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Beyond morbidity and mortality: The social and legal outcomes of non-accidental trauma

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ABSTRACT

Background: Abusive head trauma (AHT) is a significant cause of morbidity and mortality in the pediatric population. We aimed to assess the social and legal outcomes of AHT and determine if the rates of successful prosecution have changed over recent years.
Methods: We utilized the trauma database at a single institution to identify all cases of AHT during two time periods: 1996–2001 and 2006–2010 then collected data from the Child Advocacy and Protection Team database. We characterized the social and legal outcomes and compared them between the two cohorts.
Results: A total of 254 patients (120 historic and 134 modern cohort) were included. Mortality rate was 19.7% and did not differ between the two cohorts. Thirty-seven percent of patients were discharged to foster care, this rate did not change across the two time periods. Suspected perpetrators pled guilty or were found guilty in only 74 cases (29%). However, when a case involved a fatality, perpetrators pled or were found guilty more often than in cases of a non-fatality (50 vs. 21.5%; $p = 0.0001$).
Conclusions: AHT results in fatality in approximately 1 in 5 cases, perpetrators are identified and found guilty in only 29% of the cases. Trauma surgeons need to be strong advocates for these vulnerable patients and actively participate in legal proceedings.

Abusive head trauma (AHT) is one of the leading causes of head injury in American children and is the most common cause of serious head injury in the first year of life [1]. Among the population of abused children, AHT is the leading cause of morbidity and mortality [2]. Appropriate medical and surgical management of head injuries in AHT are well documented in the literature [3–5]. However, very little has been reported concerning who cares for these children after discharge and how often perpetrators are identified and prosecuted. Our aim was to identify and characterize the social and legal outcomes following AHT and to determine if there have been changes in the rates of successful prosecution of perpetrators over the past decade by evaluating two distinct cohorts. We hypothesized that the majority of infants who suffer AHT are placed in foster care after hospitalization and only a minority of these cases result in successful identification and prosecution of the perpetrator.

1. Materials and methods

Following approval by the Colorado Multi Institutional Review Board, we queried the trauma database at the Children's Hospital Colorado (CHCO), a tertiary care center, between two time periods, 1996–2001 and 2006–2010, to identify all patients with a diagnosis of traumatic brain injury secondary to AHT. No patients were excluded from analysis. Determination of AHT is based on assessment by the Child Advocacy and Protection Team (CAP). The CAP team is a multidisciplinary team, which is asked to consult in all cases of suspected child abuse, it is worth noting that the CAP team will only see patients if the primary provider asks them to consult. This team includes child abuse pediatricians, medical social workers, nurses, psychologist, and sociologist–attorney. The CAP team is asked to make a determination as to the likelihood regarding the diagnosis of abuse and then continues to be actively involved in the care of these children and any future legal proceedings. The CAP team at CHCO is available for consultation on suspected child abuse cases in the Denver Metro area however we included only those children treated at CHCO owing to availability of data for review.

After identifying the two cohorts, we then utilized data obtained from the trauma database and the electronic medical record to determine clinical data including injury severity score, clinical

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outcome, and social disposition at the time of discharge. Additionally, we utilized the database maintained by the CAP team to determine suspected perpetrators and legal outcomes of each of these cases.

Clinical outcomes were divided into four categories; normal, mild/moderate impairment, severe impairment, or unknown. Mild to moderate impairment was defined as having an abnormal motor or neurological exam at the time of discharge. Severe impairment was defined as having a severely abnormal motor or neurological exam as well as any of the following; static encephalopathy, hypertonicity or paresis, feeding problems requiring non-oral feeding, respiratory compromise requiring tracheostomy or ventilatory support, hearing deficit, or visual deficits from retinal hemorrhage.

Legal outcomes for suspected perpetrators were divided into unknown, pled guilty or found guilty at trial, not guilty at trial, or perpetrators suspected or identified by county investigators but no charges filed. Social outcomes were divided into patient discharged home with the parents, home with relatives, to foster care, or unknown. Suspected perpetrator categories were father or step-father of the child (FOC or step-FOC), mother or step-mother of the child (MOC or step-MOC), boyfriend of the MOC or other unrelated male, other male relative, other female relative, female babysitter, or unknown.

Statistical analysis was performed in Prism 6.0b (by GraphPad Software, Inc, La Jolla, CA, USA). For each of the four variables, clinical outcome, discharge disposition, suspected perpetrator, and legal outcome, comparison was made between the modern and historic cohort utilizing a chi-square test to compare proportions. If this difference was found to be significant, pairwise comparisons were made utilizing Fisher's exact test with adjustment for multiple comparisons. One-way ANOVA was used to compare ISS by age after combining the two cohorts.

2. Results

A total of 254 patients were included (120 historic cohort, 134 modern cohort). The two cohorts did not differ in terms of age, sex, injury severity score, or in hospital mortality (Table 1). ISS did not vary with age ($p = 0.63$).

Only 26% of abused children had a normal clinical outcome. The rate of severe impairment increased across the 15 year time period (13% historic vs. 32% modern, $p < 0.001$). This difference was associated with a decrease in the number of patients with mild or moderate impairment (27% historic vs. 16% modern, $p = 0.06$) (Table 2). Trends in social disposition are also shown in Table 2.

Table 3 describes the identified perpetrators in all cases of AHT. The most frequent perpetrator was either the father or stepfather of the child; this did not change across cohorts. The rate of perpetrator identification did not improve across the 15 year period (unknown perpetrator in 23% of historic cases, 25% of modern cases, $p = 0.88$) (Table 3).

In only 74 of 254 cases (29%) was the perpetrator found guilty, either through a plea or trial. This rate did not differ between the two groups (30% historic vs. 28% modern, $p = 0.78$). The rate of guilty conviction was significantly higher among those cases that resulted in a fatality. Among both cohorts, in 50% of cases involving a fatality, the

perpetrator was found guilty or pled guilty. This was true in only 22% of cases that did not involve a fatality ($p < 0.0001$). In 42% of cases ($n = 108$), a perpetrator was identified, however no charges were filed. This rate also did not differ between the two groups (38% historic vs. 46% modern). Of note, in only 2 cases was the perpetrator found not guilty at trial (Table 3).

3. Discussion

AHT remains a significant cause of morbidity and mortality in young children. The overall mortality rate in our series was 20% with only 26% of children having a normal neurologic outcome, similar to what has been reported previously [6]. Unfortunately, the current data demonstrate that in less than one third of AHT cases are the perpetrators held legally responsible for their actions. We have also demonstrated that despite efforts to improve the care of these

Table 1
Demographic characteristics of AHT victims.

	Historic cohort (n = 120)	Modern cohort (n = 134)	p value
Age (months), mean (SEM)	9.9 (1.6)	8.7 (1.1)	0.55
ISS, mean (SEM)	23.4 (0.7)	22.0 (0.64)	0.13
Male, n (%)	76 (63.3%)	90 (67.2%)	0.6
Mortality, n (%)	20 (16.7%)	30 (22.4%)	0.27

AHT—abusive head trauma, SEM—standard error of the mean, ISS—injury severity score.

Table 2
Clinical outcomes and disposition following AHT.

	Historic cohort (n = 120)	Modern cohort (n = 134)	p value of pairwise comparison
Clinical outcomes following AHT			
Normal, n (%)	32 (27%)	33 (25%)	0.77
Mild/moderate impairment, n (%)	32 (27%)	22 (16%)	0.07
Severe impairment, n (%)	16 (13%)	43 (32%)	<0.001
Death, n (%)	20 (17%)	30 (22%)	0.27
Unknown, n (%)	20 (17%)	6 (4%)	<0.01
p value, chi-square analysis	<0.001		
Discharge disposition following AHT			
Discharge to home with parent(s)	44 (37%)	31 (23%)	n/a
With relatives	11 (9%)	21 (16%)	n/a
Foster care	43 (36%)	52 (39%)	n/a
Unknown	2 (2%)	0 (0%)	n/a
p value, chi-square analysis	0.07		

*AHT - abusive head trauma.

Table 3
Suspected perpetrators and legal outcomes following AHT.

	Historic cohort (n = 120)	Modern cohort (n = 134)	p value of pairwise comparison
Suspected perpetrator in AHT			
Father or Stepfather of child	47 (39%)	53 (40%)	0.61
MOC boyfriend or unrelated male	16 (13%)	23 (17%)	0.73
Babysitter (female)	14 (12%)	12 (9%)	0.41
MOC or stepMOC	9 (8%)	23 (17%)	0.06
Other male relative	5 (4%)	0 (0%)	0.02
Other female relative	2 (2%)	5 (4%)	0.47
Unknown or not identified	28 (23%)	33 (25%)	0.88
p value, Chi-squared analysis	0.04		
Legal outcomes following AHT			
Pled guilty/guilty at trial	36 (30%)	38 (28%)	n/a
Not guilty at trial	1 (1%)	1 (1%)	n/a
Perpetrator identified, no charges filed	46 (38%)	62 (46%)	n/a
Unknown	37 (31%)	33 (25%)	n/a
p value, Chi-squared analysis	0.86		

AHT—abusive head trauma, MOC—mother of child.