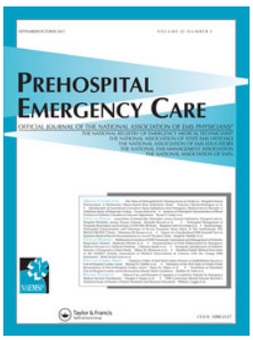

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Documentation of Child Maltreatment by Emergency Medical Services in a National Database

Catherine Qualls, DO, Hilary A. Hewes, MD, N. Clay Mann, PhD, MS, MBA, Mengtao Dai, PhD, Kathleen Adelgais, MD, MPH

Abstract

Background: Child abuse and neglect (CAN) has an estimated annual incidence of 1.46% among those ≤3 years old. Prehospital providers (PHPs) report difficulties identifying CAN and the frequency in which PHPs document CAN during prehospital encounters of young children is not known. **Objective:** To report the percentage of CAN documentation by PHPs during encounters among children ≤3 years in a national dataset and describe the characteristics of this population. **Methods:** This is an analysis of concurrent cases in the 2017–18 National Emergency Medical Services Information System database. We identified children ≤3 years old with ICD-10-CM codes specific for CAN including codes for physical and sexual abuse as well as neglect. We examined patient demographics including race, gender, Emergency Medical Services (EMS) primary and secondary impression, associated symptoms, anatomic location of chief complaint, and cause of injury. Our primary outcome is the percentage of CAN reported as an EMS primary or secondary impression; secondary outcomes include proportion of children with each subtype of abuse, the description of patients by demographic information, anatomic location of injury, and associated symptoms. **Results:** There were 498,555 for children ≤3 years old, of which 522 had an impression of CAN (0.10%). Within our cohort, 43% were <1 year of age, 51% were male. The most common anatomic location of injury was general/global (29.7%), followed by head (23.5%) and extremity (14%). The most common symptoms reported by PHPs are those associated with injury including codes for injury, burn, fracture, cutaneous findings, hemorrhage, or pain ($n = 244$, 63%). Pain is the most commonly reported symptom ($n = 110$, 21%). Few encounters specified vomiting, seizure, or disordered breathing as symptoms (1%, 1%, and 5.4%, respectively). Interestingly, 28.2% (27/124) of cases in our cohort were related to sexual abuse. **Conclusions:** The percentage of PHP documentation of CAN among children ≤3 years of age is very low. Among those with an EMS primary impression of CAN, documentation is primarily associated with findings of injury whereas documentation of nonspecific symptoms such as vomiting and seizure is infrequent. These findings suggest that recognition of abuse primarily occurs in young patients with overt signs of trauma. **Key words:** child abuse; neglect; NEMSIS; EMS and child abuse

PREHOSPITAL EMERGENCY CARE 2021;25:675–681

Background

Child abuse and neglect (CAN) is a serious cause of injury and a leading cause of death of young children in the United States (1). In 2016, the estimated annual incidence of child abuse in the United States was 14.6/1000 (1.46%) among those ≤3 years old (2, 3). All the US states and territories have systems in place to identify mandated reporters of suspected abuse and neglect. Designated mandated reporters are expected to make reports to the appropriate agency when concerned about the possibility of abuse and/or neglect (4).

Prehospital professionals (PHPs) are often at the forefront of the continuum of emergency care for children, and in most states are identified as mandated reporters of CAN. However, previous research reveals an overall lack of comfort among PHPs regarding the care of pediatric patients (5). Moreover, PHPs receive little education regarding CAN and report difficulties identifying, managing, and documenting this condition, particularly in preverbal children (6–9). This lack of comfort and knowledge serve as important barriers to the recognition of abuse and neglect and may effect willingness to report and/or document CAN (9–11). Furthermore, PHPs report a desire for more educational opportunities in this area (6).

Given previous reports of deficiencies in education and the lack of comfort in reporting child maltreatment, there is a need to better understand how these elements may interface with PHPs assessment

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of children with possible abusive injuries during EMS encounters. To date, there is no study examining prehospital documentation of child abuse. Additionally, the frequency in which PHPs document CAN during prehospital encounters of young children is not known.

The objective of this study was to report the incidence of CAN as documented during prehospital encounters among children ≤3 years and to describe the characteristics of this population utilizing the National Emergency Medical Services Information System (NEMSIS) database. We hypothesized that documentation of child maltreatment by EMS providers is far below the recognized national incidence of child maltreatment.

METHODS

Study Design

This study was approved by the Primary Children's Hospital Institutional Review Board with a waiver of informed consent.

We performed an analysis of concurrent cases in the 2017–18 National Emergency Medical Services Information System (NEMSIS) database. During the study timeframe, the NEMSIS Registry contained a convenience sample of 22,532,890 EMS activations submitted by 9,599 EMS agencies in 43 States and Territories. During this timeframe, the NEMSIS National Database contained approximately 87% of all EMS activations that occurred in the United States (N.C. Mann, personal communication, June 26, 2020). The NEMSIS National database consists of 83 data elements primarily describing EMS ground activations, based on 9-1-1 requests for emergency care, although several states also submit interfacility/acute care transports and/or air medical transports. Using the NEMSIS standard, an EMS clinician may document some attribute of child maltreatment as a cause of injury (eInjury.01), a clinical impression (eSituation.11 and .12), or as a symptom (eSituation.09 and .10).

Using the 2017–18 NEMSIS Registry, we established an analytic retrospective cohort of EMS encounters for children less than or equal to 3 years of age. Within this cohort, we identified encounters with ICD-10-CM codes specific for CAN. To identify appropriate ICD-10-CM codes, we performed a search of all codes that contain the terms "abuse," "assault," "maltreatment," and "neglect." We included codes for physical and sexual abuse as well as neglect. The ICD-10-CM codes (T74.0, T74.1, T74.2, T74.3, T74.4, T74.9, T76.0, T76.1, T76.2, T76.3, T76.9, Z04.3, Z04.4, Z04.6, Z04.7, Z04.41, Z04.42, Z04.71, Z04.72) reported as a cause of injury or as an EMS provider impression (i.e., reason for the call), flagged an EMS encounter for inclusion in the cohort. We excluded codes of "personal history of child abuse."

We defined physical abuse as any encounter with an ICD-10 code for assault or where physical injury was identified such as fracture, trauma, hemorrhage, or pain. This included encounters with the nonspecific codes T74.9 or "unspecified maltreatment suspected." We defined encounters of sexual abuse as any encounter with the code of 76.2 (sexual abuse, suspected) or 74.2 (sexual abuse, confirmed). Encounters considered "neglect" included all that have a code for neglect or abandonment, as well as those encounters with codes for "exposure hazardous to health."

Encounters which did not clearly include codes associated with physical injury were categorized as "unspecified" as were encounters where an anatomic location of injury listed as "genitalia" or primary impression of "abnormal vaginal bleeding" but with a code of "unspecified maltreatment" as these cases could represent either physical or sexual abuse.

Data Analysis

We analyzed the data using descriptive statistics. We examined patient information including age in years, race, gender, EMS primary and secondary impression, primary symptoms, anatomic location of chief complaint, and cause of injury. Our primary outcome was the percentage of encounters of CAN among all EMS encounters of children less than or equal to 3 years of age. Our secondary outcomes include the proportion of children with each subtype of abuse, description of patient encounters by demographic information, anatomic location of injury, and associated symptoms.

In our analysis, an encounter with more than one type of reported maltreatment code was counted in the total tally for each maltreatment type, but only as one incident per type. Sexual abuse was analyzed separately including demographic analysis and associated symptoms. After excluding isolated sexual abuse encounters, all other maltreatment subtypes were analyzed to determine secondary outcome data such as anatomic location of injury and associated symptoms. In the analysis, we defined an associated symptom of pain as any code for pain such as: "pain not otherwise specified" or "pain associated with an anatomic region." Cutaneous findings were identified as documentation of localized skin/soft tissue swelling, contusion, rash or other skin eruption, and abrasion. We categorize cutaneous findings as all skin findings, and when specified these were associated with traumatic injury as

Table 1. Demographics

	All Encounters ($n = 522$)	Sexual Abuse Encounters ($n = 147$)
Gender		
Female	247 (47.3%)	74 (50.3%)
Male	268 (51.3%)	70 (47.6%)
Unknown	7 (1.4%)	3 (2%)
Age in year		
0	225 (43.1%)	30 (20.4%)
1	89 (17.1%)	27 (18.4%)
2	117 (22.4%)	42 (28.6%)
3	91 (17.4%)	48 (32.7%)
Race		
American Indian	7 (1.3%)	1 (1.5%)
Asian	2 (0.4%)	1 (1.5%)
Black/AA	86 (16.5%)	33 (50%)
Hispanic/Latino	18 (3.5%)	4 (6%)
White	80 (15.3%)	15 (22.7%)
Native Hawaiian/other Pacific Islander	1 (0.2%)	0 (0%)
Not recorded	328 (62.8%)	93 (63.2%)

identified in the encounter. We defined fractures as those encounters with a code of fracture or limb deformity. Many encounters report a nonspecific code of "injury" as an associated symptom which we report in our analysis in the same nonspecific manner.

Results

During the study period, there were a total of 498,555 EMS encounters for children ≤3 years old, of which 522 had an impression of CAN (0.10%). Within our total cohort, 43% (225/552) were <1 year of age, 51% were male and, where race was documented (80/194), 41% were white (Table 1). The demographics of sexual abuse encounters are also shown in Table 1. Regarding subtype of abuse, 241 (46.1%) cases were documented as physical abuse, 9 (1.7%) as neglect or abandonment, and 147 (28.2%) as sexual abuse. Approximately one quarter of encounters ($n = 130$) were documented as unspecified abuse, neglect, or maltreatment (Figure 1).

After excluding sexual abuse, the most common anatomic location of injury was general/global ($n = 155$, 40.7%), followed by head/neck ($n = 123$, 32.3%) and extremity ($n = 73$, 19.2%). Within head injuries, five were specified as eye injuries, and six as neck injuries. Chest ($n = 10$, 2.6%), abdomen ($n = 7$, 1.8%), and back ($n = 3$, 0.7%) were the least commonly reported anatomic locations of injury. Figure 2 summarizes all anatomic locations of injury.

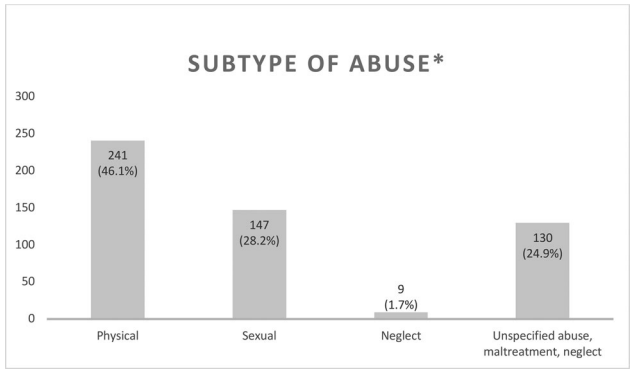

Figure 1. Subtype of abuse. Some encounters contained both a diagnosis of physical abuse and sexual abuse, therefore, these were counted once in each category, this will reflect a discrepancy in total number of encounters ($n = 522$).

The most common associated symptoms and clinical findings reported by PHPs with CAN codes were symptoms associated with injury including codes for injury, burn, fracture, cutaneous findings, hemorrhage, and pain ($n = 244$, 63%) (Figure 3). Overall, pain was the most common symptom reported ($n = 110$). Only four encounters had documentation of a fracture. Other commonly reported symptoms included behavioral changes such as excessive crying and altered mental status ($n = 76$, 19.6%). No abnormal finding was reported in 9.3% of encounters (36/387). Few encounters specified nonspecific symptoms such as vomiting, seizure, or abnormal respiratory findings (1%, 1%, and 5.4%, respectively). Injury associated nonspecific symptoms are summarized in Figure 4.

The most commonly reported symptom in the sexual abuse cohort was the nonspecific code of "other general symptoms and signs" (23/147, 16%), followed by "pain NOS" (17/147, 11.5%) and "encounter for general exam without complaint, suspected or reported diagnosis" (10/147, 7%).

Discussion

As first responders, PHPs have a unique opportunity and play a paramount role in the recognition of victims of child maltreatment and ultimately in promoting the protection of children. In many states, PHPs are mandatory reporters of child abuse and a PHP encounter with a child may be the first and only opportunity for child maltreatment to be recognized and reported. According to the 2018 Child Maltreatment report published by the US Department of Health and Human Services, medical personnel are the largest percentage of report sources for the youngest children, reporting nearly one third of all child maltreatment for children <1 year

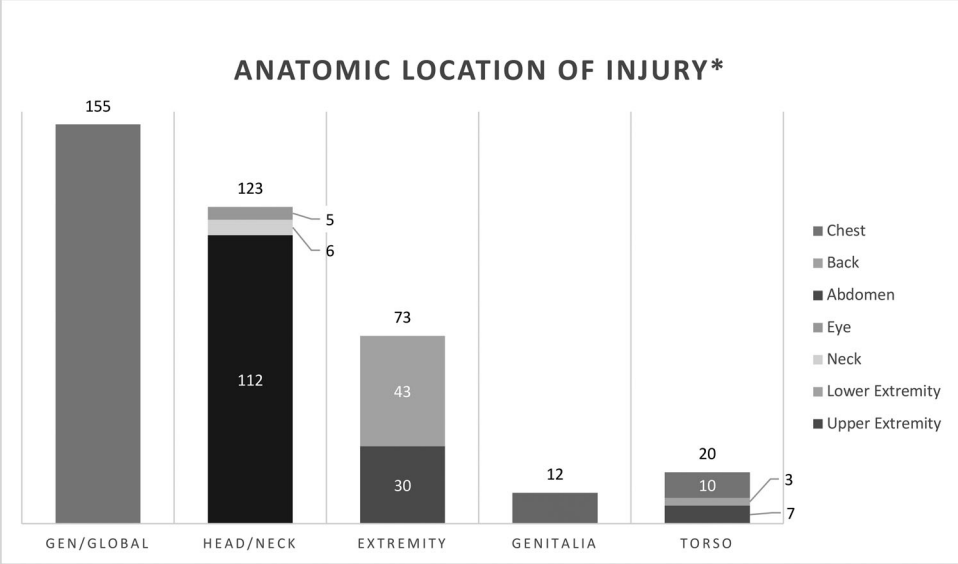

FIGURE 2. Anatomic location of injury. Some encounters contained more than one specific location of injury, therefore, these were counted once in each category, this will reflect a discrepancy in our total number of encounters ($n = 387$).

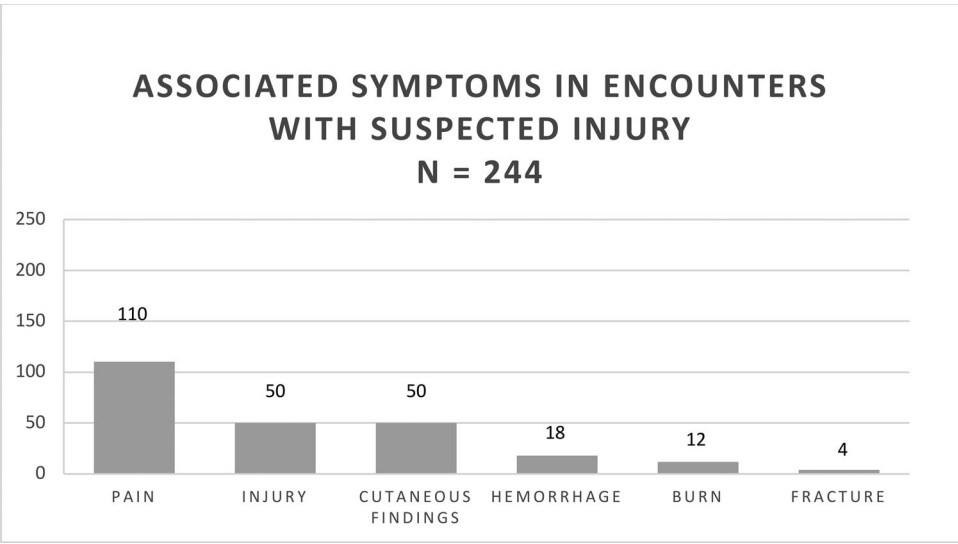

FIGURE 3. Associated symptoms in encounters with suspected injury ($n = 244$).

of age (3). Unfortunately, there are data to suggest that PHPs do not feel comfortable with pediatric patients, and receive little to no training on the recognition or management of child abuse (6, 8). Our dataset demonstrates that the documentation of child maltreatment in EMS encounters of children less than 3 years of age is drastically below the known national incidence of child abuse (0.10% vs. 1.46%) in this age group.

Interestingly, in our NEMSIS cohort, the documentation of physical abuse, sexual abuse, and neglect are 46.1%, 28.1%, and 1.7%, respectively. This is significantly different than national reported data which reveals 74.9% of victims are neglected, 18.3% are physically abused, and 8.6% are sexually abused (3). The distribution of abuse by age in our cohort is similar to national abuse data with the majority of cases documented are <1 year of age. Our cohort is also similar in documented gender to national data with approximately equal distribution of sexes. Regarding race, national data shows that most victims are one of three races: White (44.6%), Hispanic (22.3%), or African-American (20.7%). Our data reflects similar findings with White, African American, and Hispanic races being the most commonly reported in our cohort. However, our findings are somewhat dissimilar with African American race as the most commonly reported race, when race is reported. However, this finding is limited by the fact that the majority of encounters in our cohort (62%) do not identify race.

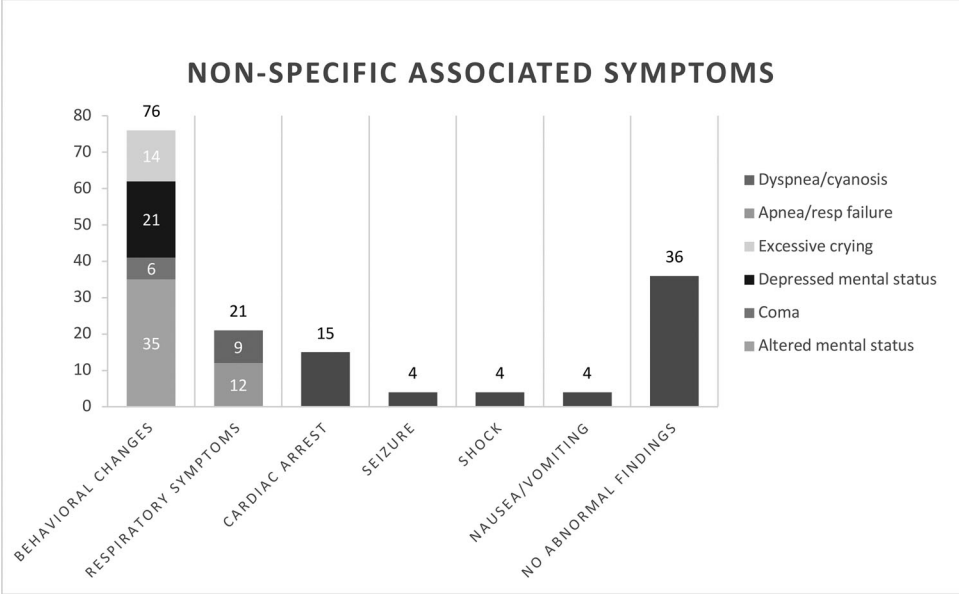

Figure 4. Nonspecific associated symptoms.

Previous research demonstrates that child abuse and neglect often presents with nonspecific symptoms such as vomiting, seizure, respiratory distress (12, 13). However, in our cohort, documentation of nonspecific symptoms is infrequent. This suggests that recognition of abuse in the out-of-hospital setting primarily occurs in young patients with overt findings of trauma. This is not surprising as most studies demonstrate that traumatic injury accounts for between 25% and 35% of all pediatric EMS encounters (14–18). We found that PHP documentation of traumatic injury is more likely to be in body areas that are not typically covered by clothing. Previous research has identified patterns of injuries in specific areas that are associated with child abuse (19). Pierce et al, describe the TEN-4 distribution of injury as both sensitive and specific for child abuse. The authors describe that torso injuries including chest, abdomen, back, and buttock, as well as genitals are areas predictive of abuse. In addition to this, we also know that sentinel injuries associated with child abuse are often present on earlier presentations to a medical provider, but missed prior to worsening violence or devastating injury (19, 20). In our cohort, the majority of descriptions of anatomic injury were to the extremities or nonspecific using terms such as "general/global," with very infrequent documentation of injury on the torso (chest, abdomen, and back). Because these areas are often covered by clothing, a lack of reported injury to these areas could signify educational opportunities for pre hospital providers on the importance of a full skin exam on preverbal patients where abuse is suspected or any traumatic injury is recognized to evaluate for the possibility of injuries suspicious for abuse. Additionally, further education plans for PHPs should include information regarding mandatory reporting after abuse is recognized.

In our dataset, sexual abuse is documented in 28% of encounters with codes for any type of abuse. This is drastically above nationally reported rates of sexual abuse (2, 3). One explanation for this could be explained by the fact that sexual abuse reporting is likely due to history provided based on suspicion from parents, not necessarily based on physical exam findings of the PHP. Also in stark contrast to national data, we found that very few encounters in our cohort use a code for neglect compared to national incidence (2, 3). The reason for these notable differences is unclear, although it may represent the subtly of neglect, especially in an isolated encounter with a medical provider. The concept of neglect is difficult to establish and often overlaps with other forms of abuse. However neglect alone is responsible for the largest number of cases of abuse yet detection of neglect often requires a longitudinal view. One instance may present as an event that a mandatory reporter may feel is inappropriate to report, multiple instances of neglect become difficult to ignore (21). However, this further highlights the educational opportunities for PHPs regarding recognition and documentation of CAN. Particularly, the disproportionate representation of sexual abuse in our cohort draws attention to the educational opportunity for PHPs that detection of abuse should go beyond caregiver history of suspicion.

This study has certain limitations primarily related to use of a national data set. Such limitations

associated with a dataset such as NEMSIS include the voluntarily submission of data as a convenience sample and inconsistencies with coding and charting, including the absence of data points in some encounters and coding of vague and nonspecific signs and symptoms. With the data available, we cannot determine if any a child abuse concern was reported to authorities within any specific encounter. One other limitation is that we are using documentation of assault as a proxy for "recognition" of abuse which could lead to incorrect inference regarding actual recognition of abuse. In addition, suspicion for abuse could be documented in other places in an EMS chart, such as the narrative section of the encounter or in discussion with an emergency department provider. These cases of suspected of abuse would be missed during our analysis. However, despite these challenges, the NEMSIS dataset allows us access to the largest numbers of prehospital encounters with pediatric patients available. The overwhelming majority of the data analyzed are specific, and the number of vague or inconsistent encounters is felt to be minimal. Any incorrect categorization of a small number of encounters in data analysis is likely to be inconsequential to our overall findings given the large number of pediatric encounters. Unfortunately, the NEMSIS database does not link to the final hospital diagnoses associated with each encounter. This information would be useful to study those encounters ultimately diagnosed as child abuse in order to compare pre-hospital and hospital documentation. In addition, without further information or outcome data, we cannot infer reporting (or lack thereof) of CAN in order to categorize the number of potential missed cases of abuse that were not recognized and/or documented in the prehospital setting.

CONCLUSIONS

The percentage of PHP documentation of CAN among children ≤ 3 years of age is very low with discrepancies seen in known types of abuse, location of injury, and associated symptoms. These results highlight educational opportunities in PHP training as well as opportunities in ongoing research regarding PHP recognition and documentation of CAN.

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