

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

TITLE (PROVISIONAL)	Injury Risks of EMS Responders: Evidence from the National Fire Fighter Near-Miss Reporting System
AUTHORS	Taylor, Jennifer; Davis, Andrea; Barnes, Brittany; Lacovara, Alicia; Patel, Reema

VERSION 1 - REVIEW

REVIEWER	Audrey Reichard National Institute for Occupational Safety and Health, USA
REVIEW RETURNED	26-Feb-2015

GENERAL COMMENTS	<p>I enjoyed reviewing this paper and think it has the potential to make a valuable contribution to the EMS literature. However, I identified multiple concerns that should be addressed prior to publication.</p> <p>Disclaimer: The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health</p> <p>I appreciated the opportunity to review this novel paper that analyzes data from a voluntary near-miss reporting system using a mixed-methods approach. EMS workers have high rates of nonfatal injury as compared to the general working population, but there is no single system that comprehensively captures all of these injuries. Consequently, there is intrinsic value in adding another data perspective into the existing research. The qualitative data in this study suggest areas that would benefit from additional research as well as important safety concepts identified by the providers themselves.</p> <p>While this is a worthwhile effort, I recommend that the authors consider multiple revisions to improve the overall quality of the paper; more effectively relay their findings; and link their results to the information in the discussion section. I have listed my comments/recommendations below by section.</p> <p>Abstract</p> <p>1. The abstract will need to be modified based on other changes made within the paper in response to reviewer comments.</p> <p>Strengths and limitations</p> <p>1. Consider adding a bullet describing the types of incidents most likely to be captured in this system. I would guess it is biased towards assault and motor vehicles as those are more sentinel near miss events compared to contact with objects and trips and falls. More importantly, bodily motion/overexertion, the most common event associated with EMS nonfatal injuries, has limited likelihood of appearing in a near miss system.</p> <p>2. You note that results can't be generalized to the US fire service, but you may also want to consider noting that results can't be generalized to the EMS worker population in general.</p>
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	<p>Introduction</p> <ol style="list-style-type: none"> 1. Second paragraph: 2012 NEISS-Work numbers are now available on the NIOSH EMS website. 2. Second paragraph: The first paragraph talks about injury risks and overall exposure. The second paragraph provides injury estimates and then resumes talking about exposure from the perspective of the number of medical calls received. It would improve flow if the last section of the second paragraph was part of, or immediately followed the first paragraph. If additional nonfatal data are needed for the injury paragraph, you could use the SOII numbers provided in Dr. Brain Maguire's 2013 Prehospital Disaster Medicine publication titled "Injuries and Fatalities among Emergency Medical Technicians and Paramedics in the United States." 3. Third paragraph, first sentence: The references cited relate to the first half of this sentence only. Move them forward to the semi-colon. 4. Third paragraph, last sentence: I struggled a bit with tying the objective to the actual study results. As written, the objective seems to be more reflective of the NFFNMRS itself. Consider revising to indicate that your aim was to identify common injury mechanisms and possible prevention considerations from the perspective of EMS providers. <p>Methods</p> <ol style="list-style-type: none"> 1. Case Inclusion, first paragraph: When I initially read the sentence about defining EMS responders as BLS, ALS, etc., I interpreted it to mean that the authors coded them as such within the data. However, when I looked at the near-miss system, it was not clear to me how this could be done with the provided information. While first responders are not mentioned in your list, it was not clear to me how you could exclude firefighters trained on the emergency medical responder/first responder level only. Please clarify this sentence. 2. Case inclusion, second paragraph: Figure 1 does not provide additional information to help in understanding the text. Rather, it briefly describes the dichotomous process already in the text. In addition, the inclusion criteria in this paragraph are not in Figure 1 limiting its utility. I recommend removing Figure 1. 3. Coding structure and method, second paragraph: The "coding structures" referred to in the first sentence seem to apply only to the mechanism of injury. If this is correct, please refer to them as such or simply as "The mechanism of injury codes (Table 1)..." 4. Coding structure and method, second paragraph: The second sentence needs to be revised to clearly indicate that "This study" is not referring to the current study. 5. You provided a nice description of the qualitative analysis. <p>Results</p> <ol style="list-style-type: none"> 1. Quantitative findings, second paragraph: The effort to code nature of injury and describe the findings in this paper seem out of place given that this is a near-miss system where most incidents will not result in an actual injury. There is no strong tie between the findings of "nature of injury" analysis and the rest of the paper. In addition, almost half of these cases are "other, unspecified" and an additional five are exposure to infectious disease, not an actual diagnosis. I recommend eliminating this component. 2. Qualitative findings: The four domains identified in this section do not match the "qualitative coding categories" in Table 1 and it is not clear why there is a discrepancy. 3. Qualitative findings: The purpose of a theme is to represent a concept that ties all the interviews together. Three of the four domains seem to do this, but the domain of "assaults" does not serve this function as it applies to only a select group of cases. In addition, "assaults" is a mechanism of injury mentioned under the
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	<p>quantitative coding column of Table 1, while the other domains are more geared toward prevention practices and identified as qualitative codes within the table. The structure of the NFFNMRS offers two overarching categories: (1) Detailed description of the event and (2) lessons learned. "Assaults" easily falls under the first category and the remainder of the identified domains fall under the second category. I think you should consider revising the Results section considerably, especially given your discussion of motor vehicle incidents in the Discussion section. I recommend a qualitative section discussing incidents related to the three primary injury mechanisms, at a minimum. Then, the remainder of your qualitative analysis can be moved into a "lessons learned" section, which will contain the three other identified domains. Of note, this may necessitate recoding some of the findings under the Assaults section as there are some recommendations for prevention/lessons learned under this description.</p> <p>4. Qualitative findings: The listing of the unique identifier numbers for individual reports throughout this section is distracting. In addition, I am concerned that it artificially creates a quantitative value for a comment/code grouping when multiple case numbers are listed. I recommend keeping these codes for direct quotations only.</p> <p>5. Qualitative findings, assaults, third paragraph: In the last sentence of this paragraph it is unclear whether the patients are under the influence and carrying weapons or if this is two groups of patients. Please clarify.</p> <p>6. Qualitative findings, assaults, checklist: While the development of a checklist to help assess the potential for violent incidents is a useful concept, I have several concerns related to the development and format of the checklist in this study. It is not clear that this checklist is grounded in the results of this study nor is it clear that the checklist is based on the findings of other research studies. The checklist itself is not formatted as a checklist, but rather as a list of concepts, and it is unclear how this would be useful to an EMS worker in the existing format. Finally, I am concerned that some of the issues listed in Table 4 would be: 1) difficult to assess (e.g., immigration status); 2) promote stereotypes (e.g., cultural differences); and 3) difficult to interpret (e.g., home status). Because much of this checklist is lacking evidence of a direct tie to the study findings and because it does not appear to be supported by any literature, I recommend removing the table and supporting text from the paper.</p> <p>7. Qualitative, relationships with emergency providers, third paragraph: The last quotation in this paragraph was not easy to interpret. Does this mean EMS and LEOs now consistently support physical scene protection by the fire department or that physical scene protection is no longer consistently offered?</p> <p>8. Qualitative, Policies, procedures, and practices: The italicized sub-themes in this section are not in Table 1. It seems as though Table 1 should be used to provide an overview of the relationships between themes and sub-themes, yet it does not directly correspond to the Results section.</p> <p>Discussion</p> <p>1. Overall, I felt the findings in the results section and the discussion were disconnected. However, should the authors choose to modify the results and describe more than just assaults in detail, the motor vehicle discussion will become more interconnected. In addition, the link between the qualitative findings and discussion was weak. Both of these issues deserve additional attention.</p> <p>2. Second paragraph: When citing references describing assault among paramedics, consider including the article from Bigham et al.</p>
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	<p>in the July/September 2014 issue of Prehospital Emergency Care.</p> <p>3. Second paragraph: While the Curbside Manner program referenced would likely be helpful in preventing and diffusing violent situations, it is not the only available program or option nor does it appear to be comprehensive for violence prevention. I think it would be beneficial to mention that other options are also available. You may also want to mention that no one program has been formally evaluated for effectiveness.</p> <p>4. Third paragraph: Similar to the comment above, the program cited is not the only available program. I would recommend not presenting it in a way that it may be interpreted as the sole solution. Also, like the violence programs, I don't believe there has been a formal evaluation of any of these motor vehicle programs for effectiveness.</p> <p>5. Third paragraph: Add USFA into your list of credits for the Improving Apparatus Response program if this specific reference remains in the text.</p> <p>6. Third paragraph, second sentence: You may want to refrain from saying this finding "supports recent research" as it really doesn't support it so much as it may align with it.</p> <p>7. Third paragraph: Remove "...health and..." as health is not generally the primary concern in the realm of motor vehicle operations and scene safety.</p> <p>8. Conclusion, second paragraph: This paragraph is the only part of the discussion that directly discusses the qualitative results, but it is largely a synopsis of the results section. Can you tie any literature or external information into these findings?</p> <p>9. Conclusion: In general, the conclusion does not seem to address the objective. Rather, it seems to be more focused on publicizing NFFNMRS. While it is OK to tout the benefits of NFFNMRS, change the focus to correlate with the study objective.</p> <p>References</p> <p>1. Reference 4: Add "s" after "Center" and consider providing website link.</p> <p>2. Reference 13: Why is this the only reference to include a doi?</p> <p>3. Journal names: Some are abbreviated and some are spelled out. Make this consistent.</p> <p>Tables and figures</p> <p>1. Table 1: The qualitative section, which is the most beneficial part of this table, does not directly correspond to the Results section as some concepts are omitted and unmentioned concepts are included. It seems as though this should reflect the actual results write-up. Consider omitting the quantitative codes as many are never discussed in this paper.</p> <p>2. Table 2: Add "Voluntarily Reporting to NFFNMRS" to the end of the table title.</p> <p>3. Table 3: Regardless of whether or not you keep the nature of injury analysis in the text, I recommend removing this table because almost half are "other, unspecified" and this is a very small segment of your total population.</p> <p>4. Table 4: I suggest removal as per the comments in the Results section above.</p> <p>5. Figure 1: I suggest removal as per the comments in the Methods section above.</p>
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REVIEWER	Ass Prof Zlatko Ulovec, MD, DMD, PhD School of Dental Medicine University of Zagreb, Croatia
REVIEW RETURNED	26-Feb-2015

GENERAL COMMENTS	I am of the opinion that the subject discussed within the article represents a valuable contribution to a somewhat underrepresented issue of concern, i.e. the health of healthcare providers. Though of sufficient merit to be published in Your esteemed journal, I can only recommend its publishing as an expert, not an original scientific contribution.
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REVIEWER	Dr Mal Boyle Monash University Australia
REVIEW RETURNED	28-Feb-2015

GENERAL COMMENTS	<p>This manuscript has merit, however, there are several issues which need to be resolved before it is of publishable standard.</p> <p>COMMENTS</p> <p>Introduction It is not clear which prehospital workers you are actually referring, e.g. you mention EMT, EMS Responders, and Paramedics, and then go on to discuss workplace risks encountered by EMS Responders. Which group do you actual mean or do you include first responders and EMTs of all levels (which includes paramedics) as EMS Responders. Do you also include EMTs who work for ambulance companies only?</p> <p>Page 4 line 25: Don't organisations capture injury data for OH&S requirements and sickness leave?</p> <p>Page 4 line 36: use the word "and" not "&"</p> <p>Page 4 line 43-47: What about the ambulance companies increasing call rate? Does this add to the overall increase in EMS usage?</p> <p>METHODS</p> <p>Can you be sure that only firefighters add data to the website and not ambulance company EMTs?</p> <p>How did you account for miscoding of the data entry? Are you sure you haven't missed any relevant records?</p> <p>There is no comment about Institutional Review Board approval, you are accessing human related data which may be accessed with the information you have provided to identify a specific incident that may cause the participant to be identified.</p> <p>Page 6 line 8-12: What about firefighter first responders?, they are part of the EMS response? Could these numbers have been missed?</p> <p>Page 4 line 13-15: The firefighters can be trained to EMT – Paramedic and may be working on an ambulance run by the fire service so act as an EMS response, but they could be working on a fire truck and act as a first responder. How is all this data captured, this point needs to be clarified.</p> <p>RESULTS</p> <p>Page 9 line 54-56: This should be in the discussion not the results, the results are for what you found only.</p>
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	<p>Page 10: information about the checklist you created has no relevance to the study, it should be deleted and written up in another paper.</p> <p>DISCUSSION Limitations section should be the last paragraph of the discussion.</p> <p>Page 13 line 35: replace “our” with “this”</p> <p>CONCLUSION This is way too long, the conclusion should be 2-3 sentences in length.</p> <p>References are not included in a conclusion.</p> <p>You do not add new material into the conclusion, if this text is needed it should be added to the discussion</p> <p>TABLE 1 “Struck-by”, struck by what?, above this you have struck by motor vehicle, could this not be part of an assault?</p> <p>TABLE 2 Again, struck by what? An object?</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer Name Audrey Reichard

Institution and Country National Institute for Occupational Safety and Health, USA

Please state any competing interests or state ‘None declared’: None declared

Please leave your comments for the authors below

I enjoyed reviewing this paper and think it has the potential to make a valuable contribution to the EMS literature. However, I identified multiple concerns that should be addressed prior to publication.

Disclaimer: The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health

I appreciated the opportunity to review this novel paper that analyzes data from a voluntary near-miss reporting system using a mixed-methods approach. EMS workers have high rates of nonfatal injury as compared to the general working population, but there is no single system that comprehensively captures all of these injuries. Consequently, there is intrinsic value in adding another data perspective into the existing research. The qualitative data in this study suggest areas that would benefit from additional research as well as important safety concepts identified by the providers themselves. While this is a worthwhile effort, I recommend that the authors consider multiple revisions to improve the overall quality of the paper; more effectively relay their findings; and link their results to the information in the discussion section. I have listed my comments/recommendations below by section.

Abstract

1. The abstract will need to be modified based on other changes made within the paper in response to reviewer comments. Done

Strengths and limitations

1. Consider adding a bullet describing the types of incidents most likely to be captured in this system. I would guess it is biased towards assault and motor vehicles as those are more sentinel near miss events compared to contact with objects and trips and falls. More importantly, bodily motion/overexertion, the most common event associated with EMS nonfatal injuries, has limited

likelihood of appearing in a near miss system.
We have added an additional bullet in this section.

2. You note that results can't be generalized to the US fire service, but you may also want to consider noting that results can't be generalized to the EMS worker population in general. Agreed. This change has been made throughout the document.

Introduction

1. Second paragraph: 2012 NEISS-Work numbers are now available on the NIOSH EMS website. We have updated this paragraph with the new data.

2. Second paragraph: The first paragraph talks about injury risks and overall exposure. The second paragraph provides injury estimates and then resumes talking about exposure from the perspective of the number of medical calls received. It would improve flow if the last section of the second paragraph was part of, or immediately followed the first paragraph.

Done.

If additional nonfatal data are needed for the injury paragraph, you could use the SOII numbers provided in Dr. Brain Maguire's 2013 Prehospital Disaster Medicine publication titled "Injuries and Fatalities among Emergency Medical Technicians and Paramedics in the United States."

Thank you. We believe the data provided by NEISS are sufficient for the background.

3. Third paragraph, first sentence: The references cited relate to the first half of this sentence only. Move them forward to the semi-colon. Completed

4. Third paragraph, last sentence: I struggled a bit with tying the objective to the actual study results. As written, the objective seems to be more reflective of the NFFNMRS itself. Consider revising to indicate that your aim was to identify common injury mechanisms and possible prevention considerations from the perspective of EMS providers.

We have modified to, "Our study aimed to investigate commonly reported injury mechanisms and prevention opportunities among EMS responders who reported events to the National Fire Fighter Near-Miss Reporting System (NFFNMRS)."

Methods

1. Case Inclusion, first paragraph: When I initially read the sentence about defining EMS responders as BLS, ALS, etc., I interpreted it to mean that the authors coded them as such within the data. However, when I looked at the near-miss system, it was not clear to me how this could be done with the provided information. While first responders are not mentioned in your list, it was not clear to me how you could exclude firefighters trained on the emergency medical responder/first responder level only. Please clarify this sentence.

We did not exclude firefighters who were trained in EMS response. In fact, our language is quite specific to signify their inclusion: "This included fire fighters who are cross-trained to provide patient care during emergency medical calls." To clarify we have changed this sentence to: "The NFFNMRS accepts reports from fire-based EMS and standalone EMS providers. This includes providers from firefighter first responders, BLS provider, ALS providers, and paramedics"

2. Case inclusion, second paragraph: Figure 1 does not provide additional information to help in understanding the text. Rather, it briefly describes the dichotomous process already in the text. In addition, the inclusion criteria in this paragraph are not in Figure 1 limiting its utility. I recommend removing Figure 1.

Providing a case inclusion criteria flowchart is strongly recommended under the STROBE criteria for scientific clarity. This would enable anybody else with access to the data to repeat our methods. Therefore we choose to retain it in the paper for reasons of transparency. However we have added additional language to clarify the process.

3. Coding structure and method, second paragraph: The "coding structures" referred to in the first sentence seem to apply only to the mechanism of injury. If this is correct, please refer to them as such or simply as "The mechanism of injury codes (Table 1)..."

This has been corrected and clarified.

4. Coding structure and method, second paragraph: The second sentence needs to be revised to clearly indicate that “This study” is not referring to the current study. This has been corrected and clarified.

5. You provided a nice description of the qualitative analysis.

We greatly appreciate that feedback.

Results

1. Quantitative findings, second paragraph: The effort to code nature of injury and describe the findings in this paper seem out of place given that this is a near-miss system where most incidents will not result in an actual injury. There is no strong tie between the findings of “nature of injury” analysis and the rest of the paper. In addition, almost half of these cases are “other, unspecified” and an additional five are exposure to infectious disease, not an actual diagnosis. I recommend eliminating this component.

As stated at the beginning of this paper, the national firefighter near miss reporting system accepts reports for near misses and the actual injuries. While this may not reflect the commonly held the definition of a near miss, it is what the IAFC chose as what could be reported. We have added some emphasis in bold to signify this in the beginning of the manuscript. This is another reason Figure 1 is important, because it shows when an actual injury occurs, that a diagnosis for that injury can be assigned. Obviously near miss events would never have a diagnosis associated with them.

2. Qualitative findings: The four domains identified in this section do not match the “qualitative coding categories” in Table 1 and it is not clear why there is a discrepancy.

Table 1 contains the a priori coding rubric for the narratives. Each node that we chose to amplify with in the results was present in this rubric. We have clarified within this portion of the results why the four nodes were important to our understanding of injury risk to EMS responders.

3. Qualitative findings: The purpose of a theme is to represent a concept that ties all the interviews together. Three of the four domains seem to do this, but the domain of “assaults” does not serve this function as it applies to only a select group of cases. In addition, “assaults” is a mechanism of injury mentioned under the quantitative coding column of Table 1, while the other domains are more geared toward prevention practices and identified as qualitative codes within the table. The structure of the NFFNMRS offers two overarching categories: (1) Detailed description of the event and (2) lessons learned. “Assaults” easily falls under the first category and the remainder of the identified domains fall under the second category. I think you should consider revising the Results section considerably, especially given your discussion of motor vehicle incidents in the Discussion section. I recommend a qualitative section discussing incidents related to the three primary injury mechanisms, at a minimum. Then, the remainder of your qualitative analysis can be moved into a “lessons learned” section, which will contain the three other identified domains. Of note, this may necessitate recoding some of the findings under the Assaults section as there are some recommendations for prevention/lessons learned under this description.

There were many importance suggestions made in this particular point. We revise the results to include information on the motor vehicle hazard specifically. We have followed the reviewer's guidance and had broken apart the two hazards of motor vehicles and assault, followed by the three themes that were merchants from the lessons learned. These results are introduced by the following lead-in:

“Two nodes representing significant EMS responder hazards (Assaults by Patients, Risks from Motor Vehicles), and three nodes reflective of the lessons learned from events are further explored because of their importance to prevention planning in the injury risks of EMS responders (Personal Protective Equipment (PPE); Relationships between Emergency Responders; and Policies, Procedures and Practices).”

4. Qualitative findings: The listing of the unique identifier numbers for individual reports throughout this section is distracting. In addition, I am concerned that it artificially creates a quantitative value for

a comment/code grouping when multiple case numbers are listed. I recommend keeping these codes for direct quotations only.

We provide these identifiers so that interested parties could go back to the near miss reporting system and pull the entire narrative. The IAFC makes these reports available through its website. This is similar to other agencies like OSHA and then NIOSH FFF IPP program that allow downloadable reports. We include these identifiers to be transparent and helpful to the readers, particularly our fire service partners. The number of cases referenced, is not meant to imply frequency of events, but there probably is a connection. We have included them in the paper because we think they are exemplary narratives that interested parties may want to reference.

5. Qualitative findings, assaults, third paragraph: In the last sentence of this paragraph it is unclear whether the patients are under the influence and carrying weapons or if this is two groups of patients. Please clarify.

This has been clarified.

6. Qualitative findings, assaults, checklist: While the development of a checklist to help assess the potential for violent incidents is a useful concept, I have several concerns related to the development and format of the checklist in this study. It is not clear that this checklist is grounded in the results of this study nor is it clear that the checklist is based on the findings of other research studies. The checklist itself is not formatted as a checklist, but rather as a list of concepts, and it is unclear how this would be useful to an EMS worker in the existing format. Finally, I am concerned that some of the issues listed in Table 4 would be: 1) difficult to assess (e.g., immigration status); 2) promote stereotypes (e.g., cultural differences); and 3) difficult to interpret (e.g., home status). Because much of this checklist is lacking evidence of a direct tie to the study findings and because it does not appear to be supported by any literature, I recommend removing the table and supporting text from the paper. This has been removed.

7. Qualitative, relationships with emergency providers, third paragraph: The last quotation in this paragraph was not easy to interpret. Does this mean EMS and LEOs now consistently support physical scene protection by the fire department or that physical scene protection is no longer consistently offered? We agreed this quote is confusing. It represents a divergent viewpoints, but we have removed it for simplicity.

8. Qualitative, Policies, procedures, and practices: The italicized sub-themes in this section are not in Table 1. It seems as though Table 1 should be used to provide an overview of the relationships between themes and sub-themes, yet it does not directly correspond to the Results section. This has been corrected and the table updated.

Discussion

1. Overall, I felt the findings in the results section and the discussion were disconnected. However, should the authors choose to modify the results and describe more than just assaults in detail, the motor vehicle discussion will become more interconnected. In addition, the link between the qualitative findings and discussion was weak. Both of these issues deserve additional attention.

2. Second paragraph: When citing references describing assault among paramedics, consider including the article from Bigham et al. in the July/September 2014 issue of Prehospital Emergency Care. Done.

3. Second paragraph: While the Curbside Manner program referenced would likely be helpful in preventing and diffusing violent situations, it is not the only available program or option nor does it appear to be comprehensive for violence prevention. I think it would be beneficial to mention that other options are also available. You may also want to mention that no one program has been formally evaluated for effectiveness. We added two other known programs and addressed your evaluation point.

4. Third paragraph: Similar to the comment above, the program cited is not the only available program. I would recommend not presenting it in a way that it may be interpreted as the sole solution. Also, like the violence programs, I don't believe there has been a formal evaluation of any of these motor vehicle programs for effectiveness. We addressed your evaluation point.

5. Third paragraph: Add USFA into your list of credits for the Improving Apparatus Response program

if this specific reference remains in the text. Done.

6. Third paragraph, second sentence: You may want to refrain from saying this finding “supports recent research” as it really doesn’t support it so much as it may align with it. Done.

7. Third paragraph: Remove “...health and...” as health is not generally the primary concern in the realm of motor vehicle operations and scene safety. Done.

8. Conclusion, second paragraph: This paragraph is the only part of the discussion that directly discusses the qualitative results, but it is largely a synopsis of the results section. Can you tie any literature or external information into these findings? This has been greatly reduced and revised.

9. Conclusion: In general, the conclusion does not seem to address the objective. Rather, it seems to be more focused on publicizing NFFNMRS. While it is OK to tout the benefits of NFFNMRS, change the focus to correlate with the study objective. This has been greatly reduced and revised.

References

1. Reference 4: Add “s” after “Center” and consider providing website link. Done.

2. Reference 13: Why is this the only reference to include a doi? This has been removed, as the DOIs are not part of the BMJ open citation framework.

3. Journal names: Some are abbreviated and some are spelled out. Make this consistent.

Tables and figures

1. Table 1: The qualitative section, which is the most beneficial part of this table, does not directly correspond to the Results section as some concepts are omitted and unmentioned concepts are included. It seems as though this should reflect the actual results write-up. Consider omitting the quantitative codes as many are never discussed in this paper. The table has been updated to reflect the sub themes in the qualitative results.

2. Table 2: Add “Voluntarily Reporting to NFFNMRS” to the end of the table title. Done

3. Table 3: Regardless of whether or not you keep the nature of injury analysis in the text, I recommend removing this table because almost half are “other, unspecified” and this is a very small segment of your total population. Done

4. Table 4: I suggest removal as per the comments in the Results section above. Done.

5. Figure 1: I suggest removal as per the comments in the Methods section above. In keeping with our previous comments on this advice, we are keeping the figure in order to convey clarity in our decision-making.

Reviewer Name Ass Prof Zlatko Ulovec, MD, DMD, PhD

Institution and Country School of Dental Medicine University of Zagreb, Croatia

Please state any competing interests or state ‘None declared’: None declared

Please leave your comments for the authors below

I am of the opinion that the subject discussed within the article represents a valuable contribution to a somewhat underrepresented issue of concern, i.e. the health of healthcare providers. Though of sufficient merit to be published in Your esteemed journal, I can only recommend its publishing as an expert, not an original scientific contribution.

Reviewer Name Dr Mal Boyle

Institution and Country Monash University

Australia

Please state any competing interests or state ‘None declared’: None declared

Please leave your comments for the authors below

GENERAL COMMENTS

This manuscript has merit, however, there are several issues which need to be resolved before it is of

publishable standard.

COMMENTS

Introduction

It is not clear which prehospital workers you are actually referring, e.g. you mention EMT, EMS Responders, and Paramedics, and then go on to discuss workplace risks encountered by EMS Responders. Which group do you actual mean or do you include first responders and EMTs of all levels (which includes paramedics) as EMS Responders. Do you also include EMTs who work for ambulance companies only?

To clarify we have changed this sentence to: "The NFFNMRS accepts reports from fire-based EMS and standalone EMS providers. This includes providers from firefighter first responders, BLS provider, ALS providers, and paramedics"

Page 4 line 25: Don't organisations capture injury data for OH&S requirements and sickness leave? Certainly, but they do not necessarily report this to a national level organization. Lost work time injuries may be reported to OSHA, and states have difference lost time thresholds before benefits are applied. This largely underestimates fire and rescue service injuries nationally.

Page 4 line 36: use the word "and" not "&" Done.

Page 4 line 43-47: What about the ambulance companies increasing call rate? Does this add to the overall increase in EMS usage?

Of course. As we explain in the paper, according to the National Fire Protection Association's Fire Loss in the U.S. During 2012 report, fire departments responded to 27,705,500 emergency medical calls, a 28% increase from the previous year. This increase in medical service calls reflects the changing work of the U.S. Fire and Rescue service and therefore warrants a deeper inspection regarding the hazards associated with this growing responsibility.

METHODS

Can you be sure that only firefighters add data to the website and not ambulance company EMTs?

As above, clarified who was able to report: "The NFFNMRS accepts reports from fire-based EMS and standalone EMS providers. This includes providers from firefighter first responders, BLS provider, ALS providers, and paramedics"

How did you account for miscoding of the data entry? Are you sure you haven't missed any relevant records?

Misclassification in this data system is a considerable issue. That is the reason we reviewed all 765 records associated with the non-fire emergency events. There were certainly events that did not make it into this category and may have been present in fire emergency events. As classifying these events into these categories was the responsibility of the voluntary reporter, we had to rely on their selection. All cases reported to the near miss system were reviewed by an experienced firefighter who usually called back the reporter contact information was provided. The reviewer would go over all of the details of the events and would make any corrections if something were not classified properly.

There is no comment about Institutional Review Board approval, you are accessing human related data which may be accessed with the information you have provided to identify a specific incident that may cause the participant to be identified.

We have included a copy of our institutional review board approval for this project. The data we analyzed are the property of the Fire Chiefs (IAFC). The IAFC acquired the data voluntarily from individuals. We (Drexel) received a de-identified data set for analysis. The IAFC stripped all identifiers (name, city, engine number, etc) from the individual respondent's narrative. We have no way to identify the individual.

Page 6 line 8-12: What about firefighter first responders?, they are part of the EMS response? Could these numbers have been missed?

To clarify we have changed this sentence to: “The NFFNMRS accepts reports from fire-based EMS and standalone EMS providers. This includes providers from firefighter first responders, BLS provider, ALS providers, and paramedics”

Page 4 line 13-15: The firefighters can be trained to EMT – Paramedic and may be working on an ambulance run by the fire service so act as an EMS response, but they could be working on a fire truck and act as a first responder. How is all this data captured, this point needs to be clarified. Please see the above response.

RESULTS

Page 9 line 54-56: This should be in the discussion not the results, the results are for what you found only. We have removed to this section and the check list entirely.

Page 10: information about the checklist you created has no relevance to the study, it should be deleted and written up in another paper. We have removed to this section and the check list entirely.

DISCUSSION

Limitations section should be the last paragraph of the discussion. Done.

Page 13 line 35: replace “our” with “this” Done.

CONCLUSION

This is way too long, the conclusion should be 2-3 sentences in length. We moved the introduction of the conclusion to the beginning of the discussion.

References are not included in a conclusion. Done.

You do not add new material into the conclusion, if this text is needed it should be added to the discussion

TABLE 1

“Struck-by”, struck by what?, above this you have struck by motor vehicle, could this not be part of an assault? The assault category is separate from the struck by motor vehicle category. If it was determined that a motor vehicle was used to assault an EMS responder it would have been coded to assault. We do not have any record of such cases.

TABLE 2

Again, struck by what? An object? This has been clarified.

VERSION 2 – REVIEW

REVIEWER	Audrey Reichard National Institute for Occupational Safety and Health, USA
REVIEW RETURNED	24-Mar-2015

GENERAL COMMENTS	Disclaimer: The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health While it is evident that this manuscript has been revised, I’m
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concerned that the correct version was not resubmitted for re-review. There are multiple areas in the “Author’s response to Decision Letter” where the author indicated a change had been made, but that change is not reflected in the actual manuscript. It is inconsistent as some of the changes were actually implemented, but others are simply noted in the author’s response. This is especially relevant in the discussion section where some significant changes are proposed but not implemented. I believe the authors need to double-check their files to be sure they submitted the correct version.

Despite this, I did spend some time reviewing this version. It is much improved from the previous version, but still needs refined which may be largely addressed in a version correlating with the complete author response. I did not point out every comment that was made in the author response but not addressed in the manuscript as this would have been too extensive. Here are some of the remaining outstanding issues:

Abstract, third paragraph, third sentence: Should this be “five” instead of “four”?

Introduction, third paragraph: “However, in 2012 the occupational supplement to the National Electronic Injury Surveillance System (NEISS-Work) found...”

Introduction, fourth paragraph: New objective in author’s response is good, but not revised here.

Methods, Case Inclusion, second paragraph: “...sufficient information to conclude the patient was...”

Results, Qualitative findings: I’m still struggling with the codes as they are represented in the text and as they are represented in Table 1. The language needs to be the same, but maybe this was a change I didn’t receive (e.g., Relationships” in table should say “Relationships between emergency responders”).

Results, Assaults by patients, second paragraph: There needs to be a sentence in front of the second quote to connect it to the paragraph as the next two quotes are not specific to anticipating danger. Something such as, “Regardless of whether or not an EMS responder anticipates danger, it can appear instantaneously.”

Results, Assaults by patients, third paragraph, first sentence: Extra commas included here.

Results, Risks from Motor Vehicles: The addition of data to support your motor vehicle discussion later on is good.

Results, Risks from Motor Vehicles, first paragraph, first sentence: Change first responders to EMS responders to maintain consistent terminology and meaning.

Results, Risks from motor vehicles, text above third example: Is “constantly” really the frequency you intend to imply?

Results, Risks from Motor Vehicles, third example: “The patient did not sustain any further injury from this even but...” Should “even” be “event”?

Discussion: There is now a good link between the event results and the discussion. However, the other qualitative findings are not really recognized in this section. (Policy and practice is a little, but could be stronger.) Consider tying the other findings to the discussion.

Conclusion, pluralize first sentence: “... that fire and emergency services”

Conclusion, first paragraph: This talks about recommendations for “EMS equipment,” but in relation to injury prevention I’m not sure what that would be other than PPE. Is this meant to capture vehicles?

Conclusion, first paragraph, last sentence: This sentence seems out

	<p>of place located here.</p> <p>Conclusion, second paragraph, third sentence: This isn't quite true as written as we know assaults are an issue. To encompass all mechanisms, consider something like, "The narrative data add extensive insight into the concerning issue of patient assault to EMS providers as well as contributing factors surrounding struck-by MV and MV collisions.</p> <p>Figure 1: Appears to be in the Track Changes version, but not in the clean copy.</p>
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REVIEWER	Dr Mal Boyle Monash University Australia
REVIEW RETURNED	08-Apr-2015

GENERAL COMMENTS	<p>The manuscript reads much better but still needs a statement about IRB/ethics committee review.</p> <p>COMMENTS METHODS</p> <p>There still needs to be a sub-heading for Ethics and a statement of approval or wavier by an IRB or ethics committee, even though you are using de-identified data.</p>
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VERSION 2 – AUTHOR RESPONSE

Reviewer Name Audrey Reichard
Institution and Country NIOSH, USA

While it is evident that this manuscript has been revised, I'm concerned that the correct version was not resubmitted for re-review. There are multiple areas in the "Author's response to Decision Letter" where the author indicated a change had been made, but that change is not reflected in the actual manuscript. It is inconsistent as some of the changes were actually implemented, but others are simply noted in the author's response. This is especially relevant in the discussion section where some significant changes are proposed but not implemented. I believe the authors need to double-check their files to be sure they submitted the correct version. Despite this, I did spend some time reviewing this version. It is much improved from the previous version, but still needs refined which may be largely addressed in a version correlating with the complete author response. I did not point out every comment that was made in the author response but not addressed in the manuscript as this would have been too extensive. We have addressed this error and apologize for the confusion.

Here are some of the remaining outstanding issues:

Abstract, third paragraph, third sentence: Should this be "five" instead of "four"? DONE

Introduction, third paragraph: "However, in 2012 the occupational supplement to the National Electronic Injury Surveillance System (NEISS-Work) found..." DONE

Introduction, fourth paragraph: New objective in author's response is good, but not revised here. DONE

Methods, Case Inclusion, second paragraph: "...sufficient information to conclude the patient was..." DONE

Results, Qualitative findings: I'm still struggling with the codes as they are represented in the text and as they are represented in Table 1. The language needs to be the same, but maybe this was a change I didn't receive (e.g., Relationships" in table should say "Relationships between emergency responders"). DONE

Results, Assaults by patients, second paragraph: There needs to be a sentence in front of the second quote to connect it to the paragraph as the next two quotes are not specific to anticipating danger. Something such as, "Regardless of whether or not an EMS responder anticipates danger, it can appear instantaneously." DONE

Results, Assaults by patients, third paragraph, first sentence: Extra commas included here. DONE

Results, Risks from Motor Vehicles: The addition of data to support your motor vehicle discussion later on is good. We deeply appreciate this feedback.

Results, Risks from Motor Vehicles, first paragraph, first sentence: Change first responders to EMS responders to maintain consistent terminology and meaning. DONE

Results, Risks from motor vehicles, text above third example: Is "constantly" really the frequency you intend to imply? Agreed, this language has been revised.

Results, Risks from Motor Vehicles, third example: "The patient did not sustain any further injury from this even but..." Should "even" be "event"? DONE

Discussion: There is now a good link between the event results and the discussion. However, the other qualitative findings are not really recognized in this section. (Policy and practice is a little, but could be stronger.) Consider tying the other findings to the discussion. Thank you for this feedback, we feel that the discussion encompasses all of the results sufficiently.

Conclusion, pluralize first sentence: "... that fire and emergency services" DONE

Conclusion, first paragraph: This talks about recommendations for "EMS equipment," but in relation to injury prevention I'm not sure what that would be other than PPE. Is this meant to capture vehicles? Agreed, this language has been revised.

Conclusion, first paragraph, last sentence: This sentence seems out of place located here. Agreed, this language has been revised.

Conclusion, second paragraph, third sentence: This isn't quite true as written as we know assaults are an issue. To encompass all mechanisms, consider something like, "The narrative data add extensive insight into the concerning issue of patient assault to EMS providers as well as contributing factors surrounding struck-by MV and MV collisions. DONE, thank you for this suggestion.

Figure 1: Appears to be in the Track Changes version, but not in the clean copy. We have not re-uploaded Figure 1. This Figure remains unchanged from our original submission.

Reviewer Name Dr Mal Boyle
Institution and Country Monash University, Australia

Please leave your comments for the authors below
GENERAL COMMENTS

The manuscript reads much better but still needs a statement about IRB/ethics committee review.
DONE, a heading has been added to the manuscript to address this concern.

COMMENTS

METHODS

There still needs to be a sub-heading for Ethics and a statement of approval or wavier by an IRB or ethics committee, even though you are using de-identified data.

DONE, a heading has been added to the manuscript to address this concern.