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Maltreatment Related Hospitalizations Among Children Ages 17 Years and Younger: New York State, 2011–2013

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Abstract

Background—Child maltreatment is an important societal and public health problem. However, there are limited data on the epidemiology of maltreatment related hospitalizations.

Objective—The objective of this study was to describe maltreatment related hospitalizations among children ages 17 and younger in New York State (NYS).

Methods—Using 2011–2013 statewide planning and research cooperative system (SPARCS) inpatient hospital discharge data, maltreatment related hospitalizations among children ages 17 years and younger were identified using international classification of diseases, ninth revision, clinical modification codes for diagnoses and external cause of injury. Distributions of demographic and inpatient care characteristics were compared between hospitalizations for maltreatment and those for other causes, and between different types of maltreatment, using chi-square tests (for categorical variables) and *t*-tests (for continuous variables).

Results—During 2011–2013, a total of 853 maltreatment related hospitalizations among 836 children ages 17 years and younger were documented in NYS SPARCS. Infants (children < 1) had the highest rates of hospitalization. Overall, physical abuse was the most prevalent maltreatment type reported.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conclusions—This is the first study in NYS to describe the epidemiology of child maltreatment hospitalizations; it establishes a statewide baseline for this public health and societal issue.

Introduction/Background

Child maltreatment, defined as child physical, sexual, or emotional abuse and neglect represent three of seven adverse childhood experience (ACE) categories (1998) (Felitti et al., 1998; Ford et al., 2014). ACEs not only impact a child's life course, but increase the risk of ischemic heart disease, cancer, stroke, and lung disease among adults ages 25 years and older (Dube et al., 2003; Felitti & Anda, 2010; Felitti et al., 1998; Klassen et al., 2016). Further, as the number of ACEs experienced in childhood increases, so does the risk for poor mental health in adulthood, including psychological distress and low perceived well-being (Giovanelli et al., 2016; Nurius et al., 2015).

For 2005, Russo et al., reported an estimated 6700 hospitalizations associated with child maltreatment in the United States (US) among children and adolescents under the age of 18 years; over 40% of hospitalizations involved physical abuse (Russo et al., 2005) representing a national maltreatment rate of approximately 9.1 hospitalizations per 100,000 children/adolescents. One of the most notable findings of the report was the disproportionately higher burden of child maltreatment hospitalizations among children under five years of age. More specifically, it was found that while children under five comprised 27.1% of the US population under 18 years old, they accounted for 79.4% of maltreatment related pediatric hospitalizations (Russo et al., 2005). Additionally, 70.6% of pediatric hospitalizations for maltreatment were billed to Medicaid (Russo et al., 2005).

Despite the above findings, few studies, since 2000, have assessed hospitalizations related to infant or child maltreatment at the state level (Forjuoh, 2000; Gessner et al., 2004). The primary goal of this study is to describe baseline population rates and proportional distributions of maltreatment related hospitalizations among children ages 17 years and younger in New York State (NYS) for the years 2011 through 2013. Ongoing surveillance is needed to provide useful epidemiologic data to inform evidence-based and evidence-informed solutions to reduce children's exposure to adverse childhood experiences.

Methods

We conducted a population-based descriptive cross-sectional study using the 2011–2013 statewide planning and research cooperative system (SPARCS) inpatient hospital discharge data to identify maltreatment related hospitalizations among children ages 17 years and younger. NYS Social Services Law, defines a "maltreated child" as "a child age 17 years and younger who has had serious physical injury inflicted upon him/her by other than accidental means or whose physical, mental or emotional condition has been impaired or is in danger of becoming impaired as a result of the failure of his/her parent or other person legally responsible for his/her care to exercise a minimum degree of care" (New York Social Services Law).

State hospital discharge databases such as SPARCS provide ongoing public health surveillance because they are readily available and they document disease and injury

morbidity severe enough to require medical attention. Specifically, SPARCS data includes a unique person-level identifier, enabling reporting of both the number of hospitalizations and the number of unique children hospitalized. SPARCS records for each hospitalized case contained a total of 26 diagnoses variables, which consisted of an admission diagnosis code (code describing condition upon admission), a principal diagnosis code (code indicating condition established after study to have been chiefly responsible for admission), and up to 24 additional variables for diagnoses (any other conditions affecting treatment or length of stay). Since newborns were less likely to have been maltreated immediately after birth, due to close monitoring by hospital staff, delivery hospitalizations for newborns were excluded (Leventhal et al., 2012; Russo et al., 2005).

To estimate cases aligned with NYS Social Services Law's definition for maltreatment, we used International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes for diagnoses and external causes of injury (E-codes) (Russo et al., 2005). If any of the following ICD-9-CM codes (995.5–995.59, 995.80–995.85) for maltreatment, physical, emotional/psychological abuse, sexual abuse and neglect were used in any of the 26 diagnostic variables, then that hospitalization was defined as 'maltreatment related'. Analogously, if E- codes for perpetrators of child and adult abuse and criminal neglect (E967.0–E967.9, E968.4) and a code for observation for suspected abuse and neglect (V71.81) were used in the external cause of injury or in any of the diagnostic variables, then that hospitalization was also defined as 'maltreatment related' (Russo et al., 2005). Subsequently, hospitalizations for maltreatment were also grouped into the following types: physical abuse, sexual abuse, emotional abuse, neglect, shaken baby syndrome, and other maltreatment (i.e., child abuse, unspecified, other child abuse and neglect, adult maltreatment unspecified, other adult abuse and neglect, observation and evaluation for abuse and neglect).

Independent variables were child characteristics and inpatient care variables available in SPARCS. Included child characteristics consisted of age, sex, race/Hispanic ethnicity (to include: non-Hispanic white, non-Hispanic Black, non-Hispanic other, and Hispanic), and residence (defined as residence in New York City or rest of New York State). Non-Hispanic other category included American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, and other categories. Inpatient care characteristics included insurance type, admission through emergency department (ED), disposition (description for the patient's destination or status upon discharge), and length of inpatient stay.

Statistical Analysis

To describe the burden of child maltreatment related hospitalizations in NYS, population rates were calculated and defined as the number of maltreatment related hospitalizations per 100,000 children (US Department of Health & Human Services, xxxx). Population rates were compared using chi-square tests of differences in order to assess which children had higher rates for maltreatment related hospitalizations. For the population rate comparisons, the following referent groups were used: by age groups-children ages 15–17 years; by gender-males; by race/ethnicity-non-Hispanic white children; by residence-children residing in Rest of State. Furthermore, population rates provided a basis for comparison with all other

(non-maltreatment related) health outcome rates among children overall and by individual characteristic. Chi-square and t-tests were used to assess the distribution of demographic and inpatient care characteristics between hospitalizations for maltreatment causes and those for non-maltreatment related causes.

All analyses were conducted utilizing SAS software version 9.3 (SAS Institute Inc., Cary, NC, USA). The study protocol was determined by the NYS Department of Health Institutional Review Board to meet the criteria for exemption according to federal regulations.

Results

During 2011–2013, a total of 853 maltreatment related hospitalizations among 836 children ages 17 years and younger were documented in SPARCS. Sixteen children (1.9%) had more than one hospital admission related to maltreatment during the study timeframe.

The rate of maltreatment related hospitalizations among children ages 17 years and younger was 6.7 per 100,000 children, with age, gender, race/ethnicity and residence-specific stratifications shown in Fig. 1. Rates were statistically significantly higher for infants compared to older children and for non-Hispanic Black children and children of other/unknown race/ethnicity as compared with Hispanic and non-Hispanic whites (Fig. 1). While infants made up only 5.6% of the population of children 17 years and younger in NYS (Vital Statistics of New York State, 2011, 2012, 2013), they comprised 45.7% of maltreatment related hospitalizations, a greater proportion than any other age group (Table 1). Also, non-Hispanic white children made up a higher proportion of maltreatment related hospitalizations compared with all other race/ethnicity hospitalizations (Table 1).

A higher proportion of children hospitalized due to maltreatment cases was found to reside outside New York City, to be enrolled in Medicaid, and to be admitted through the ED compared to non-maltreatment hospitalizations (Table 1). Their mean length of stay was 2.8 days longer compared with other types of hospitalizations.

The most common type of maltreatment was physical abuse followed by other maltreatment (Table 2). Further, infants were diagnosed the most for all types of maltreatment except sexual abuse. There were no differences across types of maltreatment by sex except for sexual abuse and neglect, which were more frequent among females (81% and 56%, respectively) in the study cohort. The highest proportion of cases for each category of maltreatment were among non-Hispanic whites as follows physical abuse (35%), sexual abuse (37%), neglect (39%) and shaken infant syndrome (27%). The majority of hospitalizations were among Medicaid covered children across all maltreatment types, and among those residing outside of New York City for all types of maltreatment, with the exception of other maltreatment.

Leading maltreatment types varied by age group (Table 3). Infants, followed by children 1–4 and 5–9 years old were diagnosed with physical abuse as a leading cause. Children 10–14 years old were diagnosed with sexual abuse (39%) followed by physical abuse (24%). This pattern was also reflected among children 15–17 years old with 36% and 30%, respectively.

Discussion

This is the first study to describe maltreatment related hospitalizations among children in NYS. We found a rate of 6.7 per 100,000 maltreatment related hospitalizations among children 17 years and younger, which is lower compared with the national rate of 9.1 per 100,000 children found in a 2005 study that analyzed data from the Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample (NIS) dataset (Russo et al., 2005).

The estimated rate from the HCUP study was higher in comparison to the rate reported here for NYS, but age-related patterns were similar, with the youngest children, especially infants, having the highest rates (U.S. Department of Health and Human Services, 2017). Infants are posited to represent the greatest proportion of child maltreatment cases given their physical vulnerability as represented by increased prevalence of head and brain trauma as well as other injuries indicating shaken baby syndrome (Davies et al., 2015; U.S. Department of Health and Human Servies, 2015). Our findings also demonstrated a disproportionately higher burden of hospitalizations among infants.

With respect to maltreatment type, physical abuse represented the greatest proportion of diagnosed child maltreatment cases (Finkelhor et al., 2013; Leventhal et al., 2012). Our study also described an overall high proportion for physical abuse with some variation across the age groups. Further, our results were consistent with the literature regarding sex differences by maltreatment types with females being diagnosed with a greater proportion of sexual abuse compared to males (Gilbert et al., 2009; Hussey et al., 2006).

Other studies have used different data sources and definitions to examine child maltreatment (Farst et al., 2013; Leventhal & Gaither, 2012; Leventhal et al., 2012) and reported a broad range for the incidence of serious physical injury and maltreatment related hospitalizations among children in a few states (Forjuoh, 2000; Friedman et al., 2012; Gessner et al., 2004; Schnitzer et al., 2004) and nationally (Schnitzer et al., 2011). While all of these studies used statewide hospital discharge data, none used the same case definition preventing jurisdiction-level comparisons. Nevertheless, all of these studies demonstrated that the highest proportion and/or rate of maltreatment related injuries resulting in hospitalization was among infants (Forjuoh, 2000; Friedman et al., 2012; Gessner et al., 2004; Schnitzer et al., 2004).

In a previous study comparing ascertainment methods for child maltreatment, investigators identified 12% more cases from hospital discharge data compared with Child Protective Services data, suggesting that hospital discharge data may be an effective data source for surveillance of child maltreatment (Schnitzer et al., 2004). The findings of this study suggest that SPARCS and, by extension, other state hospital discharge data systems may be readily available and effective data sources for surveillance of maltreatment.

A strength of this study was its use of the all-payer comprehensive SPARCS dataset, which has high completeness of documentation of discharges (98%) (Bureau of Health Informatics, 2016). Additionally, this study used all 27 variables (26 diagnoses and external cause of injury), as opposed to just a primary diagnosis code. This approach was taken to minimize potential underreporting issues related to substitution of a maltreatment related ICD-9-CM

code for a non- maltreatment code with a higher reimbursement rate as reported by others (Schnitzer et al., 2011).

This study was also subject to limitations. First, research has shown that no existing single data system captures all instances of child maltreatment (Putnam-Hornstein et al., 2011). Since this study used SPARCS inpatient data only, the results reported here underestimate the incidence of child maltreatment since cases not resulting in a hospitalization were not captured. Some children with severe maltreatment may present at other medical facilities, such as outpatient facilities. Our results may also underestimate maltreatment related hospitalization rates if health care personnel failed to appropriately code hospitalizations as maltreatment related. All of these factors contribute to a conservative estimate of the burden of child maltreatment in NYS. However, the primary finding regarding the susceptibility of infants to maltreatment is robust (Leventhal & Gaither, 2012; Russo et al., 2005).

Another limitation of the study is that administrative data may be subject to reporting error and the severity of maltreatment cannot be assessed. Additionally, the data sources used for the analyses were not compared with the information reported to child protective services, which may capture more comprehensive information on maltreatment.

Future investigations and surveillance efforts could incorporate data from outpatient facilities and ED visits to establish a more complete picture of maltreatment rates in the state. Additionally, linkage of hospital discharge, ED, and outpatient data to birth records would allow examination of the parental characteristics of children presenting with suspected maltreatment.

Epidemiologic assessment of maltreatment related hospitalizations in NYS adds to the evidence base about child factors associated with hospitalization for maltreatment. Finally, given that investigations of the burden of ACEs, which encompass maltreatment, are often focused on retrospective reporting by adults, this investigation of recent child hospitalizations for maltreatment may identify a source of surveillance data for more timely monitoring of maltreatment that may be used to design intervention and prevention strategies.

These findings help bring awareness regarding the burden of maltreatment in NYS and its association with child and inpatient care characteristics. Increased awareness among practitioners, public health professionals, and their partners (e.g., child administration service providers) of existing issues in the healthcare system as well as the importance of accurate reporting of hospitalization due to child maltreatment can inform efforts to improve diagnosis, treatment, referral and hospital services for suspected and confirmed cases of child maltreatment.

Conclusions

Child maltreatment is a societal and public health problem with potentially severe psychological and health consequences (Dube et al., 2003; Felitti & Anda, 2010). Establishing timely and effective surveillance is necessary for understanding patterns and trends in child maltreatment in order to inform prevention and intervention efforts (Dube et

al., 2003; Felitti & Anda, 2010; Felitti et al., 1998; Ford et al., 2014; Klassen et al., 2016). Our study establishes a statewide baseline for this public health and societal issue with downstream consequences, as well as a method for using administrative data for ongoing surveillance of maltreatment related hospitalizations statewide.

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Significance Statement

Child maltreatment is a societal and public health problem with potentially severe psychological and health consequences (Felitti et al., 1998; Ford et al., 2014). Establishing timely and effective surveillance is necessary for understanding patterns and trends in child maltreatment in order to inform prevention and intervention efforts (Dube et al., 2003; Felitti & Anda, 2010; Felitti et al., 1998; Ford et al., 2014; Klassen et al., 2016). Our study establishes a statewide baseline for this public health and societal issue with downstream consequences, as well as a method for using administrative data for ongoing surveillance of maltreatment related hospitalizations statewide.

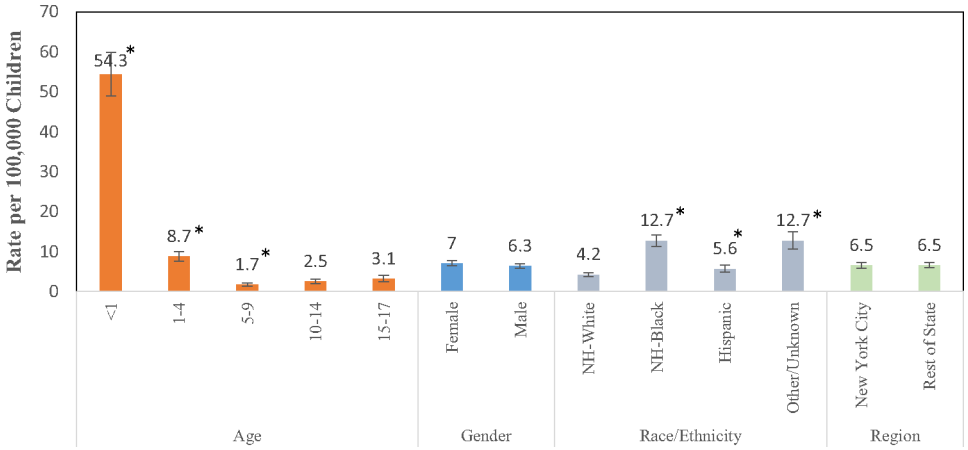

Fig. 1.

Maltreatment related hospitalization rates[a] among children ages ≤ 17 years, New York State, 2011–2013 (n = 853 hospitalizations[b]). [a]Hospitalization rates = number of maltreatment related hospitalizations per 100,000 children. [b]All birth hospitalizations were excluded from this and subsequent analysis for hospitalized children. *Statistically significant at $p < 0.05$, chi-square tests. Error bars represent 95% confidence intervals. For the population rate comparisons, the following referent groups were used: by age groups-children ages 15–17 years; by gender-males; by race/ethnicity-non-Hispanic white children; by residence-children residing in Rest of State

Table 1

Demographic and inpatient care characteristics of children ages ≤ 17 years hospitalized for maltreatment related causes versus non-maltreatment related causes, New York State, 2011–2013

Characteristic	Hospitalizations due to maltreatment		Hospitalizations not due to maltreatment	
	n	%	n	%
Total	853	100	409,816	100
Age group (years), n (%)[a]				
< 1	390	45.7	89,863	21.9
1–4	242	28.4	103,903	25.4
5–9	60	7.0	66,971	16.3
10–14	90	10.6	72,870	17.8
15–17	71	8.3	76,209	18.6
Gender, n (%)[a]				
Female	438	51.4	192,820	47.1
Male	415	48.6	216,993	52.9
Unknown			*	0.0
Race/ethnicity, n (%)[a]				
Non-Hispanic White	278	32.6	150,023	36.6
Non-Hispanic Black	276	32.4	89,238	21.8
Hispanic	168	19.7	91,881	22.4
Other/unknown, non-Hispanic	131	15.4	78,674	19.2
Residence, n (%)[a]				
Rest of State	487	57.1	188,040	45.9
New York City	350	41.0	204,832	50.0
Unknown	16	1.9	16,944	4.1
Insurance, n (%)[a]				
Medicaid	717	84.1	236,575	57.7
Private	108	12.7	156,121	38.1
Self-pay	12	1.4	8690	2.1
Government other	*	*	3006	0.7
Other/unknown	*	*	4558	1.1
Medicare	*	*	866	0.2
Admission through emergency department, n (%)[a]				
Yes	637	74.7	262,020	63.9
No	216	25.3	147,796	36.1
Disposition, n (%)[a]				
Discharged home	670	78.5	365,924	89.3
Transferred elsewhere	166	19.5	42,608	10.4
Expired	17	2.0	1284	0.3
Length of stay, mean (sd)[b]	7.3 (13.5)		4.5 (9.5)	

All birth hospitalizations were excluded from this and subsequent analysis for hospitalized children

[a] Statistically significant ($p < 0.05$), chi-square tests

[b] Statistically significant ($p < 0.05$), t-tests

[*] Data are not presented in these cells due to a small sample size

Table 2

Demographic and inpatient care related characteristics of children ages ≤ 17 years hospitalized due to maltreatment by maltreatment types, New York State, 2011–2013

Characteristic	Type of maltreatment[a]				
	Physical abuse (n = 350) # (%)	Sexual abuse (n = 105) # (%)	Neglect (n = 115) # (%)	Shaken baby syndrome (n = 81) # (%)	Other maltreatment (n = 279) # (%)
Age group (years)					
< 1 (infant)	166 (47)	*	60 (52)	62 (77)	130 (47)
1–4	112 (32)	20 (19)	34 (30)	13 (16)	91 (33)
5–9	25 (7)	13 (12)	*	*	21 (8)
10–14	24 (7)	39 (37)	12 (10)	*	19 (7)
15–17	23 (7)	28 (27)	*	*	18 (6)
Gender, n (%)					
Female	161 (46)	85 (81)	64 (56)	37 (46)	130 (47)
Male	189 (54)	20 (19)	51 (44)	44 (54)	149 (53)
Race/ethnicity, n (%)					
Non-Hispanic White	122 (35)	39 (37)	45 (39)	22 (27)	75 (27)
Non-Hispanic Black	114 (33)	28 (27)	44 (38)	20 (25)	96 (34)
Hispanic	64 (18)	29 (28)	12 (10)	20 (25)	53 (19)
Other/unknown	50 (14)	*	14 (12)	19 (23)	55 (20)
Insurance, n (%)					
Medicaid	296 (85)	79 (75)	109 (95)	69 (85)	233 (84)
Private	41 (12)	20 (19)	*	10 (12)	38 (14)
Medicare	*	*	*	*	*
Self-pay	*	*	*	*	*
Other government insurance	*	*	*	*	*
Other/unknown	*	*	*	*	*
Residence, n (%)					
Rest of State	220 (63)	62 (59)	71 (62)	41 (51)	137 (49)
New York City	121 (35)	42 (40)	42 (37)	37 (46)	140 (50)
Unknown	*	*	*	*	*

Characteristic	Type of maltreatment[a]				
	Physical abuse (n = 350) # (%)	Sexual abuse (n = 105) # (%)	Neglect (n = 115) # (%)	Shaken baby syndrome (n = 81) # (%)	Other maltreatment (n = 279) # (%)
Admission through ED, n (%)					
Yes	284 (81)	79 (75)	74 (64)	41 (51)	224 (80)
No	66 (19)	26 (25)	41 (36)	40 (49)	55 (20)
Disposition, n (%)					
Discharged home	274 (78)	91 (87)	77 (67)	47 (58)	246 (88)
Transferred elsewhere	67 (19)	11 (10)	38 (33)	29 (36)	31 (11)
Expired	*	*	*	*	*
Length of stay in days, mean (sd)	6.5 (13.3)	11 (26.1)	7.9 (10.4)	16.5 (20.8)	4.8 (6.9)

All birth hospitalizations were excluded from this and subsequent analysis for hospitalized children

[a] One hospitalization can have multiple types of maltreatment and consequently counted more than once

* Data are not presented in these cells due to a small sample size

Table 3

Ranking of maltreatment types for maltreatment related hospitalizations among children ages ≤ 17 years, by age group, New York State, 2011–2013

Type of maltreatment	Age group (years)									
	< 1 year		1–4		5–9		10–14		15–17	
	Rank	# (%)	Rank	# (%)	Rank	# (%)	Rank	# (%)	Rank	# (%)
Physical abuse	1	166 (39)	1	112 (41)	1	25 (37)	2	24 (24)	2	23 (30)
Sexual abuse	5	*	4	20 (7)	3	13 (19)	1	39 (39)	1	28 (36)
Neglect	4	60 (14)	3	34 (13)	4	*	4	12 (12)	4	*
Shaken baby syndrome	3	62 (15)	5	13 (5)	–	–	–	–	–	–
Other maltreatment	2	130 (31)	2	91 (34)	2	21 (31)	3	19 (19)	3	18 (23)

One hospitalization can have multiple types of maltreatment and consequently counted more than once

*Data are not presented in these cells due to a small sample size