

PEER REVIEW HISTORY

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ARTICLE DETAILS

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| TITLE (PROVISIONAL) | Epidemiology of pediatric pain-related visits to emergency departments in the United States: a cross-sectional study |
| AUTHORS | Anderson, Jana; Oliveira J. e Silva, Lucas; Funni, Shealeigh; Bellolio, Fernanda; Jeffery, Molly |

VERSION 1 – REVIEW

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| REVIEWER | Donado, Carolina Boston Children's Hospital, Anesthesiology, Critical Care & Pain Medicine |
| REVIEW RETURNED | 22-Dec-2020 |

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| GENERAL COMMENTS | <p>This is an epidemiological study looking at the prevalence of Pain-related ED visits across the US. The study is very straight forward and presents data from the 2017 NHAMCS.</p> <p>In general, I believe the authors can add more details to the methods to give more context to the readers that are not familiar with the NHAMCS and their data collection and variable definitions.</p> <p>Additionally, I believe that presenting additional results of differences in the prevalence among sex would strengthen the manuscript's conclusion.</p> <p>Methods:</p> <p>The categorization of "Pain-related ED visits" and "Pain-related ED visits with a painful chief complaint" might not be accurate. In the NHAMCS, the Chief complaint tends to be only the 1st line of the RFV; the 2-5 line can be another concern from the patient's history. Therefore, if a patient has a "definitely painful" RFV in the 5th line, that might not be the chief complaint. I suggest changing the wording of these categories as "probably/definitely Pain-related ED visit" and "Definitely Pain-related ED visit" or something along those lines to increase clarity in the terminology.</p> <p>How were discrepancies in the RFV categorization between the two reviewers solved?</p> <p>Can you please be more specific in the definition of "trauma?" The variable "Injury" is a construct made by NHAMCS, and it might be useful for a reader not familiar with the survey to have the definition in the manuscript.</p> <p>It seems that not all the RFV categorized as "possible" or "definitely" pain-related are categorized by body location. Was</p> |
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| | <p>there an "other" category? What happens if, within the 5 RFV, a patient had more than one pain location?</p> <p>Did you use the inputted or unimputed data for the variables like age, sex, ethnicity, and race? There is a lack of detail around secondary variables used in the analysis, such as insurance, triage. I suggest adding information on how the NHAMCS defines these variables</p> <p>Results:</p> <p>Please revise the wording around the chief complaint. I believe it is more accurate to say the percentages reflect the proportion of patients with at least one "definitely pain-related" RFV.</p> <p>Does the proportion of ED admission with a "definitely pain-related" RFV follow the same trend in males and females?</p> <p>Similarly, I think it would be good to stratify the pain location by gender too. There might be differences between sexes that need to be taking into consideration.</p> <p>Discussion</p> <p>The authors mention possible trauma prevention initiatives. It might be important to highlight a couple of the ones that have proved to be successful.</p> <p>The authors discussed different aspects of pain management differences across the population. However, no data related to pain management is presented. Since the NHAMCS has information on medication prescribed, I wonder if the author considered adding this information to the analysis to strengthen the results.</p> |
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| REVIEWER | Jung, Jin Hee College of Medicine, Seoul National University, Seoul Metropolitan Boramae Medical Center, Department of Emergency Medicine |
| REVIEW RETURNED | 18-Jan-2021 |

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| GENERAL COMMENTS | <p>Reviewer's opinion</p> <p>This study was to investigate the epidemiology of pediatric pain-related emergency department visit from US national data. The pediatric pain improvement is a very important topic in the ED and pain assessment process is deficient yet. I would like to encourage your interest of pediatric pain in the ED. However, your method for definition of pain group in this study has a significant bias to reduce the pain-related ED visit among children. Firstly, in #2 reference, pain group of adults was defined by the reasons for visit and you, authors also applied the similar definition for adult patients. Because toddler and infants can't complain about their pain or ache correctly, their pain could be neglected when you apply the same definition of pain in these age group. Therefore, your result which show lower prevalence of pain among children younger than 6 years old could have a high probability to possess a significant bias result like this "Younger children who visit emergency department have less pain than older children and adolescent." In result section, children younger than 6 years old constituted 67% of non-pain related visit group. In</p> |
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| | <p>other words, it means that pain assessment was not properly evaluated in this age group. The common reason of visit for toddler and infant group would be fever, irritability or lethargy due to their immature verbal response. These symptoms could have a probability to have pain or ache, discomfort.</p> <p>Secondly, more than 6% (about 6~12%) of non-pain related group have also pain score in table 1. This mismatch result can make us confused about the definition of pain group in this study.</p> <p>For the specific result, Table 2 show the description of body system involvement of pain-related ED visit by the presence of trauma. What is the purpose of this table? The kinds of categorization are mixed with anatomic area and injury mechanism. I can't find any scientific meaning from table 2,3 in this study. As you know, most trauma patient generally have musculoskeletal pain. Rather than this result, the difference of pain assessment by anatomic area or injury mechanism could be meaningful.</p> |
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| REVIEWER | Strehlow, Matthew Stanford, Emergency Medicine |
| REVIEW RETURNED | 21-Jan-2021 |

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| GENERAL COMMENTS | <p>General Comments</p> <p>This paper is a single year analysis of the NHAMCS data set to determine the rates of pediatric ED visits that may or likely have a pain related component. Overall, the manuscript is clearly written and has followed the appropriate STROBE reporting guidelines.</p> <p>Major Comments</p> <ol style="list-style-type: none"> 1. The Limitations section and key findings section focus on the limitations of the NHAMCS data set but do not provide much review of the limitations of this specific study or its analysis. For example, the definitions used for identifying a pain related ED visit. Please increase the critique of the limitations of this individual work. The authors may be able to decrease the discussion of the oft published NHAMCS data collection methodology to maintain manuscript length. 2. Would a multi variable regression analysis be beneficial in identifying predictors of ED pain related visits? The authors state that White children were more likely to have non-pain-related visits as were children with non-private insurance. Assess whether a MVR analysis would increase the strength of these comparisons/findings. 3. Given the more conclusive nature of the “definitely painful” category, it may strengthen the paper to compare three groups. Definitely painful, probably painful, and not pain related. The definition of “probably painful” likely includes a hopefully small subset of children that likely did not have pain at the time of visit. This categorization scheme would give you a more accurate analysis of the pain score performance in children with pain which is a major finding of the study. <p>Minor Comments</p> |
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| | <p>1. Using the “pain-related ED visits with a painful chief complaint” category (definitely painful) would allow an analysis of predictors of getting a pain score recorded which might be a nice addition.</p> <p>2. In the conclusions, I struggle with the idea that this study’s findings demonstrate that “trauma prevention” should remain a major topic of study in pediatrics. While I agree with the conclusion that trauma prevention is important, this does not appear to be a primary finding of the study.</p> <p>3. The definition of pain-related “ED visit with a painful chief complaint” seems to be the same as anyone with a “definitely painful” RFV code. If the same, I am not sure the reader benefits from having this extra complexity.</p> |
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VERSION 1 – AUTHOR RESPONSE

Reviewer #1 Comments - Dr. Carolina Donado, Boston Children’s Hospital

“This an epidemiological study looking at the prevalence of Pain-related ED visits across the US. The study is very straight forward and presents data from the 2017 NHAMCS.

In general, I believe the authors can add more details to the methods to give more context to the readers that are not familiar with the NHAMCS and their data collection and variable definitions.”

Answer: We have added more details to the Methods in regards to the NHAMCS dataset. Their methods, however, have been extensively published in other journals and we added extra references as well. The definitions of variables are included in the Methods section under the subheading “Variables and Measurements”.

“Additionally, I believe that presenting additional results of differences in the prevalence among sex would strengthen the manuscript's conclusion.”

Answer: As detailed in Table 1, we did not find any significant differences in regards to sex in our study population. Also, in the logistic regression analysis added to address reviewer #3, there was no significant difference in sex. We added a statement to emphasize that in the Results.

Methods:

“The categorization of "Pain-related ED visits" and "Pain-related ED visits with a painful chief complaint" might not be accurate. In the NHAMCS, the Chief complaint tends to be only the 1st line of the RFV; the 2-5 line can be another concern from the patient's history. Therefore, if a patient has a "definitely painful" RFV in the 5th line, that might not be the chief complaint. I suggest changing the wording of these categories as "probably/definitely Pain-related ED visit" and "Definitely Pain-related ED visit" or something along those lines to increase clarity in the terminology.”

Answer: We agree that the wording was somewhat confusing. We have clarified in the Methods that the category of “pain-related ED visits with a painful chief complaint” was defined as any visit in which the first RFV code was categorized as “definitely painful” (first line of RFV only) and we did not consider all RFV codes for this category.

“How were discrepancies in the RFV categorization between the two reviewers solved?” **Answer:** Discrepancies were resolved by consensus between the two emergency physicians. We added this information to the Methods section.

Can you please be more specific in the definition of "trauma?" The variable "Injury" is a “construct made by NHAMCS, and it might be useful for a reader not familiar with the survey to have the definition in the manuscript.”

Answer: Thank you for highlighting this discrepancy. We have corrected the text to use the same terminology as NHAMCS (“Injury”) and have clarified that it includes injury/trauma, overdose/poisoning, or adverse effects of medical treatments.

“It seems that not all the RFV categorized as "possible" or "definitely" pain-related are categorized by body location. Was there an "other" category? What happens if, within the 5 RFV, a patient had more than one pain location?”

Answer: We categorized body location based on the first RFV code only in the pain-related ED visits with a painful chief complaint. We did not use RFV codes 2 through 5 for body location categorization. We have clarified this in the Methods.

“Did you use the inputted or unimputed data for the variables like age, sex, ethnicity, and race?”

There is a lack of detail around secondary variables used in the analysis, such as insurance, triage. I suggest adding information on how the NHAMCS defines these variables”

Answer: As provided by NHAMCS, missing data was filled by imputed data for age, sex, race, and ethnicity. We clarified this in the Methods.

“Results:

Please revise the wording around the chief complaint. I believe it is more accurate to say the percentages reflect the proportion of patients with at least one "definitely pain-related" RFV.”

Answer: We have clarified the categorization of pain-related ED visits with a painful chief complaint. This included only those definitely painful conditions or symptoms present at RFV line 1.

“Does the proportion of ED admission with a "definitely pain-related" RFV follow the same trend in males and females? Similarly, I think it would be good to stratify the pain location by gender too. There might be differences between sexes that need to be taking into consideration.”

Answer: We did not find any significant difference in regards to sex between the pain-related and non-pain-related ED visits and for this reason we did not look any further. We added a statement in the Results to call that out.

“Discussion

The authors mention possible trauma prevention initiatives. It might be important to highlight a couple of the ones that have proved to be successful.”

Answer: We have added a statement to the Discussion that emphasizes that the type and effectiveness of prevention interventions will actually depend on factors such as child’s age and level of development.

“The authors discussed different aspects of pain management differences across the population. However, no data related to pain management is presented. Since the NHAMCS has information on medication prescribed, I wonder if the author considered adding this information to the analysis to strengthen the results.”

Answer: We agree that pain management is an important topic and that the NHAMCS database may provide insightful information in regards to pain management patterns across the United States. We did not evaluate pain management data as this was beyond the scope of our study.

Reviewer #2 Comments - Dr. Jin Hee Jung, College of Medicine, Seoul National University, Seoul Metropolitan Boramae Medical Center

“This study was to investigate the epidemiology of pediatric pain-related emergency department visit from US national data. The pediatric pain improvement is a very important topic in the ED and pain assessment process is deficient yet.

I would like to encourage your interest of pediatric pain in the ED.

However, your method for definition of pain group in this study has a significant bias to reduce the pain-related ED visit among children. Firstly, in #2 reference, pain group of adults was defined by the reasons for visit and you, authors also applied the similar definition for adult patients. Because toddler and infants can’t complain about their pain or ache correctly, their pain could be neglected when you apply the same definition of pain in these age group. Therefore, your result which show lower prevalence of pain among children younger than 6 years old could have a high probability to possess a significant bias result like this “Younger children who visit emergency department have less pain than older children and adolescent.” In result section, children younger than 6 years old constituted 67% of non-pain related visit group. In other words, it means that pain assessment was not properly evaluated in this age group. The common reason of visit for toddler and infant group would be fever, irritability or lethargy due to their immature verbal response. These symptoms could have a probability to have pain or ache, discomfort.”

Answer: We agree that the proportion of pain-related visits in the youngest group may be underestimated due to their immature verbal response. We added more details to address this issue in the Limitations section.

“Secondly, more than 6% (about 6~12%) of non-pain related group have also pain score in table 1. This mismatch result can make us confused about the definition of pain group in this study.”

Answer: Our classification system for visits does not rely on the reported pain score for two reasons: 1. Many children may be unable to respond to the standard pain score question, making it less useful for a large portion of our population 2. The pain score field in NHAMCS has a large proportion of missing data. Instead, we used clinical knowledge to classify reasons for visits according to how painful they are likely to be. Because people classified as having painful visits are nearly 5 times as likely to report a pain score of 6 or higher and 3.5 times as likely to have a recorded pain score, we believe that the pain classification we created is appropriate for use. We do have in our Discussion more details about the poor reporting of pain in this population. We also addressed this issue further in the Limitation section.

“For the specific result,

Table 2 show the description of body system involvement of pain-related ED visit by the presence of trauma. What is the purpose of this table? The kinds of categorization are mixed with anatomic area and injury mechanism. I can't find any scientific meaning from table 2,3 in this study. As you know, most trauma patient generally have musculoskeletal pain. Rather than this result, the difference of pain assessment by anatomic area or injury mechanism could be meaningful.”

Answer: We have moved Tables 2 and 3 to the Supplementary Material and we kept in the Results only the body system involvement categorization for pain-related visits and for those non-injury related. Table 2 now contains the logistic regression results as suggested by reviewer #3.

Reviewer #3 Comments - Dr. Matthew Strehlow, Stanford

Comments to the Author:

General Comments

This paper is a single year analysis of the NHAMCS data set to determine the rates of pediatric ED visits that may or likely have a pain related component. Overall, the manuscript is clearly written and has followed the appropriate STROBE reporting guidelines.

Major Comments

“1. The Limitations section and key findings section focus on the limitations of the NHAMCS data set but do not provide much review of the limitations of this specific study or its analysis. For example, the definitions used for identifying a pain related ED visit. Please increase the critique of the limitations of this individual work. The authors may be able to decrease the discussion of the oft published NHAMCS data collection methodology to maintain manuscript length.”

Answer: We added more specific details in the Limitations section that address our study and our approach to the classification of pain-related visits. We also removed the last two statements of the Limitations regarding NHAMCS to address this comment.”

“2. Would a multi variable regression analysis be beneficial in identifying predictors of ED pain related visits? The authors state that White children were more likely to have non-pain-related visits as were children with non-private insurance. Assess whether a MVR analysis would increase the strength of these comparisons/findings.”

Answer:

The purpose of the study was primarily descriptive and epidemiological rather than predictive. We performed a multivariable logistic regression that is now presented in Table 2. The older Tables 2 and 3 were removed, as suggested by reviewer #2.

“3. Given the more conclusive nature of the “definitely painful” category, it may strengthen the paper to compare three groups. Definitely painful, probably painful, and not pain related. The definition of “probably painful” likely includes a hopefully small subset of children that likely did not have pain at the time of visit. This categorization scheme would give you a more accurate analysis of the pain score performance in children with pain which is a major finding of the study.”

Answer: The reviewer is correct that the “probably painful” group of children is very small. We did complete a sensitivity analysis comparing definitely painful, probably painful, and non-pain related visits, but unfortunately, we had very small numbers within our variables of interest for the group of “probably painful”. NHAMCS guidelines indicate that cell sizes smaller than 30 are not reliable, so we were unable to include meaningful analysis on this subset. We did, however, include a supplemental table comparing the larger subset of definitely painful with non-pain related visits (Data Supplement S4). Also, we changed Figure 1 to include the different definitions of a pain-related visit. The pattern of increase by age was very similar regardless of the definition.

Minor Comments

“1. Using the “pain-related ED visits with a painful chief complaint” category (definitely painful) would allow an analysis of predictors of getting a pain score recorded which might be a nice addition.”

Answer: This is a very interesting idea. Unfortunately, we are unable to determine whether missing pain scores are missing because they were never collected or because they were present but not abstracted from the medical record by the coders.

“2. In the conclusions, I struggle with the idea that this study’s findings demonstrate that “trauma prevention” should remain a major topic of study in pediatrics. While I agree with the conclusion that trauma prevention is important, this does not appear to be a primary finding of the study.”

Answer: We agree that trauma prevention was not addressed by our study and we deleted that from the conclusion. We now used “injuries” as one of the topics that should remain being studied in research of pediatric acute pain management. Also, we have changed the word “trauma” to “injury” to comply with the original NHAMCS definition.

3. The definition of pain-related “ED visit with a painful chief complaint” seems to be the same as anyone with a “definitely painful” RFV code. If the same, I am not sure the reader benefits from having this extra complexity.

Answer: We agree that the wording of the classifications was confusing and we have now clarified that in the Methods. The ED visit with a painful chief complaint was actually defined as those visits in which the first RFV was a definitely painful condition or symptom (we did not consider RFV 1-5; only the RFV 1, which is the chief complaint).

VERSION 2 – REVIEW

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| REVIEWER | Donado, Carolina Boston Children’s Hospital, Anesthesiology, Critical Care & Pain Medicine |
| REVIEW RETURNED | 31-Mar-2021 |

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| GENERAL COMMENTS | <p>Thank you for the opportunity to review the revised manuscript. The revised manuscript has improved significantly in terms of readability and clarity. Some additional clarifications are needed.</p> <p>I am still struggling with the readability of the multiple ways groups were created for the study. The variable Pain-related visit with a painful chief complaint is mainly used to mention the body system most commonly involved in the results (Page 12, line 31-37). However, this is not discussed any further in the manuscript. If this result is not further discussed, it might make sense to simplify the manuscript by not including these results.</p> <p>I appreciate the authors added a logistic regression to evaluate possible factors associated with Pain-related visits. Do the authors use a weighted logistic regression to incorporate the complex sampling method of the NHAMCS? I think it would be valuable to clarify it. Additionally, was a single model that included all variables? Or, was there any stepwise approach to variable selection to obtain a more accurate model that might not have all variables?</p> |
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VERSION 2 – AUTHOR RESPONSE

Reviewer #1 Comments - Dr. Carolina Donado, Boston Children’s Hospital

“Thank you for the opportunity to review the revised manuscript. The revised manuscript has improved significantly in terms of readability and clarity. Some additional clarifications are needed.

I am still struggling with the readability of the multiple ways groups were created for the study. The variable Pain-related visit with a painful chief complaint is mainly used to mention the body system most commonly involved in the results (Page 12, line 31-37). However, this is not discussed any further in the manuscript. If this result is not further discussed, it might make sense to simplify the manuscript by not including these results.”

Answer: We thank the reviewer for her suggestions on the painful chief complaint analysis. We believe it will be helpful to readers because it describes the most common body systems affected in pain-related visits. This is purely descriptive data that can be helpful for future researchers planning studies in this area. For example, abdominal pain seems to be important, and it perhaps deserves more attention in the future. Also, the grouping of pain-related visits with a painful chief complaint was performed to understand if different definitions of pain-related visits would significantly change our main results (Figure 1). We defer to the editors on whether they would like us to keep it.

“I appreciate the authors added a logistic regression to evaluate possible factors associated with Pain-related visits. Do the authors use a weighted logistic regression to incorporate the complex

sampling method of the NHAMCS? I think it would be valuable to clarify it. Additionally, was a single model that included all variables? Or, was there any stepwise approach to variable selection to obtain a more accurate model that might not have all variables?"

Answer: Thank you for your comment. All analyses were performed using the svy suite of tools in Stata, which considers the sampling design of the NHAMCS survey. We clarified this in the Methods to make it clearer that the logistic regression analysis also considered the sampling method of NHAMCS. As for variable selection, we selected variables to include in the model based on theoretical relevance. All variables included in the model are presented in Table 2.