

## 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

<b>TITLE (PROVISIONAL)</b>	Age and nationality in relation to injuries at sea among officers and non-officers: a study based on contacts from ships to Telemedical Assistance Service in Denmark
<b>AUTHORS</b>	Herttua, Kimmo; Gerdøe-Kristensen, Stine; Vork, Jan C.; Nielsen, Jesper Bo

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Marcus Oldenburg Institute for Occupational and Maritime Medicine, Hamburg, Germany
<b>REVIEW RETURNED</b>	17-Oct-2019

<b>GENERAL COMMENTS</b>	<p>Herttua et al. explored the association between age, nationality and injuries among officers and ratings in the Danish-flagged merchant fleet. The study was designed as a retrospective cohort study.</p> <p>The cohort included data from the TMAS in Denmark covering the years from 2004 till 2014 and the data were linked with the Danish Register of Shipping. The included seafarers were grouped into 3 categories: under 30 years, from 30 to 49 years, and older than 50 years. Furthermore, the seafarer were grouped in respect of their nationality and their occupational status (officers and ratings).</p> <p>Endpoints were defined as TMAS contacts with an ICD-10-registered injury. Subcategories of injuries were determined by a broad anatomic location or type. They included injuries to the</p> <ol style="list-style-type: none"> <li>1. head (S00-09),</li> <li>2. injuries to the neck, thorax, abdomen, lower back, lumbar spine and pelvis (S10-39 and T08-09),</li> <li>3. injuries to the upper limb (S40-69 and T10-11),</li> <li>4. injuries to the lower limb (S70-99 and T12-13),</li> <li>5. injuries involving multiple body regions and effects of foreign body entering through natural orifice (T00-07 and T14-19),</li> <li>6. burns, poisoning and other injuries (T20-79 and T90-98).</li> </ol> <p>General evaluation The data of the present manuscript confirm the findings from previous studies that</p> <ol style="list-style-type: none"> <li>a. ratings showed a distinctly higher risk for injuries than officers</li> <li>b. the risk increases in older and younger seafarers compared with those aged 30-39 years and</li> <li>c. ratings from the EU had an increased risk for injuries compared to their counterparts from outside the EU.</li> </ol>
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	<p>As a new aspect the authors categorized in their register-based study the injuries according to their anatomic location (see above) and evaluated their association to sociodemographic characteristics. This is a new approach and will likely attract the interest of the readership of BMJ Open. The paper is clearly written and well structured. There are only a few points of criticism that needs to be addressed:</p> <p>Specific topics Abstract</p> <ul style="list-style-type: none"> <li>• The used TMAS data derived from recordings in the time span from 2004-2014. Why did the authors present these older data instead of newer ones (up to 2018)?</li> </ul> <p>Methods</p> <ul style="list-style-type: none"> <li>• The authors stated that in case there “were two or more contacts to TMAS on one person within a two-year period regarding an identical injury category, only the first contact was taken into account”. This may lead to a considerable underestimation of happened injuries. To my own experience, particularly the galley staff on board is at high risk for injuries during handling with sharp cooking utensils. Therefore, there is a high risk for injuries due to cuts or burns in this occupational group that may occur also within two years. This needs to be mentioned as limitation of the study. In general, is it possible to receive some information about the risk for injuries related to this occupational group? Generally, it should be taken into consideration that the group of “ratings” (including the galley staff) is relatively heterogeneous.</li> <li>• It needs to be explained if the females among the seafarers (obviously 3% of the total group) were excluded. In this case this must be explained at several places of the manuscript (e.g. “the study aims to quantify risk for injuries among male officers...”). Otherwise, some explanations about the gender-related differences in risk assessment must be provided.</li> <li>• The authors classified the nationality of seafarers into 3 categories: Danish, non-Danish European Union, and non-European Union citizens. I have the impression that the 2nd group “non-Danish European Union seafarers” is used inconsistently in the manuscript: in Tab. 3 this group is named “EU” (excluding the Danish seafarers - as described in the previous text to this Table?). In addition, what was the reason to summarize the Danish and the other European officers when presenting the Odds Ratio concerning different types of injuries (page 11, line 58)?</li> <li>• The seafarers were also classified according to their occupational group: deck officers, engine officers, and ratings and other occupation. What is actually meant by “other occupation”?</li> </ul> <p>Results</p> <ul style="list-style-type: none"> <li>• I agree with the authors’ statement that “significant interactions between age and occupations, and nationality and occupations” exist. Therefore, the conclusion in the Abstract and at the end of the Discussion that “position and age are independent risk factors for several types of injuries on board” is misunderstanding and should be revised. These risk factors are significant, but not independent.</li> <li>• The study group in Table 3 does only rely on examined ratings. Therefore, the respective previous text should only use the</li> </ul>
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	<p>description “ratings” instead of “seafarers”. Furthermore, in this Table the line header “Burn, poisoning and other injuries” is incomplete.</p> <ul style="list-style-type: none"> <li>• Generally, I recommend highlighting significant findings in bold type in all Tables.</li> <li>• Figure 1 should present - as consistently done in the whole manuscript - the injury rate in 1,000 person years. The rate is relatively constant during the examination time with the exception in 2014. How can the authors explain this remarkable increase in this last year of observation period?</li> </ul> <p>Discussion</p> <ul style="list-style-type: none"> <li>• The study gives an impression on the numbers of injuries on ships contacting RMD: This does not necessarily reflect the burden of injuries in the international fleet, as safety standards of the fleet will be higher.</li> <li>• The study does not differentiate between merchant fleet and fishing boats, which have a relevant higher rate of accidents.</li> <li>• Underestimation may also result from ships contacting other TMAS services than RMD in Denmark.</li> <li>• The authors observed that ratings from outside the EU demonstrated a decreased risk for injuries. As the ratings normally are trained in their home country, different standards of education concerning safety culture and safe behaviour on board can be assumed. This also needs to be discussed.</li> <li>• Page 15, line 37: “overestimated” instead of “overestimates”</li> <li>• As limitation of this study the authors discussed that many contacts from ships to TMAS had used the unclear ICD10 code R00-R99. To provide the reader an impression of the relevance of this effect, an approximate percent value of this not-attributable denomination should be given.</li> <li>• In Discussion some headings are to be included: e.g. Strengths and Limitations, Conclusions</li> </ul>
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<b>REVIEWER</b>	Laurel Kincl Oregon State University, United States
<b>REVIEW RETURNED</b>	20-Oct-2019

<b>GENERAL COMMENTS</b>	<p>BMJopen-2019-034502</p> <p>This paper describes an analyses of the data collected in the Telemedical Assistance Service in Denmark. The objectives were to describe the injuries and to determine if age, position and nationality were related to the incidence and type of injury. This provides some important findings for an understudied worker population, however additional background information on this population and work environment is needed and I suggest the following to improve the paper:</p> <ul style="list-style-type: none"> <li>• Some of the language common to the industry must be standardized throughout the abstract and paper. All are accurate but deciding on your term to use would help the reader. For example, ships, fleet, shipping industry, merchant shipping, merchant fleets are all used. Also for the positions analyzed in this paper and that are commonly referred to in the industry – you used “ratings” in the abstract but this term may not be commonly known. Basically you analyzed between officers and non-officers with each group having several occupations included. Consider that the reader may not know these terms and use accordingly throughout.</li> <li>• The introduction should not be a literature review but rather provide a brief background of the industry, the workers in this industry including describing the typical occupations and what their</li> </ul>
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	<p>tasks typically are, and the significance of the industry. Make the case of why providing medical care and public health practices for the prevention of injuries and illness at sea in these work environments is important and what your analysis can provide for this understanding. Also you selected age and nationality and you need to provide some insight to the demographics of this industry and why this may be important for injury prevention?</p> <ul style="list-style-type: none"> <li>• Describing injury patterns are important for development of prevention strategies so could additional descriptive statistics be provided that are an overview of the body part, event, and nature of injuries – it was not clear how you determined the categories you shared in the paper that are a mix of body part and nature (burns...). Typically, the nature or event is most helpful for prevention and taken into account with body part (cross-tabulated) can help. With ICD 10 codes seems like a more sophisticated injury epi study could be conducted.</li> <li>• Looking into factors that could be related to injury - the age, nationality and position is important, but there are other statistical modeling that could be applied to identify which of the factors are more significantly related rather than stratifying?</li> <li>• The discussion is long and should rather focus on content related to what is found in this study in relation to the current knowledge, and what further work could be done. Some of the content seems unrelated to the central purpose, i.e. on page 13 lines 20-35 you discuss long work hours, but that was not investigated in this study?</li> </ul> <p>Further revisions are suggested to improve this paper and detailed comments are provided below by section, page number and line.</p> <p>Abstract pg 2</p> <p>Line 10: do not understand “ratings” at this point. Objective should be more clear. For example could be rewritten: Characterization of worker injuries on board merchant ships is modest. Using telemedical service contacts in Denmark, we describe the worker injuries patterns and factors related to injury incidence.</p> <p>Line 15: include the n for the contacts since you included the n for the estimation of seafarers in line 20.</p> <p>Line 20: not clear if by data you are meaning the TMAS data or DMA or both?</p> <p>Line 24-29: this sentence is not needed in abstract.</p> <p>Line 51: You state in your analysis that there is a relationship between age and position so can you state they are independent?</p> <p>Pg 3-4. Introduction</p> <p>First two paragraphs can describe the citations in better detail. The Jensen et al was a self reported international study.... The Roberts et al study looked at fatalities globally so why put the sentence only describing British? Some of the sentences are long and awkward, for example Pg 3 lines 39-44 and Pg 4 lines 4-12</p> <p>P4. Methods- data sources</p> <p>You describe the use of the telemedical service, but is there any evidence of the use of the service? I.e. is this capturing more severe injuries as they have first aid on the vessel (trained personnel) and would not call unless they need advanced medical services? If this is the case you need to describe the representiveness of this data of the injury burden. Also is there a differential of who gets to call, are non-officers less likely to report anything to someone who initiate a call for fear of losing the job or being seen as weak at sea? You may not be able to get at this but some discussion either in the intro or discussion about this data source is important.</p>
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	<p><b>P5. Injury cases</b>          Lines 20-39: As mentioned in overall comments, describe why you selected these categories a priori or ?? Also why the two year period for 2nd contact? What are the basis for these assumptions/decisions for analysis.          Lines 44-55: not really sociodemographic but rather demographic, age and nationality. The position is really occupational. Was there any information about the experience or other demographic variables and why were these also not explored? Some statement here about the other data available is important and why the decision to focus on these.</p> <p><b>P 6. Statistics</b>          Were the two datasets matched? You need to describe how they were matched to get cases/non-cases. Need to provide more details of the parameters of the statistical testing – i.e. what p-value was used for the chi square tests?</p> <p><b>Page 6. Results</b>          Consider the title for the section. Better than Descriptive Statistics might be “Study Population Demographics”          table 1. In the parentheses include % since not described in the column title. Or else include this (%) in the column title.</p> <p>For entire results, if presenting the rates/Cis or ORs in tables, do not include or limit in the paragraphs. The text should point the reader to highlight the tables and not include the exact same information. If table or data not shown, then more appropriate to include some of these details.</p> <p><b>Pg 12-16 Discussion</b>          Long discussion that could be broken into sections to highlight the findings and implications. Some discussion should address what can be done to improve the work environments or health and safety programs in this fleet – what application can these findings inform? Also typically limitations can be a short section as well.</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer #1:

As a new aspect the authors categorized in their register-based study the injuries according to their anatomic location (see above) and evaluated their association to sociodemographic characteristics. This is a new approach and will likely attract the interest of the readership of BMJ Open. The paper is clearly written and well structured. There are only a few points of criticism that needs to be addressed:

Specific topics

Abstract

**POINT 1.** The used TMAS data derived from recordings in the time span from 2004-2014. Why did the authors present these older data instead of newer ones (up to 2018)?

**OUR RESPONSE:** The reviewer is correct that RMD has recorded contacts also for 2015-2018. Our initial idea was to use these data. However, some severe errors have occurred in transferring these records to a data set, which means that there is not any data available for these years at this point of time nor in the near future.

## Methods

POINT 2. The authors stated that in case there “were two or more contacts to TMAS on one person within a two-year period regarding an identical injury category, only the first contact was taken into account”. This may lead to a considerable underestimation of happened injuries. To my own experience, particularly the galley staff on board is at high risk for injuries during handling with sharp cooking utensils. Therefore, there is a high risk for injuries due to cuts or burns in this occupational group that may occur also within two years. This needs to be mentioned as limitation of the study. OUR RESPONSE: We aimed to reduce risk for overestimation of injuries with this definition because it may take several months, a year or even a longer time to recover from some types of injuries. It is, however, true that this definition may lead to an underestimation of injuries. This limitation has been acknowledged in the revised manuscript:

“Fifth, the definition that in case there were two or more contacts to TMAS on one person within a two-year period, only the first contact was taken into account, may lead an underestimation of occurred injuries.” P. 16.

POINT 3. In general, is it possible to receive some information about the risk for injuries related to this occupational group? Generally, it should be taken into consideration that the group of “ratings” (including the galley staff) is relatively heterogeneous.

OUR RESPONSE: The reviewer is correct that the group of ratings is heterogeneous. The reason why used only two occupational categories was that the data on the population at risk (i.e., the data from the Danish Maritime Authority) included only categories of “officers” and “other crew”. The term “ratings” is now replaced throughout with a more accurate term “non-officers” in the revised manuscript.

POINT 4. It needs to be explained if the females among the seafarers (obviously 3% of the total group) were excluded. In this case this must be explained at several places of the manuscript (e.g. “the study aims to quantify risk for injuries among male officers...”). Otherwise, some explanations about the gender-related differences in risk assessment must be provided.

OUR RESPONSE: Female seafarers are included in all analyses. We did not conduct analyses separately for men and women because of a low number of injuries among female seafarers. However, we calculated simple unadjusted incidence rates of injuries for both sexes. In the revised manuscript under Methods and Results chapters, we note:

“Similarly, due to a low number of female seafarers and injuries among them, we performed all analyses both men and women included.” P. 6.

“Unadjusted injury rates in men and women were 19.0 and 21.1, respectively.” P. 8.

POINT 5. The authors classified the nationality of seafarers into 3 categories: Danish, non-Danish European Union, and non-European Union citizens. I have the impression that the 2nd group “non-Danish European Union seafarers” is used inconsistently in the manuscript: in Tab. 3 this group is named “EU” (excluding the Danish seafarers - as described in the previous text to this Table?). In addition, what was the reason to summarize the Danish and the other European officers when presenting the Odds Ratio concerning different types of injuries (page 11, line 58)?

OUR RESPONSE: The reviewer is correct. We have revised the manuscript so that these terms are consistently used. We have also revised the sentence in page 11 to read:

“Officers from Denmark and non-Danish European Union countries had lower risk for burns, poisonings and other types of injuries than officers from non-European countries with ORs of 0.30

(0.13 to 0.67) and 0.13 (0.02 to 0.95), respectively.”

POINT 6. The seafarers were also classified according to their occupational group: deck officers, engine officers, and ratings and other occupation. What is actually meant by “other occupation”?

OUR RESPONSE: In case of merchant fleet, other occupation means galley staff. We have replaced the term “ratings” with “non-officers” throughout, which better reflect the true occupational positions. It is however important to mention that injuries among galley staff were few, less than 30 in the whole study period.

## Results

POINT 7. I agree with the authors’ statement that “significant interactions between age and occupations, and nationality and occupations” exist. Therefore, the conclusion in the Abstract and at the end of the Discussion that “position and age are independent risk factors for several types of injuries on board” is misunderstanding and should be revised. These risk factors are significant, but not independent.

OUR RESPONSE: We have revised both the abstract and the end of the discussion as follows:

“These findings suggest that non-officers, older but also younger, and European seafarers have an increased risk for several types of injuries on board Danish-flagged merchant ships.” P. 2.

“These register-based data demonstrate that non-officers, older but also younger, and European seafarers have an increased risk for several types of injuries on board Danish-flagged merchant ships.” P. 17.

POINT 8. The study group in Table 3 does only rely on examined ratings. Therefore, the respective previous text should only use the description “ratings” instead of “seafarers”. Furthermore, in this Table the line header “Burn, poisoning and other injuries” is incomplete.

OUR RESPONSE: We have changed the wording of the text and the table as suggested.

POINT 9. Generally, I recommend highlighting significant findings in bold type in all Tables.

OUR RESPONSE: We have highlighted the statistically significant ORs in bold type in Tables 2 and 3.

POINT 10. Figure 1 should present - as consistently done in the whole manuscript - the injury rate in 1,000 person years. The rate is relatively constant during the examination time with the exception in 2014.

OUR RESPONSE: The injury rate is now presented per 1,000 person-years in the revised figure.

POINT 11. How can the authors explain this remarkable increase in this last year of observation period?

OUR RESPONSE: Our data do not give a comprehensive answer to the reviewer’s question. These data only show that increases have occurred in all injury categories except in head injuries. We are not aware of any changes in safety culture, reporting of injuries to Radio Medical Denmark or registration of contacts at RMD. It is plausible that this finding results from several coincidental factors. In addition, a possibility that the increase is partially a matter of chance cannot be fully excluded. Future analysis with extended data will likely help to give an answer to this question. This limitation has been acknowledged in the revised manuscript:

“Sixth, our data do not give a comprehensive answer to a remarkable increase in injury rate in the last year of the study period. These data only show that increases have occurred in all injury categories except in head injuries. We are not aware of any changes in safety culture, reporting of injuries to RMD or registration of contacts at RMD. Future analysis with extended data will likely help to find an

answer.” P. 16.

#### Discussion

POINT 12. The study gives an impression on the numbers of injuries on ships contacting RMD: This does not necessarily reflect the burden of injuries in the international fleet, as safety standards of the fleet will be higher.

OUR RESPONSE: The reviewer’s interpretation is correct. This limitation has been acknowledged in the revised manuscript:

“Finally, we note that our data are country-specific and safety standards vary across countries. Consequently, these findings do not necessarily reflect the burden of injuries in the international fleet.” P.16.

POINT 13. The study does not differentiate between merchant fleet and fishing boats, which have a relevant higher rate of accidents.

OUR RESPONSE: In our analysis we include TMAS contacts from merchant fleet, which means that fishing boats and ferries are excluded. We have revised the “Material and methods” chapter as follows:

“In this retrospective cohort study, the cohort was defined as the seafaring population on board merchant ships registered in the Danish Register of Shipping.” P.4, the first sentence after the title.

“In our analysis, we include TMAS contacts from merchant fleet, which means that fishing boats and ferries were excluded.” P.5.

POINT 14. Underestimation may also result from ships contacting other TMAS services than RMD in Denmark.

OUR RESPONSE: We agree with the reviewer. In the revised manuscript, we note:

“It is noteworthy that underestimation may also result from ships contacting other TMAS services than RMD in Denmark.” P. 16.

POINT 15. The authors observed that ratings from outside the EU demonstrated a decreased risk for injuries. As the ratings normally are trained in their home country, different standards of education concerning safety culture and safe behaviour on board can be assumed. This also needs to be discussed.

OUR RESPONSE: We agree with the reviewer. In the revised manuscript, we note:

“These differences may result from the fact that non-officers are normally trained in their home country with different standards of education regarding safety culture.” P. 15.

POINT 16. Page 15, line 37: “overestimated” instead of “overestimates”

OUR RESPONSE: We have revised the wording as the reviewer suggested.

POINT 17. As limitation of this study the authors discussed that many contacts from ships to TMAS had used the unclear ICD10 code R00-R99. To provide the reader an impression of the relevance of this effect, an approximate percent value of this not-attributable denomination should be given.

OUR RESPONSE: We have revised this sentence to read:

“Second, as many as 23% of the contacts from ships to TMAS had been recorded with a diagnosis

code in the interval of “Symptoms, sign and abnormal clinical and laboratory findings, not elsewhere classified” (ICD10 codes R00-R99).” P. 16.

POINT 18. In Discussion some headings are to be included: e.g. Strengths and Limitations, Conclusions.

OUR RESPONSE: These headings and “Compared with other studies” are included in the revised discussion chapter.

Reviewer #2:

This paper describes an analyses of the data collected in the Telemedical Assistance Service in Denmark. The objectives were to describe the injuries and to determine if age, position and nationality were related to the incidence and type of injury. This provides some important findings for an understudied worker population, however additional background information on this population and work environment is needed and I suggest the following to improve the paper:

POINT 1. Some of the language common to the industry must be standardized throughout the abstract and paper. All are accurate but deciding on your term to use would help the reader. For example, ships, fleet, shipping industry, merchant shipping, merchant fleets are all used. Also for the positions analyzed in this paper and that are commonly referred to in the industry – you used “ratings” in the abstract but this term may not be commonly known. Basically you analyzed between officers and non-officers with each group having several occupations included. Consider that the reader may not know these terms and use accordingly throughout.

OUR RESPONSE: We agree with the reviewer that some terms used in the original manuscript may be unfamiliar to many readers. We have replaced the term “ratings” with “non-officers”.

POINT 2. The introduction should not be a literature review but rather provide a brief background of the industry, the workers in this industry including describing the typical occupations and what their tasks typically are, and the significance of the industry. Make the case of why providing medical care and public health practices for the prevention of injuries and illness at sea in these work environments is important and what your analysis can provide for this understanding. Also you selected age and nationality and you need to provide some insight to the demographics of this industry and why this may be important for injury prevention?

OUR RESPONSE: We believe that there are many acceptable ways to structure an introduction. We have structured the introduction, following a conventional organization of epidemiologic research in medical journals, as follows: 1) we introduce the topic, 2) we present shortly what is already known, 3) we show where the gap in the literature is, and 4) we demonstrate the objectives.

POINT 3. Describing injury patterns are important for development of prevention strategies so could additional descriptive statistics be provided that are an overview of the body part, event, and nature of injuries – it was not clear how you determined the categories you shared in the paper that are a mix of body part and nature (burns...). Typically, the nature or event is most helpful for prevention and taken into account with body part (cross-tabulated) can help. With ICD 10 codes seems like a more sophisticated injury epi study could be conducted.

OUR RESPONSE: The aim of the study was to investigate injuries characterized by anatomic location or type of injury using ICD-10 codes to categorize them. To our best knowledge, this is the first study which investigates this. We did NOT aim to examine accidents leading to injuries, on which there is more evidence available.

POINT 4. Looking into factors that could be related to injury - the age, nationality and position is important, but there are other statistical modeling that could be applied to identify which of the factors

are more significantly related rather than stratifying?

OUR RESPONSE: We agree with the reviewer, but the thing is that there were no other potential factors available. We have described in the methods section in p. 5 that "Sociodemographic characteristics were determined by the data obtained from the Danish Maritime Authority" and in limitations in p. 16 that "The type of data on the population at risk was also the reason why the number of explanatory or confounding variables was limited".

POINT 5. The discussion is long and should rather focus on content related to what is found in this study in relation to the current knowledge, and what further work could be done. Some of the content seems unrelated to the central purpose, i.e. on page 13 lines 20-35 you discuss long work hours, but that was not investigated in this study?

OUR RESPONSE: We believe that the length of the discussion (1628 words) is in line with the journal standards. A quick review on a random sample of 5 articles of BMJ Open published in August 2019 shows that the range of discussion length is from 1252 words to 2128 with a mean of 1566. We also believe that nothing of the content is unrelated to the central purpose. We agree with reviewer that discussion need to focus on what was found and possibly, but not necessarily, on what further work could be done. But it needs necessarily to try to find explanations for what was found. The discussion section the reviewer mentions relates to our efforts to find reasons for higher risk for injuries among non-officers.

Further revisions are suggested to improve this paper and detailed comments are provided below by section, page number and line.

Abstract p. 2

POINT 6.

Line 10: do not understand "ratings" at this point. Objective should be more clear. For example could be rewritten: Characterization of worker injuries on board merchant ships is modest. Using telemedical service contacts in Denmark, we describe the worker injuries patterns and factors related to injury incidence.

OUR RESPONSE: As the reviewer suggested, we have revised the objectives in abstract. P. 2.

POINT 7. Line 15: include the n for the contacts since you included the n for the estimation of seafarers in line 20.

OUR RESPONSE: N for the contacts is already presented in line 32. P.2.

POINT 8. Line 20: not clear if by data you are meaning the TMAS data or DMA or both?

OUR RESPONSE: This is clarified. In the revised abstract, we use the wording: "The final data..." P.2.

POINT 9. Line 24-29: this sentence is not needed in abstract.

OUR RESPONSE: The sentence was removed. P.2.

POINT 10. Line 51: You state in your analysis that there is a relationship between age and position so can you state they are independent?

OUR RESPONSE: OUR RESPONSE: We have removed this statement and revised both the abstract and the end of the discussion:

"These findings suggest that non-officers, older but also younger, and European seafarers have an increased risk for several types of injuries on board Danish-flagged merchant ships." P. 2.

"These register-based data demonstrate that non-officers, older but also younger, and European seafarers have an increased risk for several types of injuries on board Danish-flagged merchant

ships.” P. 17.

Introduction pp. 3-4

POINT 11. First two paragraphs can describe the citations in better detail.

OUR RESPONSE: In the revised introduction, we have added a sentence as follows:

“For example, in 2017, unintentional injuries were responsible for 36.5 million years lived with disability.”

POINT 12. The Jensen et al was a self reported international study.... The Roberts et al study looked at fatalities globally so why put the sentence only describing British?

OUR RESPONSE: Despite of its title, the Roberts et al. study was for the most part about British shipping. This global part was just one descriptive table with fatal accident rates derived from different studies with extremely mixed quality and a short paragraph.

POINT 13. Some of the sentences are long and awkward, for example Pg 3 lines 39-44 and Pg 4 lines 4-12 P4.

OUR RESPONSE: We have revised these sentences to read:

“Evidence on determinants or risk factors for injuries among seafarers is scarce, partially conflicting and much of it is based on self-reported data [6-9]. Nevertheless, earlier research consistently reports that non-officers or ratings have higher risk for injuries than officers [6-9].”

“Using data on contacts from ships to the Danish Telemedical Assistance Service, we quantified risk for injuries among officers and non-officers in the Danish-flagged merchant fleet. Moreover, we investigated associations of age and nationality with all-cause injuries and six broad categories of injuries, characterized by anatomic location or type of injury.”

Methods, data sources

POINT 14. You describe the use of the telemedical service, but is there any evidence of the use of the service? I.e. is this capturing more severe injuries as they have first aid on the vessel (trained personnel) and would not call unless they need advanced medical services? If this is the case you need to describe the representiveness of this data of the injury burden.

OUR RESPONSE: As we wrote in the Methods section, the RMD is staffed by a team of medical specialists which guarantees validity and reliability of the records. We are not aware of any published evaluation documents. The reviewer is correct that many minor injuries remain unreported to the TMAS as trained personnel can deal with them without advanced medical services. In Strengths and limitations, we note:

“Fourth, we had no information on severity of injuries. It is, however, likely that minor injuries remain unreported regardless of their anatomic location.”

POINT 15. Also is there a differential of who gets to call, are non-officers less likely to report anything to someone who initiate a call for fear of losing the job or being seen as weak at sea? You may not be able to get at this but some discussion either in the intro or discussion about this data source is important.

OUR RESPONSE: We have no information about this, but as the reviewer suggested, in the revised discussion chapter, we note:

“Moreover, non-officers may report less frequently injuries than officers due to worries for harmful consequences. This would result in underestimated injury rates among non-officers.” P. 13.

POINT 16. P5. Injury cases

Lines 20-39: As mentioned in overall comments, describe why you selected these categories a priori or?

OUR RESPONSE: As we wrote in POINT 3, the aim of the study was to investigate injuries characterized by anatomic location or type of injury using ICD-10 codes to categorize them.

POINT 17. Also why the two year period for 2nd contact? What are the basis for these assumptions/decisions for analysis.

OUR RESPONSE: We aimed to reduce risk for overestimation of injuries with this definition because it may take several months, a year or even a longer time to recover from some types of injuries. It is, however, true that this definition may lead to an underestimation of injuries. This limitation has been acknowledged in the revised manuscript:

“Fifth, the definition that in case there were two or more contacts to TMAS on one person within a two-year period, only the first contact was taken into account, may lead an underestimation of occurred injuries.” P. 16.

POINT 18. Lines 44-55: not really sociodemographic but rather demographic, age and nationality. The position is really occupational. Was there any information about the experience or other demographic variables and why were these also not explored? Some statement here about the other data available is important and why the decision to focus on these.

OUR RESPONSE: We have replaced “Sociodemographic characteristics” with more neutral “Covariates”. Please see our answer in POINT 4.

## Results

POINT 19. Consider the title for the section. Better than Descriptive Statistics might be “Study Population Demographics”.

OUR RESPONSE: We have removed the title “Descriptive results” as unnecessary.

POINT 20. Table 1. In the parentheses include % since not described in the column title. Or else include this (%) in the column title.

OUR RESPONSE: These % are now included in the column titles.

POINT 21. For entire results, if presenting the rates/CIs or ORs in tables, do not include or limit in the paragraphs. The text should point the reader to highlight the tables and not include the exact same information. If table or data not shown, then more appropriate to include some of these details.

OUR RESPONSE: We have followed the journal’s convention to present the most important results in the text. We have not shown, for example, all statistically significant estimates in the text but highlighted the most important estimates.

## Discussion

POINT 22. Long discussion that could be broken into sections to highlight the findings and implications. Some discussion should address what can be done to improve the work environments or health and safety programs in this fleet – what application can these findings inform? Also typically limitations can be a short section as well.

OUR RESPONSE: We have broken the discussion into section to underline findings and to compare them with those already published in the field, and to discuss strengths and limitations. As this is an epidemiologic rather than a policy paper, we prefer to discuss our epidemiologic findings and how they are related to existing research evidence. Please see also POINT 5.

### VERSION 2 – REVIEW

<b>REVIEWER</b>	Marcus Oldenburg Institute for Occupational and Maritime Medicine, Hamburg
<b>REVIEW RETURNED</b>	17-Nov-2019

<b>GENERAL COMMENTS</b>	All of my points of criticism have sufficiently been addressed. Well done! A very interesting paper!
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<b>REVIEWER</b>	Laurel Kincl Oregon State University, United States
<b>REVIEW RETURNED</b>	25-Nov-2019

<b>GENERAL COMMENTS</b>	<p>The authors have provided appropriate responses and revisions from the previous review and the manuscript is improved. There are a few suggestions to improve the language for clarity to consider:</p> <p>P3 Line 4 and P17 Line50: Consider removing the "older but also younger" from the sentence as it is awkward phrasing. Add a short sentence following stating. Additionally, age affected risk with the younger (&lt;30 years) and older (&gt;50 years) seafarers having increased risk.</p> <p>P6 Line 4: These are not covariates but rather independent variables.</p> <p>P6 Line 22: Consider revising second part of sentence to " all analyses included both men and women."</p> <p>P14 Line 16: Consider revising "non-officers may report injuries less frequently than officers...."</p>
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### VERSION 2 – AUTHOR RESPONSE

Reviewer #1:

All of my points of criticism have sufficiently been addressed. Well done! A very interesting paper!  
OUR RESPONSE: Thank you for this very positive comment.

Reviewer #2:

The authors have provided appropriate responses and revisions from the previous review and the manuscript is improved. There are a few suggestions to improve the language for clarity to consider:

POINT 1. P3 Line 4 and P17 Line50: Consider removing the "older but also younger" from the sentence as it is awkward phrasing. Add a short sentence following stating. Additionally, age affected risk with the younger (<30 years) and older (>50 years) seafarers having increased risk.

OUR RESPONSE: As the reviewer suggested, we have revised conclusions to read:

“These findings suggest that non-officers and European seafarers have an increased risk for several types of injuries on board Danish-flagged merchant ships. Additionally, age affected risk with the younger (<30 years) and older (>50 years) seafarers having increased risk.”

POINT 2. P6 Line 4: These are not covariates but rather independent variables.

OUR RESPONSE: We have replaced “covariates” with “independent variables” as the reviewer suggested.

POINT 3. P6 Line 22: Consider revising second part of sentence to " all analyses included both men and women."

OUR RESPONSE: We have revised this sentence to read:

“Similarly, due to a low number of female seafarers and injuries among them, all analyses included both men and women.”

POINT 4. P14 Line 16: Consider revising "non-officers may report injuries less frequently than officers...."

OUR RESPONSE: We have revised the sentence.