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Bulletin No. 23 November 1, 2012

Abusive Head Trauma among Children Aged <2 Years — Alaska, 2005–2010

Background

Abusive head trauma (AHT) is the third leading cause of all head injuries and the leading cause of trauma death among U.S. children aged <2 years. Pediatric AHT is defined as an injury to the skull or intracranial contents of an infant or young child (aged <5 years) due to inflicted blunt impact and/or violent shaking.¹ In 2003, the estimated national AHT incidence rate among children aged <2 years was 32 cases per 100,000 person-years.²

The purpose of this study was to characterize the Alaska-specific epidemiology of pediatric AHT among children aged <2 years. Because existing individual public health databases are limited in their ability to detect AHT cases, we used the Alaska Surveillance of Child Abuse and Neglect (SCAN) data system, which links together multiple public health databases.

Methods

AHT cases among children aged <2 years residing in Alaska during 2005–2010 were identified in each SCAN source and subsequently linked together to identify unique cases. The SCAN data sources included vital death records, the Violent Death Reporting System, the Maternal Infant Mortality Review – Child Death Review, the Alaska Trauma Registry (ATR), the inpatient Hospital Discharge Database (HDD), and Medicaid claims.

We applied the U.S. Centers for Disease Control and Prevention's Pediatric Abusive Head Trauma coding schema to identify cases (Figure 1). Using these data, we calculated statewide AHT incidence rates. Trends were assessed using a quasi-Poisson distribution. All calculations were performed using R version 2.15.1.

Figure 1. CDC ICD-9-CM coding. AHT cases must have both a clinical diagnosis code AND injury/abuse code

ICD-9 coding	Clinical Diagnosis Code	Injury or abuse Code
Definite or Presumptive Abusive Head Trauma	781.0–781.4, 781.8, 800, 801, 803, 804.1–804.4, 804.6–804.9, 850, 851, 852.0–852.5, 853.0, 853.1, 854.0, 854.1, 925.1, 950.0–950.3, 959.01, 995.55**	E960.0, E967, E968.1, E968.2, E968.8, E968.9, 995.50* 995.54, 995.59*
Probable Abusive Head Trauma	All of those above (except 995.55)	E987, E988.8, E988.9

*Exclude cases in the presence of a fall or accident code
**Does not require a cause code

Results

We identified 45 cases of AHT among children aged <2 years during 2005–2010, yielding an annual average incidence of 34.4 cases per 100,000 children aged <2 years (95% CI 25.1, 46.1) and a case fatality proportion of 22% (10/45). Of the 45 AHT cases, 37 (82%) were infants (children aged <1 year), yielding an average annual incidence of 56.0 per 100,000 infants (95% CI 39.4, 77.1) and a case fatality proportion of 25% (8/32).

The AHT incidence among children aged <2 years ranged from 18.9 (95% CI 5.1, 48.3) in 2006 to 48.9 (95% CI 24.4, 87.4) in 2010. We did not detect a statistically significant change in the AHT incidence trend over time (p=0.75).

We identified statistically significant differences in AHT by age and race, but not by sex (Table).

The databases with the highest case capture rates were ATR and Medicaid, both at 51% (23/45), followed by HDD at 38% (17/45; Figure 2). Combined, the ATR, HDD, and Medicaid systems captured 91% (41/45) of the AHT cases identified.

Table. Abusive Head Trauma Characteristics among Children Aged <2 Years — Alaska, 2005–2010 (N=45)

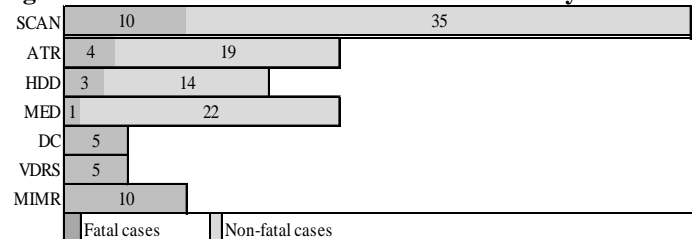
Characteristic	Pop.*	AHT Cases (%)	Incidence Rate Ratio (95% CI)	P-value [†]
Age				
1 year	64,561	8 (18)	1	
<1 year	66,122	37 (82)	4.4 (2.2, 10.4)	<0.001
Sex				
Male	67,514	20 (44)	1	
Female	63,169	25 (56)	1.3 (0.7, 2.4)	0.34
Race[‡]				
White	79,989	20 (44)	1	
AI/AN	33,240	11 (24)	1.33 (0.61, 2.75)	0.46
Asian/PI	10,445	8 (18)	3.10 (1.27, 6.83)	0.01
Other	7,009	6 (13)	3.49 (1.26, 8.25)	0.02

*N=130,683; $\sum(\text{annual births} + [\text{previous years births} - \text{previous years infant deaths}])$

[†]P-value and 95% CI calculated by median unbiased methods; $\alpha = 0.05$

[‡]As indicated on mother's birth record; AI/AN American Indian/Alaska Native; Asian/PI Asian/Pacific Islander

Figure 2. Abusive Head Trauma Cases Detected by Source



SCAN = Surveillance of Child Abuse and Neglect; ATR = Alaska Trauma Registry

HDD = Hospital Discharge; MED = Medicaid; DC = Death Certificate;

VDRS = Violent Death Reporting System; MIMR = Maternal Infant Mortality Review

Discussion

In Alaska, the risk of AHT was significantly higher among infants compared to 1-year-olds, and among Asian/PI and "other" race children compared to White children. These results indicate that primary prevention efforts to reduce AHT should be implemented at birth (or before) with culturally appropriate material for diverse minority populations. Evidence-based primary prevention strategies to help parents cope with crying include Dr. Diaz's Hospital-based Intervention and Dr. Barr's Period of PURPLE Crying.³

SCAN's multi-source linkage enabled us to capture 49% more AHT cases than any of the individual database used in this analysis. The most common reason for misclassification in individual databases was missing/misclassified E-codes.

Recommendations

1. Health care providers and other stakeholders who interface with new parents should provide evidence-based AHT prevention strategies early and often, such as the Period of PURPLE Crying or Dr. Diaz's Hospital-based Intervention.³
2. Health care providers should adopt the AAP recommendation to use "Abusive Head Trauma" rather than a single mechanism of injury term (e.g., shaken baby) in their diagnoses and medical communications.⁴
3. Health care providers should routinely use E-codes to classify injuries in medical records.

References

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4. Christian C, Block R, et al. Abusive head trauma in infants and children. *Pediatrics* 2009;123:1409-11.

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