORS	Härgestam, Maria; Lindkvist, Marie; Jacobsson, Maritha; Brulin, Christine; Hultin, Magnus

VERSION 1 - REVIEW

REVIEWER	Joaquim Havens MD Brigham and Women's Hospital Boston, MA USA
REVIEW RETURNED	03-Oct-2015

GENERAL COMMENTS	The authors have presented an interesting and well written manuscript describing their study of the association between the type of communication and time to the decision for surgery during trauma team training. The main finding that closed loop communication originating from the team leader is associated with shorter decision times, but that when the communication is originated by the team members is associated with longer time has not clearly been previously described. The major limitation is that this result is based on analysis of 8 teams which greatly limits the strength of the findings. The censoring of those groups that did not make the decision within 15 minutes may have led to significant selection bias. I have several comments on the manuscript Introduction: hypothesis statement is clear and appropriate Aim: This is a run on sentence and could be simplified or broken up to make it more clear Methods: Participants-need to clarify whether the physicians/anesthesiologists were trainees (residents) or fully trained (attendings). I am not familiar with the term “enrolled nurse” it is not a term used in the U.S. Does it mean “student nurse”, or “nursing assistant”? Research setting-could you comment a little more on the type of “hospital” was it a trauma center or non-trauma center (urban or rural, teaching or non-teaching etc)? It would also be helpful to know the mechanism of injury for the simulation (blunt or penetrating). Data collection-The last sentence has the words “via from”

	together. Independent variables-you use the term CO without previously defining it. While you reference “step one, two and three” it would be helpful to describe them here as you discuss them again with describing them in the discussion section. Statistical analysis- quite a bit of data is lost by censoring those cases that are not completed within 15 minutes. As taking more than 15 minutes represents the far end of the time scale this leads to selection bias. Results: The results section and table one do not include raw numbers for “ethnicity” Table 1: This table is cumbersome and might work better as 2 or more tables. Discussion: Would be helpful to describe “step one, two and three” as they pertain to closed loop communication as this relates to your critical finding. Methodological discussion: appropriate discussion of limitations, but it still seems that censoring those cases that were not completed within 15 minutes leads to bias. Clinical implications: the first sentence has the grammatical error “These results provide improved the knowledge”.

REVIEWER	Richard A. Falcone, Jr., MD, MPH Cincinnati Children's Hospital Medical Center Cincinnati, Ohio United States
REVIEW RETURNED	04-Oct-2015

GENERAL COMMENTS	The topic of communication in the trauma bay is critically important and the authors should be congratulated for continuing to address this topic. They make an important conclusion that too much communication can be a detriment. It is however a bit difficult to follow the data that lead to this conclusion. It would be useful if the authors could further clarify what is meant by a high number of call outs and closed loop communication initiated by the team members. Is there not a benefit of team members participating and initiating their concerns? There is literature to support this approach and should be discussed. Although too much unnecessary talking during a resuscitation certainly can impede an efficient resuscitation, how do the authors separate valuable input from the team vs. no value added communication? Although the authors reference articles with definitions of CO and CLC are provided, a bit more explanation would be useful to the reader. In addition, how leadership style was analyzed and reported could

	also benefit from further explanation rather than requiring the reader to go the referenced papers. In reviewing table 1 it is not clear how to interpret this data. It would benefit the reader to further clarify some of the measures. For example how was an n of leadership styles reached. For example is each communication, whether initiated by the team or the leader graded to evaluate the leadership style? The hazards model shows that leader CLC has a positive impact on reaching the decision to operate while team driven communication negatively impacts this decision. It would be interesting however to address if there was value in the team communication in other areas of the resuscitation. For example, did this communication allow faster identification of other injuries, improved rapidity of appropriate fluid resuscitation, identification of potential threats, etc.? It would be very helpful for the authors to address this before concluding that added communication from the team is not of value. Although there is data to support the negative impact of communication overload it is important that the authors do not overstate their conclusions and the value of egalitarian approach and communication initiated by those other than the leader in improving the overall safety of patient care. This can not easily be measured by simply looking at the outcome of decision time to go to surgery.

REVIEWER	Peter Oluf Andersen Bispebjerg hospital Department of Anaesthesiology Copenhagen Denmark
REVIEW RETURNED	09-Oct-2015

GENERAL COMMENTS	This paper represents a fine precision of important elements in trauma-team dynamics, with regards to effective use of time in the critical phase. Some comments: 1: The data are collected in 2009/2010. References are made to ATLS. The European Trauma Course is established in 2008, and has focus on team dynamics and communication. If the authors has knnowledge about this course it could be implemented in the discussion. 2: The dynamics in the scripted scenario are not clear to the reader. Are there any other factors in the scenario that could lead to compromised deciosion-making with regards to definitive surgery.? 3: The trauma-team are paged in the hospitals system. Has there been any announcement of the simulation prior to the training? 4: A figure describing the CLC model would be very helpfull for readers

	that are not som familliar to the model. 5: The observations and field notes werer made during the team training by the first author. How do these observations fit into the data-collection? 6: Does it have any impact if the teamleader is either a sorgeon or a emergency phyciscian. 7. Do some teamleaders of non-scandinavian origin have problems with ordinary scandinavian spoken language, hence compromising effeicient team-commuication. 8: The training is "in-situ".Since this has a major place in the title´, could you comment of the potential of another outcome if placed in a simulation centre? I know that this is not the research question, but has your litterature search found anything about this. Afterall you comment about "time out of production" in the methodological discussion. The statistical part regearding Cox proportional hazard regression needs a statistical review, since i am not able to do so.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1

1. The authors have presented an interesting and well written manuscript describing their study of the association between the type of communication and time to the decision for surgery during trauma team training. The main finding showing that closed loop communication originating from the team leader is associated with shorter decision time, on the other hand when the communication is originated by the team members the association with time to decision increased which has not clearly been previously described. The major limitation is that this result is based on analysis of 8 teams which greatly limits the strength of the findings.

Thank you. The Cox-regression includes all data in the analysis process of the dependent variable. In this study, both the time taken and the fact that half of the teams did not reach a decision within the 900 s time frame. Thus all 16 teams were included in the analysis. This has been rephrased in the section Statistical analysis (p. 10)

2. Aim: This is a run on sentence and could be simplified or broken up to make it more clear.

We have simplified the aim (p. 5).

3. Methods: Participants-need to clarify whether the physicians/anesthesiologists were trainees (residents) or fully trained (attendings). I am not familiar with the term “enrolled nurse” it is not a term used in the U.S. Does it mean “student nurse”, or “nursing assistant”?

“Enrolled nurse” is the British English name for “assistant nurse”. This has been clarified in the manuscript (p. 6)

We added information on the number of surgeons/emergency physicians and anesthesiologists that were trainees (residents) or fully trained (attendings) (p. 6).

4 Research setting-could you comment a little more on the type of “hospital” was it a trauma center or

non-trauma center (urban or rural, teaching or non-teaching etc)? It would also be helpful to know the mechanism of injury for the simulation (blunt or penetrating).
This has been rephrased and clarified in the manuscript in Research setting (p. 6)

5 Data collection-The last sentence has the words “via from” together.
We have corrected the last sentence in Data collection (p. 8).

6 Independent variables-you use the term CO without previously defining it. While you reference “step one, two and three” it would be helpful to describe them here as you discuss them again with describing them in the discussion section.
A short description of CLC including a new figure has been added to the methods section to clarify how CLC is defined (p. 8-9). The discussion has also been modified accordingly (p. 15).

7 Statistical analysis- quite a bit of data is lost by censoring those cases that are not completed within 15 minutes. As taking more than 15 minutes represents the far end of the time scale this leads to selection bias.
The Cox-regression includes all data in the analysis process of the dependent variable. The analysis calculates hazards-ratios. The dependent variable, time to make a decision to go to surgery, is followed until the event either happens or the observation is censored, i.e. not followed any longer. In this study, eight teams made the decision within the time allotted for the trauma team training and eight teams were followed until the team training was stopped by the instructors. Thus all 16 teams were included in the analysis. This has been rephrased in the section Statistical analysis (p. 10).

8 Results: The results section and table one do not include raw numbers for “ethnicity”.
The raw data for “ethnicity” has been included in Table 1.

9 Table 1: This table is cumbersome and might work better as 2 or more tables.
The table has been divided into two tables; Table 1 and Table 2

10 Discussion: Would be helpful to describe “step one, two and three” as they pertain to closed loop communication as this relates to your critical finding.
Please see answer to question 6.

11 Methodological discussion: appropriate discussion of limitations, but it still seems that censoring those cases that were not completed within 15 minutes leads to bias.
We believe that this is a misconception of what we mean with “censored”. Please see answer to question 1.

12 Clinical implications: the first sentence has the grammatical error “These results provide improved the knowledge”.
Thank you. Corrected. (p. 19)

Reviewer: 2
13 The topic of communication in the trauma bay is critically important and the authors should be congratulated for continuing to address this topic. They make an important conclusion that too much communication can be a detriment. It is however a bit difficult to follow the data that lead to this conclusion.

It would be useful if the authors could further clarify what is meant by a high number of call outs and closed loop communication initiated by the team members. Is there not a benefit of team members participating and initiating their concerns? There is literature to support this approach and should be

discussed. Although too much unnecessary talking during a resuscitation certainly can impede an efficient resuscitation, how do the authors separate valuable input from the team vs. no value added communication?

This is a difficult and important question that we can not find an easy answer to: How to separate necessary and unnecessary communication during resuscitation?

CRM guidelines underline and encouraged team members to speak up in the trauma team when there is a need to pay attention to important changes in patient status. In an earlier study we found that 14% of all CO resulted in a full CLC (Hargestam et al 2013).
However, if all team members initiate CO and CLC and actively and vividly discuss pro's and con's of different strategies, a state of communication overload and also a lack of leadership would result and thus the assessments and actions would be delayed.

This has been expanded in the discussion. (p 16)

14 Although the authors reference articles with definitions of CO and CLC are provided, a bit more explanation would be useful to the reader.
Please see answer to question 6.

15 In addition, how leadership style was analyzed and reported could also benefit from further explanation rather than requiring the reader to go the referenced papers.
Clarifying text regarding the analysis of leadership style and the quantification into turn-constructional units has been inserted in the section Independent variables (p. 9-10).

16 In reviewing table 1 it is not clear how to interpret this data. It would benefit the reader to further clarify some of the measures. For example how was an n of leadership styles reached. For example is each communication, whether initiated by the team or the leader graded to evaluate the leadership style?
The concept of turn-constructional units as a measurement of the use of different communication strategies has been clarified in the manuscript (See answer to question 15).

17 The hazards model shows that leader CLC has a positive impact on reaching the decision to operate while team driven communication negatively impacts this decision. It would be interesting however to address if there was value in the team communication in other areas of the resuscitation. For example, did this communication allow faster identification of other injuries, improved rapidity of appropriate fluid resuscitation, identification of potential threats, etc.? It would be very helpful for the authors to address this before concluding that added communication from the team is not of value.
In this study we chose to use the time taken to make the decision to go to surgery as a measurement of team function, rather than e.g. intubation. We discussed in the research group that time to go to surgery would be an variable that could define the teamwork more appropriate than for example intubation. It is quite possible, or perhaps likely, that specific parts of communication are related to specific parts of the resuscitation. The problem with this analysis is partly a problem of mass significance and partly a problem of sensitivity. The latter problem has to do with the fact that in a fully functional team where all parts of the team are working at its full potential, the team knows what needs to be done and the need for communication decreases. This is now addressed in the Methodological discussion (p. 18).

18 Although there is data to support the negative impact of communication overload it is important that the authors do not overstate their conclusions and the value of egalitarian approach and communication initiated by those other than the leader in improving the overall safety of patient care. This can not easily be measured by simply looking at the outcome of decision time to go to surgery.

We have rephrased the conclusion to better show that this negative association is just an indication and deleted the speculative sentence on communication overload (p. 19)

Reviewer 3

19 This paper represents a fine precision of important elements in trauma-team dynamics, with regards to effective use of time in the critical phase.

The data are collected in 2009/2010. References are made to ATLS. The European Trauma Course is established in 2008, and has focus on team dynamics and communication. If the authors has knowledge about this course it could be implemented in the discussion.

Thank you!

ECT is now included in the introduction and also included in the discussion. However, the details and evaluations of the different parts of the course have as far as we can understand not yet been published in detail. (p. 5and p. 17)

20 The dynamics in the scripted scenario are not clear to the reader. Are there any other factors in the scenario that could lead to compromised decision-making with regards to definitive surgery.?
The instructions to the trauma team before the hand-over was to act as during a normal trauma resuscitation in the emergency room. As stated in Methods the Mannequin's auto mode was used to control the physiological model. We have added a sentence to Methods to clarify this (p. 6)

21 The trauma-team are paged in the hospitals system. Has there been any announcement of the simulation prior to the training?
Before the trauma team training the participants were gathered for a short introduction of the manikin. We have added a sentence to Methods to clarify this (p. 7)

22 A figure describing the CLC model would be very helpful for readers that are not so familiar to the model.
This has been added to the manuscript. Please see answer to question 6.

23 The observations and field notes were made during the team training by the first author. How do these observations fit into the data-collection?
The observations and the field notes were used as a support during the analysis. This has been added to methods (p. 8).

24 Does it have any impact if the teamleader is either a surgeon or a emergency physician.
In this study we did not find any associations between if the leader was a surgeon or emergency physician and the result of the team. This was not one of the questions that the study was designed to answer. Data not shown.

25 Do some teamleaders of non-Scandinavian origin have problems with ordinary Scandinavian spoken language, hence compromising efficient team-communication.
The participants with non-Scandinavian background were talking Swedish. There were no indications that the leaders did not understand the Swedish language and we did not ask them about their understanding of the communication in the emergency room. This is now clarified in methods (p. 6)

26 The training is "in-situ". Since this has a major place in the title, could you comment of the potential of another outcome if placed in a simulation centre? I know that this is not the research question, but has your literature search found anything about this. After all you comment about "time out of

production" in the methodological discussion.
A paragraph on the differences between in-situ and in-centre has been added to the methodological discussion. (p 19)

27 The statistical part regearding Cox proportional hazard regression needs a statistical review, since i am not able to do.
We believe that the Cox regression has been performed and interpreted correctly. ML, one of the authors of this manuscript, is a trained statistician.

VERSION 2 – REVIEW

REVIEWER	Joaquim Havens Brigham and Women's Hospital, Boston MA. USA
REVIEW RETURNED	09-Nov-2015

GENERAL COMMENTS	The authors have addressed all key concerns with their revisions. I have no further questions. The study question is interesting and the results provocative.

REVIEWER	Richard A. Falcone, Jr, MD, MPH Cincinnati Children's Hospital Medical Center Cincinnati, Ohio US
REVIEW RETURNED	19-Nov-2015

GENERAL COMMENTS	This is overall well written and important paper. The authors have addressed most of the previous comments appropriately. The issue of "censored" data could still benefit from clarity in the manuscript. It is curious to this reviewer that there is not discussion or evaluation of differences when a Surgeon or Emergency physician is the team leader or when it is a trainee or staff physician. Please address this or add to the analysis. In addition, were there any differences in time to surgery decision for the penetrating vs. blunt scenario? It would seem the penetrating trauma may have a more clear indication. Did this matter in the analysis? Finally, I would encourage the authors to further elaborate and take care in how they interpret the "negative" impact of team initiated communication. Encouraging team members to contribute and voice concerns has certainly been demonstrated to improve safety. With the only outcome being time to surgery decision it may be possible that the additional team initiated communication could have had other benefits that were missed using the single endpoint of surgery decision.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1

1.The authors have addressed all key concerns with their revisions. I have no further questions. The study question is interesting and the results provocative.

Thank you!

Reviewer: 2
2. This is overall well written and important paper. The authors have addressed most of the previous comments appropriately.

Thank you!

3. The issue of "censored" data could still benefit from clarity in the manuscript.

The explanation of the dependent variable has been extended (P.10)

4. It is curious to this reviewer that there is not discussion or evaluation of differences when a Surgeon or Emergency physician is the team leader or when it is a trainee or staff physician. Please address this or add to the analysis.

The study was not designed to analyse the differences between surgeons and emergency physicians. Out of the aim, the analyses were performed on the team level not on the individual level. However, this is an interesting question and has been added as a suggestion for further studies in the discussion (P.18).

5. In addition, were there any differences in time to surgery decision for the penetrating vs. blunt scenario? It would seem the penetrating trauma may have a more clear indication. Did this matter in the analysis?

The study was not designed to analyse the differences in handling of blunt and penetrating scenarios. However, this is an interesting question and has been added to the methodological discussion (P18).

6. Finally, I would encourage the authors to further elaborate and take care in how they interpret the "negative" impact of team initiated communication. Encouraging team members to contribute and voice concerns has certainly been demonstrated to improve safety. With the only outcome being time to surgery decision it may be possible that the additional team initiated communication could have had other benefits that were missed using the single endpoint of surgery decision.

The clinical implications and the discussion has been adjusted to better reflect this (P.16,)