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Violence: Recognition, Management and Prevention

CHILD SEXUAL ABUSE IDENTIFIED IN EMERGENCY DEPARTMENTS USING ICD-9-CM, 2011 TO 2014

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☐ **Abstract—Background: Child sexual abuse (CSA) is poorly identified due to its hidden nature and difficulty surrounding disclosure. Surveillance using emergency department (ED) data may identify victims and provide information on their demographic profile. Objectives: Study aims were to calculate the prevalence of visits assigned an explicit or suggestive medical diagnosis code (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM]) for CSA and compare the demographic profile of ED visits by coding type. Methods: This study examined ED data for children < 10 years of age in Connecticut from 2011 to 2014. Cases involving CSA were identified using explicit and suggestive ICD-9-CM codes and age qualifiers previously established in the literature, and compared across visit characteristics (age, race/ethnicity, sex, and primary insurance payer, and town group). Results: ICD-9-CM codes for explicit CSA were identified in 110 ED visits, or 1.7 per 10,000 total ED visits. Inclusion of ICD-9-CM codes for suggestive CSA identified an additional 630 visits (9.7 per 10,000 visits). Suggestive codes identified proportionally more visits of younger (50% vs. 38%) and male (35% vs. 22%) children, compared with the explicit code ($p < 0.05$). Conclusions: This study demonstrates one method for identifying CSA cases, which has the potential to increase surveillance of victims in the ED. Results imply that explicit codes alone may overlook most cases, whereas use of suggestive codes may identify additional cases, and proportionally more young and male victims. As the health consequences of CSA are severe, innovative forms of surveillance must be explored to detect a higher number of cases and improve the clinical care of patients.** © 2019 Elsevier Inc. All rights reserved.

☐ **Keywords—child sexual abuse; epidemiology; emergency departments; International Classification of Diseases**

INTRODUCTION

Child sexual abuse (CSA) is one form of child maltreatment and is defined by the Centers for Disease Control and Prevention as any "completed or attempted sexual act, sexual contact with, or exploitation of a child by a caregiver" (1). Sexually abused children are more likely to experience negative health outcomes, including gynecological and gastrointestinal problems, obesity, sexually transmitted infections, depression, anxiety disorders, posttraumatic stress disorders, substance abuse, and adolescent pregnancy (2–16). Given the impact of CSA on numerous outcomes, more attention should be directed toward understanding the scope of the problem and implementing prevention measures.

Quantifying CSA is challenging due to its hidden nature (17–22). Existing literature describing the scope of child sexual abuse is predominately garnered from studies using child welfare data, community informants, or victim self-report (17). Inconsistencies in study

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methodology within the literature likely contribute to variable estimates reported, with prevalence estimates ranging from 2% to 62% (17,23–26). Retrospective studies based on self-report suggest that the magnitude of CSA is significantly greater than what is shown by child protective service (CPS) data or informant studies (27–31). In one study, computer-assisted self-interviews of a sample of at-risk early adolescents found that rates of sexual abuse by self-report were four to six times higher than CPS substantiations among the sample, suggesting significant underestimation of rates by CPS (31). Disagreement in estimates based on reporting source underscores the potential magnitude of CSA under-ascertainment, and highlights a need to explore other surveillance methods to increase case detection.

Records of hospital admissions and discharges for child maltreatment, including sexual abuse, is emerging as a useful surveillance tool (32–43). The emergency department (ED) setting may be an ideal place to detect victims because medical records encompass a large pediatric population. In 2012, children visited Connecticut EDs at a rate of 406 visits per 1000 children under 18 years old (44). Therefore, a victim may visit the ED for either CSA-related or unrelated symptoms and be detected. Individuals with a history of CSA have also been shown to be more likely to use the ED than the general population, suggesting that the ED may be an opportune place to identify current or former victims (45–47). Surveillance in the ED has the potential to address the major limitations of child welfare data, which likely includes only the most severe cases (17,48). Suspected cases of CSA detected in the hospital should be reported to child protective services. However, medical professionals are among the least frequent reporters of suspected maltreatment, as compared with social services, education, legal, and law sectors (48).

In clinical practice, the International Classification of Diseases and Related Health System (ICD), Clinical Modification (CM) system functions primarily to identify injury or disease diagnoses for billing purposes in health care settings (49). Although the ICD coding scheme was not created for the purposes of surveillance, it has the capacity to function as a surveillance tool by providing information on the scope of child maltreatment and trends over time for those seeking medical care (50). ICD diagnosis codes are used ubiquitously in U.S. health care settings, and are applied to visits in a routine and timely manner. Importantly for the current study, ICD-9-CM diagnosis codes for child maltreatment (995.50–995.59), including child sexual abuse (995.53), exist in the system. However, considering that medical professionals need to document definitive evidence of CSA in the medical record for an explicit code to be assigned, they likely exercise caution and under-document cases that are indefinite. Therefore, the strict criteria of the explicit CSA code may limit identification of all cases.

In recognizing the limitations of explicit maltreatment codes in child maltreatment surveillance, Schnitzer et al. identified and validated a set of suggestive ICD-9-CM codes for CSA intended to increase the sensitivity of detection (35). The inclusion of suggestive cases in combination with explicit codes has the potential to detect CSA in a more complete and representative manner. Suggestive ICD-9-CM codes identified by Schnitzer et al. have since been applied to national samples of medical records to describe child maltreatment, emphasizing their ability to identify additional cases, compared with explicit codes alone (33,35,51). A study by King et al. examining ED visits for children $\leq$ 3 years old found that the explicit code for CSA (995.53) identified the least number of visits, compared with other forms of maltreatment (3.3% of total maltreatment; n = 1999) (33). Additional studies have applied codes for abuse-related injuries to evaluate rates of physical abuse in the ED and inpatient setting; however, less work has been conducted to examine the prevalence of CSA by suggestive ICD-9-CM codes in the ED (32,42). The current study addresses this research gap through three objectives. First, we will calculate frequency and prevalence of visits coded with an explicit or suggestive ICD-9-CM code for CSA in Connecticut EDs from 2011 to 2014. Second, we will calculate the coding agreement between suggestive and explicit code CSA codes. Finally, we will compare the demographic profiles of visits with an explicit and suggestive CSA code. We hypothesize that we will identify more visits of child sexual abuse through the use of suggestive and explicit codes, compared with use of explicit codes alone.

METHODS

Population and Setting

The current research involved a retrospective observational study of nonadmission visits for children < 10 years old treated in Connecticut acute care hospitals from 2011 to 2014. Information within this database is compiled from 27 of the 29 total acute care and children's hospitals in the state, providing a representative sample of statewide ED utilization. To isolate the state-specific burden, visits with non-Connecticut zip codes were removed from the sample. This database was provided by the Injury Prevention Center at Connecticut Children's Medical Center. The Institutional Review Board at the University of Connecticut determined that this study was not human subject research.

Measurement

ED visits for children < 10 years of age were identified by the ICD-9 codes as explicit or suggestive of CSA. Explicit CSA was defined as having an ICD-9-CM code for child sexual abuse (995.53). ICD-9-CM codes for suggestive CSA included the following: genital herpes (54.1), gonococcal infection (98), pelvic inflammatory disease (614.9), contusion of genital organs (922.4), and observation after alleged rape or seduction (V71.5). To minimize misclassification of suggestive codes, ED visits with co-occurring exclusion codes were classified as nonabusive (Table 1). The age qualifier (<10 years old) is consistent with the original study that identified and validated the suggestive codes of CSA in this age group, and was used to minimize the inclusion of consensual youth sexual relationships, peer sexual assaults, and dating violence, which do not constitute CSA (35). Cases with both a suggestive and explicit code for CSA were unduplicated and included in the explicit only.

For demographic characterization, variables were operationalized in the following manner. Age was categorized into two groups (<5, 5–10 years). Race and ethnicity were combined and categorized into four groups (non-Hispanic White, non-Hispanic Black/African American, Hispanic, and Other). Other race included American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and other unidentified. Sex was defined as a binary variable (male or female). Insurance type was categorized into four groups: self-pay, private, public/federal, and other. Town group was categorized into five groups: suburban, rural, urban periphery, urban core, and wealthy based on the classification by the Center for Population Research at the University of Connecticut.

Statistical Analysis

Descriptive statistics of the sample were calculated using univariate analysis. Prevalence rates were calculated by dividing the number of visits assigned an explicit or suggestive CSA code by the total number of ED visits of children aged < 10 years old. Cross-tabulation was used to compare demographic characteristics between explicit and suggestive groups. Differences between groups was assessed using the chi-squared (χ^2) test for independence. Statistical significance was set at $p < 0.05$. Fisher's exact test was used when cell counts < 5. All statistical analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC).

RESULTS

From 2011 to 2014, there were 646,766 visits to Connecticut EDs for patients < 10 years old. Almost all visits (97%) involved residents of Connecticut; nonresidents (n = 20,927) were removed from the study sample. Visits most often involved children who were male (54%), under 5 years old (64%), non-Hispanic white (38%), using public insurance (73%), and from urban Connecticut (78%).

Child Sexual Abuse

A total of 110 ED visits involving children < 10 years old were identified by the explicit CSA code (995.53) (Table 2). Additionally, 632 individual suggestive codes were identified in visits of children younger than 10 years old. The majority of visits (n = 628) had one suggestive code, and two visits had two suggestive codes. One visit had both an explicit and suggestive code and was included in the explicit code group only. The most prevalent suggestive codes were contusion of genital organs (n = 157) and observation after alleged rape (n = 459). The least prevalent suggestive codes were pelvic inflammatory disease (n = 2), gonococcal infection (n = 3), and genital herpes (n = 11) (Table 2). In combination, explicit and suggestive codes were identified in < 1% of all ED visits (Table 3). The prevalence of visits with at least

Table 1. Explicit and Suggestive ICD-9-CM Diagnosis Codes for Child Sexual Abuse (CSA)

	ICD-9 Inclusion Code	Code Description	Age, Years	ICD-9 Exclusion Code(s)	Code Description
Explicit	995.53	Child abuse – sexual	0–17		
Suggestive	54.1	Genital herpes	< 10	771.2	Other congenital infections*
	98	Gonococcal infection	< 10	98.4	Gonococcal infection of eye
				771.6	Neonatal conjunctivitis
	614.9	Pelvic inflammatory disease	< 10		
	922.4	Contusion of genital organs	< 10	E800–E819	Motor vehicle crash(es)
				286–287	Coagulation defects, purpura, other hemorrhagic conditions
				E880–888	Unintentional falls
	V71.5	Observation after alleged rape or seduction	< 10		

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification.
* Nonspecific for herpes simplex virus.

Table 2. Frequency of Visits With Explicit or Suggestive Code for Child Sexual Abuse

	Code Description	# Visits
Explicit	Child sexual abuse	110
Suggestive	Genital herpes	11
	Gonococcal infection	3
	Pelvic inflammatory disease	2
	Contusion of genital organs	157
	Observation after alleged rape or seduction	459
	Total suggestive	632
Total		742

one suggestive code (9.7 per 10,000 visits) was approximately five times more than the prevalence of visits with an explicit code (1.7 per 10,000 visits) (Table 3).

Visit Characteristics

When comparing visits with explicit and suggestive codes for child sexual abuse, significant differences in the distributions of sex and age group ($p < 0.05$) emerged (Table 4). Visits with an explicit code for CSA were more frequent in female children (78%), compared with visits with a suggestive code (65%). Additionally, visits with an explicit code identified children more frequently in the older age range of 5–10 years (62%) than visits with a suggestive code (50%). In contrast, visits with a suggestive code for CSA identified proportionally more boys (35%) and younger children (50%). There were no significant differences between groups for race/ethnicity, insurance type, or town group variables (Table 4).

DISCUSSION

In the present study, the inclusion of suggestive codes, in conjunction with the explicit code, increased the prevalence of CSA visits by fivefold. This finding supports that case identification using explicit criteria alone may overlook the majority of victims. A similar study conducted by King et al. examined explicit and suggestive codes for child maltreatment and found that suggestive codes identified sixfold the number of visits compared with the explicit code alone (33). Increased case detection by inclusion of suggestive codes indicates that additional codes may be required to more fully describe the scope of CSA in a clinical population.

Table 3. Prevalence of Visits With Explicit or Suggestive Code(s) for Child Sexual Abuse

	# CSA Coded Visits	# Total Visits (per Age Group)	# CSA per 10 000 Visits
Explicit	110	646,766	1.7
Suggestive*	629	646,766	9.7

CSA = child sexual abuse.
* Suggestive (no explicit).

Table 4. Demographic Profile of Visits With Explicit or Suggestive Code(s), Under 10 Years

	Explicit, n (%)	Suggestive*, n (%)	*p*-Value
# Visits	110 (100)	629 (100)	
Sex			
Female	86 (78)	408 (65)	<0.01
Male	24 (22)	221 (35)	
Age group, years			
5–10	68 (62)	316 (50)	
Race/ethnicity			
White	35 (32)	243 (39)	0.27
Black/AA	32 (29)	134 (21)	
Hispanic	27 (25)	134 (21)	
Other	12 (11)	94 (15)	
Unknown	4 (3)	24 (4)	
Insurance type			
Private	68 (62)	359 (57)	0.76
Public/Federal	16 (15)	102 (16)	
Self-pay	6 (5)	31 (5)	
Other	20 (18)	137 (22)	
Town group			
Rural	10 (9)	53 (8)	0.77
Suburban	9 (8)	64 (10)	
Urban periphery	56 (51)	284 (45)	
Urban core	33 (30)	218 (35)	
Wealthy	2 (2)	10 (2)	

AA = African American.
* Suggestive (no explicit).

Identifying visit characteristics that are more frequently associated with CSA coding type may contribute to an early understanding of victim risk factors. In this study, visits with an explicit CSA code were more frequently female and older children, compared with suggestive CSA visits. This finding is consistent with the previous literature on sex and age as risk factors for CSA (52–54). Interestingly, suggestive codes identified proportionally more boys and younger children than explicit codes. This finding may indicate that clinicians are less likely to identify children that differ from the "common" profile, although these children are exhibiting signs indicative of CSA. This information will be useful when educating pediatric clinicians on the demographic profile of victims in their area of practice, furthering potential to aid identification of victims in the ED.

When examining code agreement among visits, only one visit had both an explicit and a suggestive code for CSA. Therefore, identification of cases by suggestive codes revealed an almost entirely discrete group of visits, compared with visits identified by the explicit code. The lack of coinciding explicit and suggestive codes may suggest that clinicians are not recognizing clinical signs as indicators of CSA or are uncertain about the diagnosis. The latter implies a need to increase training of

health professionals in the identification and management of CSA victims.

Overall, the results of this study indicate a low prevalence of CSA (<1%) among children seeking medical care at Connecticut EDs. This finding is similar to other studies that have estimated rates of child maltreatment by ICD coding in hospital records (33,36–38,40,41,43). Low rates may be a consequence of missed detection. Under-ascertainment may be explained by a variety of reasons, including low rates of identification, lack of documentation, or the limited ability of ICD-9 codes to function for surveillance purposes. Under-ascertainment is problematic for surveillance because it inhibits an accurate description of the population rate of CSA, which can be misleading for physicians, researchers, and policy-makers. Consequently, fewer resources may be allocated and policies may not be implemented toward addressing the problem. Therefore, to avoid the issue of under-ascertainment, future research should focus on how to improve the use of ICD-9-CM codes to increase the accuracy of detection, and work toward consistent application of codes across place and time.

Limitations

One major limitation of this study is inherent to the ICD-9-CM coding scheme. Considering that ICD-9 codes were designed for the purposes of reimbursement and not surveillance, codes lack specific details that may increase the specificity and sensitivity of detection. Although the current study attempted to increase the accuracy of detection by including suggestive codes with co-occurring exclusion codes, it is likely that the list is incomplete. For example, straddle injuries, which occur when a child straddles and falls upon a hard object, could be an alternative explanation for trauma to the urogenital area resulting in the code for contusion of genital organs. Straddle injuries can occur unintentionally during play or other falls, or less commonly from impalement by sticks, playground equipment, fence posts, or another cylindrically shaped sharp object (55–58). The current study attempted to minimize misclassification of contusion of genital organs as maltreatment by excluding visits with co-occurring exclusion codes of motor vehicle accidents (E800–819), bleeding disorders (286–287), and accidental falls (E880–888). Furthermore, this code does not specify the particular anatomical area of injury. This type of detail could provide a basis for distinction between abusive and nonabusive injuries (59). Since the ICD-9-CM system was updated to the 10th revision in October 2015, more recent data could not be included in the analysis.

From the clinical perspective, in order for a pediatric clinician to be able to detect CSA when present, clinicians need routine training to identify children who are suspected or at risk for sexual abuse. Identification is contingent on level of suspicion, clinical knowledge, and skills to identify suspected CSA. Considering that cases of CSA are extremely sensitive and clinically complex, pediatric clinicians are faced with many changes with the initial detection of CSA and subsequent clinical and administrative decision-making process. It has been shown that many pediatric clinicians lack the scientific knowledge and do not feel clinically prepared to provide the appropriate medical assessments of child maltreatment (60–62). If the pediatric clinician is unable to accurately identify and document CSA, the medical coder cannot apply the appropriate code to the visits. Therefore, our results are limited by the clinician's ability to perform these clinical actions. Lastly, we were not able to rely on unique identifiers to account for repeat visits, therefore, some individuals could have been counted for more than one visit and are subsequently overrepresented in the findings presented.

CONCLUSIONS

Hospital-based surveillance has the potential to supplement the current forms of child maltreatment surveillance. The current study demonstrated an ability to conduct innovative surveillance on child sexual abuse by medical diagnosis coding of ED visits. An important finding of this study is that the use of both suggestive and explicit ICD-9-CM codes identified a wider range of cases than the explicit code alone. The implication of this finding is that CSA surveillance in EDs and other hospital settings may be enhanced by the use of additional codes to describe both confirmatory (explicit) and probable/possible (suggestive) cases of sexual abuse. Another important finding is that the demographic profile of explicit CSA cases differed significantly from suggestive CSA cases in the ED. This preliminary analysis of demographic characteristics can contribute to our understanding of victim risk factors and has the potential to aid identification in the future.

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ARTICLE SUMMARY

1. Why is this topic important?

Child sexual abuse (CSA) is associated with multiple negative social, behavioral, and health consequences throughout the lifespan. However, the complex and hidden nature of CSA has posed several challenges to the public health approach of surveillance, leaving the full scope of CSA unknown.

2. What does this study attempt to show?

This study aims to conduct innovative surveillance on the magnitude and distribution of CSA in an emergency department (ED) clinical population through the use of International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) medical diagnosis codes.

3. What are the key findings?

This study highlights the need for better detection of CSA and how medical diagnosis code data from the ED hold promise to detect cases through explicit and suggestive codes. An important finding of this study is that the use of both suggestive and explicit ICD-9-CM codes identified a wider range of cases than the explicit code alone. Additionally, suggestive ICD-9-CM codes identified proportionally more young and male children, indicating that children who differ from the "common" profile may be under-detected.

4. How is patient care impacted?

Population-level data on CSA are crucial to increase public awareness, maximize use of resources, improve practices in child protection, and promote policy that addresses the needs of maltreated child and families. Replication of this methodology can also be used to educate pediatric clinicians on the demographic profile of victims in their area of practice, furthering potential to aid identification of victims in the ED.