2017 New York City Abusive Head Trauma Conference

Thursday, September 14, 2017

8:30 – 9:00 Check-in

9:00 – 9:15 Opening Remarks
Leigh Bishop, J.D.
Chief, Child Fatality Unit
Queens County District Attorney’s Office
Barbara A. Sampson, M.D., Ph.D.
Chief Medical Examiner
Office of Chief Medical Examiner, City of New York

9:15 – 9:45 The Boston Nanny Case: Twenty Years Later
Deborah Spellman Eappen, M.D.
Founder, The Mattie Eappen Foundation

9:45 – 11:00 The Abusive Head Trauma Diagnosis in 2017
John M. Leventhal, M.D.
Professor of Pediatrics, Yale School of Medicine
Director of the Child Abuse Programs & Child Abuse Prevention Programs
Yale-New Haven Children’s Hospital

11:00 – 11:15 Break

11:15 – 12:30 Forensic Pathology and Abusive Head Trauma
Rebecca D. Folkerth, M.D.
Neuropathologist
Office of Chief Medical Examiner, City of New York
Michele S. Slone, M.D.
Deputy Chief Medical Examiner
Office of Chief Medical Examiner, City of New York

12:30 – 1:15 Lunch (provided on premises)

1:15 – 2:15 How Does Brain Injury Translate to the Police Investigation?
Cindy W. Christian, M.D.
Anthony A. Latini Endowed Chair in Child Abuse & Neglect Prevention
Children’s Hospital of Philadelphia
Professor of Pediatrics & Associate Dean for Admissions
The Perelman School of Medicine, University of Pennsylvania
2:15 – 3:15  
* Differential Diagnoses of Retinal Hemorrhages of Live Patients & Literature Updates  
Brian J. Forbes, M.D., Ph.D.  
Attending Surgeon, Division of Ophthalmology  
Children’s Hospital of Philadelphia  
Associate Professor of Ophthalmology  
The Perelman School of Medicine, University of Pennsylvania  
Steven E. Rubin, M.D.  
Assistant Dean, Hofstra Northwell School of Medicine  
Vice Chair, Ophthalmology & Co-Chief, Pediatric Ophthalmology  
Department of Ophthalmology, Northwell Health

3:15 – 3:30  
Break

3:30 – 4:45  
* The Intersection of Law and Medicine in Abusive Head Trauma  
Sandeep Narang, J.D., M.D.  
Fulbright-Nehru Scholar & Division Head of Child Abuse Pediatrics  
Ann & Robert H. Lurie Children’s Hospital of Chicago  
Associate Professor, Northwestern Feinberg School of Medicine

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**Friday, September 15, 2017**

8:30 – 9:00  
Check-in

9:00 – 10:00  
* Distilling Abusive Head Trauma Literature for Court  
Christopher S. Greeley, M.D., M.S., FAAP  
Chief, Section of Public Health Pediatrics  
Texas Children’s Hospital  
Vice-Chair for Community Health  
Baylor College of Medicine

10:00 - 11:00  
* The Impact of Media Perspectives on Abusive Head Trauma Litigation  
Marci Hamilton, J.D.  
Child USA  
Joelle A. Moreno, J.D.  
Associate Dean & Professor of Law  
Florida International University College of Law

11:00 – 11:15  
Break

11:15 – 12:45  
* Enhancing Post-Conviction Litigation Accuracy: Debate and Roundtable  
Mark Baker, Esq.  
Of Counsel – Brafman & Associates, P.C.  
Adele Bernhard, J.D.  
Distinguished Adjunct Professor of Law & Director, Post-Conviction Innocence Clinic  
New York Law School  
Robert J. Masters, J.D.  
Executive Assistant District Attorney, Legal Affairs  
Queens County District Attorney’s Office  
John Castellano, J.D.  
Deputy Executive Assistant District Attorney & Chief Appellate Counsel, Legal Affairs Division  
Queens County District Attorney’s Office

12:45  
* Closing Remarks
From Injury to Investigation: Working Together to Protect Children
Cindy W. Christian, M.D.
WHAT WE HAVE HERE

is a failure
to communicate
OBJECTIVES

IMPROVE COMMUNICATION
IMPROVE COLLABORATION
OBJECTIVES

• To translate biological concepts of brain injury into useful information for non-biologists
• To highlight the complementary use of medical and investigative data in the evaluation of AHT
• To understand the limitations of medical data in the evaluation of suspected AHT
AHT Investigations are Difficult

- No “weapon”
- No witnesses
- No “wanting to believe”
- No victim statement
- Timing of the injuries is difficult
  - Dependent on clinical, radiographic, investigative data
  - Challenge of exclusive custody
How Doctors think about AHT...

Doctor’s positions:
1. This is DEFINITELY abuse
2. This is NOT abuse
3. This MAY BE abuse...we need more info
4. I didn’t even think about abuse
How Investigators think about AHT...

• WHO DID THIS?
• What’s the evidence?
• How can we prove it?
What we both should think...

• What is this?
  – We have to get the medicine right
• What does the medical data tell us?
• What does the investigation tell us?
WHAT IS THIS?

• Covered by previous speakers...
What does the Medical Data Tell Us?
+- Mechanism, Timing, Frequency
What is the Mechanism?
What is the Mechanism?
Pathophysiology

- Primary Traumatic Brain Injury
  - Injury that is direct result of initial traumatic force
    - Neuronal and glial disruptions
    - Vascular injuries - SDH, SAH
    - Contusions, lacerations, shearing injuries
Pathophysiology

• Secondary Traumatic Brain Injury
  – Tissue damage that occurs as a consequence of the primary injury
  – LACK OF OXYGEN
  – LACK OF BLOOD FLOW

• HIE, Cerebral edema

• Timing depends on mechanism and severity of injury
What does this look like clinically?

VARIABLE
What does this look like clinically?

- Clinical Presentation is Dependent on
  - Mechanism of trauma
  - Extent of brain injury- focal vs. diffuse
  - Severity of injury- mild vs. severe
  - Age of victim
- Presentation of accidental and AHT overlap
- Symptoms of primary and secondary injuries overlap
Timing of the Injury

- Presentation of the patient depends on:
  - MECHANISM OF INJURY
  - SEVERITY OF INJURY
  - AGE
  - OTHER FACTORS

- “When did this happen?” is case dependent
  - Involves comparing medical and investigative data
When Did This Happen?  
Influence of Age
Fatal Pediatric Head Injuries Caused by Short-Distance Falls

John Phunkett, M.D.

Physicians disagree on several issues regarding head injury in infants and children, including the potential lethality of a short-distance fall, a lucid interval in an ultimately fatal head injury, and the specificity of retinal hemorrhage for inflicted trauma. There is scant objective evidence to resolve these questions, and more information is needed. The objective of this study was to determine whether these are witnessed or investigated fatal short-distance falls that were concluded to be accidental. The author conducted the January 1, 1988 through June 30, 1998 United States Consumer Product Safety Commission database for head injury associated with the use of playground equipment. The author obtained and reviewed the primary source data (hospital and emergency medical services' records, law enforcement reports, and coroner or medical examiner records) for all fatalities involving a fall. The results revealed 18 fall-related head injury fatalities in the database. The youngest child was 12 months old, the oldest 13 years. The falls were from 0.5 to 3 meters (1.6-10 feet). A noncaretaker witnessed 12 of the 13, and 12 had a lucid interval. Four of the six children in whom funduscopic examination was documented in the medical record had bilateral retinal hemorrhage. The author concludes that an infant or child may suffer a fatal head injury from a fall of less than 3 meters (10 feet). The injury may be associated with a lucid interval and bilateral retinal hemorrhage.

Key Words: Child abuse—Head injury—Lucid interval—Retinal hemorrhage—Subdural hematoma.

Many physicians believe that a simple fall cannot cause serious injury or death (1-9). That a lucid interval does not exist in an ultimately fatal pediatric head injury (7-13), and that retinal hemorrhage is highly suggestive if not diagnostic for inflicted trauma (7,12,14-21). However, several have questioned these conclusions or urged caution when interpreting head injury in a child (15,22-26). This controversy exists because most infant injuries occur in the home (29,30), and if there is history of a fall, it is usually not witnessed or is seen only by the caretaker. Objective data are needed to resolve this dispute. It would be helpful if there were a database of fatal falls that were witnessed or wherein medical and law enforcement investigation unequivocally concluded that the death was an accident.

The United States Consumer Product Safety Commission (CPSC) National Injury Information Clearinghouse uses four computerized data sources (31). The National Electronic Injury Surveillance System (NEISS) file collects current injury data associated with 15,000 categories of consumer products from 101 U.S. hospital emergency departments, including 9 pediatric hospitals. The file is a probability sample and is used to estimate the number and types of consumer product-related injuries each year (32). The Death Certificate (DC) file is a demographic summary created by information provided to the CPSC by selected U.S. State Health Departments. The Injury/Potential Injury Incident (IR) file contains summaries, indexed by consumer product, of reports to the CPSC from consumers, medical examiners and coroners (Medical Examiner and Coroner Alert Project (MECAP)), and newspaper accounts of product-related incidents discovered by local or regional CPSC staff (33). The In-Depth Investigations (AI) file contains summaries of investigations performed by CPSC staff based on reports received from the NEISS, DC, or IR files (34). The AI files provide details about the incident from victim and witness interviews, accident reconstruction, and review of law en-
Initial Neurologic Presentation in Young Children Sustaining Inflicted and Unintentional Fatal Head Injuries
Kristy B. Arbogast, Susan S. Margulies and Cindy W. Christian
Pediatrics 2005;116;180-184
DOI: 10.1542/peds.2004-2671

This information is current as of March 23, 2006

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://www.pediatrics.org/cgi/content/full/116/1/180
Methods

• PA Trauma Systems Foundation (PTSF)
• Children < 48-months-old
• Died at a PA Trauma Center
• Fatal HEAD injury
  – As determined by ICD-9 codes (800-995)
  – E codes for inflicted injury, falls, MVC
• Examined GCS at admission
  – Poor: GCS 3-7
  – Moderate: GCS 8-12
  – “Lucid”: GCS 13-15
• 1986-2002
Distribution of injury mechanism by age

- AHT
- Falls
- MVC

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number (n)</th>
</tr>
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<tbody>
<tr>
<td>all ages</td>
<td>324</td>
</tr>
<tr>
<td>0-11 mo</td>
<td>90</td>
</tr>
<tr>
<td>12-23 mo</td>
<td>110</td>
</tr>
<tr>
<td>24-35 mo</td>
<td>70</td>
</tr>
<tr>
<td>36-48 mo</td>
<td>54</td>
</tr>
</tbody>
</table>
Overall distribution of GCS

- GCS <7: 93%
- GCS 7-12: 5%
- GCS 13-15: 2%

“lucid”
## % of Children with GCS > 7

<table>
<thead>
<tr>
<th></th>
<th>AHT</th>
<th>MVC</th>
<th>Falls</th>
<th>AHT vs MVC</th>
<th>AHT vs Falls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall</strong></td>
<td>9.9%</td>
<td>3.3%</td>
<td>7.5%</td>
<td><strong>OR=3.26 (1.18-9.03), p=0.022</strong></td>
<td><strong>OR=3.26 (1.18-9.03), p=0.022</strong></td>
</tr>
<tr>
<td></td>
<td>(n=131)</td>
<td>(n=153)</td>
<td>(n=40)</td>
<td><strong>P=0.65</strong></td>
<td><strong>P=0.65</strong></td>
</tr>
<tr>
<td><strong>0-23 months</strong></td>
<td>11.7%</td>
<td>1.4%</td>
<td>8.3%</td>
<td><strong>OR=9.36 (1.52-57.49), p=0.011</strong></td>
<td><strong>OR=9.36 (1.52-57.49), p=0.011</strong></td>
</tr>
<tr>
<td></td>
<td>(n=103)</td>
<td>(n=72)</td>
<td>(n=24)</td>
<td><strong>P=0.77</strong></td>
<td><strong>P=0.77</strong></td>
</tr>
<tr>
<td><strong>&gt;24 months</strong></td>
<td>3.6%</td>
<td>6.3%</td>
<td>4.9%</td>
<td><strong>P=0.64</strong></td>
<td><strong>P=0.68</strong></td>
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<tr>
<td></td>
<td>(n=28)</td>
<td>(n=81)</td>
<td>(n=16)</td>
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</tbody>
</table>
Can Radiographs Help Us Time the Injury?
Serial neuroimaging in infants with abusive head trauma: timing abusive injuries

Clinical article

RAY BRADFORD, M.D., ARABINDA K. CHOUDHARY, M.D., M.R.C.P., F.R.C.R., and MARK S. DIAS, M.D.

Departments of Radiology and Neurosurgery, Penn State College of Medicine, Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania

Object. The occurrence and evolution of neuroimaging findings showing abusive head trauma (AHT) is important for determining the time and severity of abusive injuries. From a legal perspective, this frames the criminal or civil case where abuse has occurred, and excludes postabusive trauma or previous pilot study involving 33 infants. This study helped refine the staging of these injuries in a population with a small sample size. In the present study, a review of cases over a 10-year period was undertaken to collect cases from the AHT registry to analyze the frequency and evolution of abnormalities over time. Results. Review of serial neuroimaging studies in 210 cases involved infants with AHT to chronicle the first appearance and evolution of neuroimaging findings.

Methods. All infants aged 1-18 months admitted to the Penn State Hershey Medical Center with AHT over a 10-year period were reviewed. A retrospective review of medical records and imaging studies were analyzed, and the frequency and evolution of abnormalities were chronicled on serial neuroimaging studies. Results. Of 210 cases with AHT, 143 had repeat neuroimaging studies performed. A subset of 43 children additionally had multiple neuroimaging studies performed. A subset of children with homogenous hyperdense subdural hematomas (SDHs) on initial CT scans, the first hypodense component appeared within the SDH between 0.3 and 16 days after injury, and the second hyperdense component disappeared between 2 and 40 days after injury. In infants with mixed-density SDHs on initial scans, the last hyperdense component disappeared between 1 and 181 days. Parenchymal hypodensities appeared on CT scans performed as early as 1.2 hours, and all were visible within 27 hours after the injury. Rebleeding into SDHs was documented in 17 cases (16%) and was always asymptomatic.

Magnetic resonance imaging of the brain was performed in 49 infants. Among those with SDH, 5 patterns were observed. Patterns I and II reflected homogeneous SDH; Pattern I (T1 hyperintensity and T2/FLAIR hypointensity, "early subacute") more commonly appeared on scans performed earlier after injury compared with Pattern II (T1 hyperintensity and T2/FLAIR hypointensity, "late subacute"), although there was considerable overlap. Patterns III and IV reflected heterogeneous SDH; Pattern III contained relatively equal mixtures having different intensities, whereas Pattern IV had fluid that was predominantly T1 hypointense and T2/FLAIR hyperintense. Again, Pattern III more commonly appeared on scans performed earlier after injury compared with Pattern IV, although there was significant overlap.

Conclusions. These data extend the preliminary data reported by Dias and colleagues and provide a framework for a more focused approach to determining injuries in AHT. The timing of injuries can be better determined, and the limitations on such timing estimates are discussed.

(http://thejns.org/doi/abs/10.3171/2013.4.PEDS12596)

Key Words • abusive head trauma • shaken baby syndrome • infant traumatic brain injury • magnetic resonance imaging • computed tomography
What is the Frequency?

• Evidence of repeated injury:
  – History
  – Physical examination
  – Radiographic data
Abusive Head Trauma: Judicial Admissions Highlight Violent and Repetitive Shaking
Catherine Adamsbaum, Sophie Grabar, Nathalie Mejean and Caroline Rey-Salmon
Pediatrics 2010;126;546; originally published online August 9, 2010;
DOI: 10.1542/peds.2009-3647

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/126/3/546.full.html
I was feeling really bad. I was at the end of my rope from not sleeping. I shook him several times a week, I don’t know exactly, always at night.

He was crying. It drove me crazy. I shook him... maybe 10 times, and threw him on the sofa.

“I had fits of anger. She would cry; sometimes, when she did that, I’d shake her... I got worked up and twisted her arm; I was slapping her hard for more than 2 months.”
FIGURE 3
Probability of sentinel injury by age in 4 cohorts.
If the Baby Don't Cruise...

The Baby Don't Bruise!
Moving on...

TRANSLATING MEDICINE TO INVESTIGATION
The Physician’s Responsibility

• Diagnostic Accuracy
  – Important to be thorough and objective

• Information about Mechanism
  – Is there evidence of blunt impact?

• Information about Frequency
  – Is there evidence of old injury?

• Information about Timing
  – Usually dependent on the history
  – Usually dependent on the investigation
Investigating Possible AHT

- **Who**: who has been caring for the child?
  - Anyone new on the scene?
- **What**: What had the child been doing prior to the hospitalization?
  - Ask for precise hour to hour timeline of the days
- **Where**: Where has the child been over past days?
  - Have objective observers seen the child?
- **When**: The TIMELINE IS SO IMPORTANT
  - When was the last time the child was WELL?
- **How**: How was the child injured?
  - If they provide a history of trauma
Typical AHT Timeline

8 AM
Woke up

Noon
Gave her lunch

4 PM
Played Video Game

6 PM
Stopped Breathing

○ = INFORMATION
HOW DOES THIS WORK?
What does the Medical Data Tell us? Mechanism, Frequency, Timing
What about Timing?

- Medical Data only good for rough estimates
Do short falls kill?
Can short falls kill?

- Short falls are common
- Short falls are commonly used as an explanation in cases of child abuse
- Literature shows that:
  - Short falls are harmless
  - Short falls kill young children
- How should you reconcile these data?
Annual Risk of Death Resulting From Short Falls Among Young Children: Less Than 1 in 1 Million

David L. Chadwick, MDa,b,c, Gina Bertocci, PhDd, Edward Castillo, PhD, MPHd, Lori Frasier, MDa,f, Elisabeth Guenther, MD, MPHa,f, Karen Hansen, MDa,f, Bruce Herman, MDa,f, Henry F. Krous, MDd,a,g

aDepartment of Pediatrics, University of Utah Health Sciences Center, Salt Lake City, Utah; bChadwick Center for Children and Families and cDepartment of Pathology, Rady Children's Hospital and Health Center, San Diego, California; dGraduate School of Public Health, San Diego State University, San Diego, California; eDepartments of Mechanical Engineering, Bioengineering, and Pediatrics, University of Louisville, Louisville, Kentucky; Departments of fEmergency Medicine and gPathology, School of Medicine, University of California, San Diego, California; hPrimary Children's Medical Center, Salt Lake City, Utah

The authors have indicated they have no financial relationships relevant to this article to disclose.

ABSTRACT

OBJECTIVE. The objective of the work was to develop an estimate of the risk of death resulting from short falls of <1.5 m in vertical height, affecting infants and young children between birth and the fifth birthday.

METHODS. A review of published materials, including 5 book chapters, 2 medical society statements, 7 major literature reviews, 3 public injury databases, and 177 peer-reviewed, published articles indexed in the National Library of Medicine, was performed.

RESULTS. The California Epidemiology and Prevention for Injury Control Branch injury database yielded 6 possible fall-related fatalities of young children in a population of 2.5 million young children over a 5-year period. The other databases and the literature review produced no data that would indicate a higher short-fall mortality rate. Most publications that discuss the risk of death resulting from short falls say that such deaths are rare. No deaths resulting from falls have been reliably reported from day care centers.

CONCLUSIONS. The best current estimate of the mortality rate for short falls affecting infants and young children is <0.48 deaths per 1 million young children per year. Additional research is suggested. Pediatrics 2008;121:1213–1224
Number of Children 0-5 yrs in US

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<td>73.9</td>
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<td>2032</td>
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<td>2034</td>
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</table>
Wang, 12 Fatal Pediatric Falls

Review of 729 children treated for falls in LA
Classified as low (<15 ft) or high (>15 ft)
12 total deaths - 4 in children who fell < 15 ft

## Table 2. Deaths From Falls

<table>
<thead>
<tr>
<th>Height</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Setting</th>
<th>GCS</th>
<th>ISS</th>
<th>Head Injuries</th>
<th>Extracranial Injuries</th>
<th>Surgery</th>
<th>Complications</th>
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<tbody>
<tr>
<td>3 ft</td>
<td>3 yr</td>
<td>F</td>
<td>Hispanic</td>
<td>Tripped</td>
<td>3</td>
<td>17</td>
<td>Orbital fracture, ocular injury, subdural hematoma</td>
<td>None</td>
<td>Craniotomy for clot evacuation</td>
<td>None</td>
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<tr>
<td>4 ft</td>
<td>11 yr</td>
<td>M</td>
<td>White</td>
<td>Furniture</td>
<td>3</td>
<td>25</td>
<td>Cerebral contusions and edema</td>
<td>None</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>5 ft</td>
<td>8 yr</td>
<td>F</td>
<td>Black</td>
<td>Sports equipment</td>
<td>10</td>
<td>16</td>
<td>Subarachnoid hemorrhage, cerebral edema</td>
<td>None</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>12 ft</td>
<td>13 mo</td>
<td>F</td>
<td>Hispanic</td>
<td>Balcony</td>
<td>3</td>
<td>26</td>
<td>Skull fracture, cerebral edema</td>
<td>None</td>
<td>No</td>
<td>None</td>
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<tr>
<td>15 ft</td>
<td>2 yr</td>
<td>F</td>
<td>Hispanic</td>
<td>Window</td>
<td>7</td>
<td>17</td>
<td>Skull fracture, cerebral edema</td>
<td>Abdominal abrasions</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>24 ft</td>
<td>28 mo</td>
<td>M</td>
<td>Hispanic</td>
<td>Window</td>
<td>4</td>
<td>30</td>
<td>Cerebral edema</td>
<td>Pulmonary contusions</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>25 ft</td>
<td>21 mo</td>
<td>M</td>
<td>Hispanic</td>
<td>Window</td>
<td>3</td>
<td>41</td>
<td>Skull fracture, cerebral edema</td>
<td>Splenic, pancreatic, and liver lacerations; aortic injury</td>
<td>No</td>
<td>Diabetes insipidus</td>
</tr>
<tr>
<td>30 ft</td>
<td>10 yr</td>
<td>M</td>
<td>Hispanic</td>
<td>Window</td>
<td>15</td>
<td>29</td>
<td>Orbital fracture</td>
<td>None</td>
<td>Mesenteric repair and cross clamping of aorta</td>
<td>None</td>
</tr>
<tr>
<td>33 ft</td>
<td>15 mo</td>
<td>M</td>
<td>Hispanic</td>
<td>Balcony</td>
<td>3</td>
<td>25</td>
<td>Skull fracture, cerebral edema</td>
<td>None</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>33 ft</td>
<td>2 yr</td>
<td>F</td>
<td>Hispanic</td>
<td>Window</td>
<td>3</td>
<td>50</td>
<td>Skull fracture, cerebral edema</td>
<td>Pulmonary contusion, splenic laceration</td>
<td>Splenectomy</td>
<td>None</td>
</tr>
<tr>
<td>40 ft</td>
<td>8 yr</td>
<td>M</td>
<td>Hispanic</td>
<td>Balcony</td>
<td>3</td>
<td>43</td>
<td>Skull fracture</td>
<td>Heart contusion, liver laceration, renal injury</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>75 ft</td>
<td>3 yr</td>
<td>M</td>
<td>Black</td>
<td>Balcony</td>
<td>3</td>
<td>27</td>
<td>Cerebral edema</td>
<td>Pulmonary contusion, rib fractures</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>

Steinbok P, CT finding of early hypodensity of the brain in 5 children with fatal, accidental head injury

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age/sex</th>
<th>Mechanism</th>
<th>GCS</th>
<th>Pupils</th>
<th>Funduscopv</th>
<th>CT scan</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 mo/F</td>
<td>MVC</td>
<td>3</td>
<td>2 fixed</td>
<td>Not performed</td>
<td>3.5 hr: SAH, IVH, tentorial ASDH, PH</td>
<td>&lt;24 hr: brain death</td>
</tr>
<tr>
<td>2</td>
<td>7 mo/M</td>
<td>Fall down stairs</td>
<td>3</td>
<td>1 fixed</td>
<td>Bilateral retinal and preretinal hemorrhages</td>
<td>2 hr: falx, tentorial and convexity ASDH, mild IVH, PH</td>
<td>&lt;24 hr: brain death</td>
</tr>
<tr>
<td>3</td>
<td>14 yr/M</td>
<td>Bike accident</td>
<td>4</td>
<td>2 fixed</td>
<td>Not performed</td>
<td>4.5 hr: DAI, mild falx ASDH, mild SAH, mild IVH, PH</td>
<td>&lt;36 hr: brain death</td>
</tr>
<tr>
<td>4</td>
<td>12 mo/F</td>
<td>Fall from fast moving hay wagon</td>
<td>5</td>
<td>2 fixed</td>
<td>Bilateral retinal infarcts</td>
<td>3.5 hr: mild SAH, mild falx and tentorial ASDH, PH</td>
<td>&lt;24 hr: brain death</td>
</tr>
<tr>
<td>5</td>
<td>2 yr/M</td>
<td>Fall from stool</td>
<td>4</td>
<td>2 fixed</td>
<td>Normal</td>
<td>1 hr: tentorial and convexity ASDH, PH</td>
<td>48 hr: death</td>
</tr>
</tbody>
</table>

*GCS, Glasgow coma scale; CT, computed tomographic; MVC, motor vehicle collision; SAH, subarachnoid hemorrhage; IVH, intraventricular hemorrhage; ASDH, subdural hematoma; PH, parenchymal hypodensities; DAI, diffuse axonal injury.*
Communication
The Role of the Physician

• Identify and report abuse
• Treat children and support families
• Interpret medicine for non-medical professionals
  – Provide courts with medical information
• Work collaboratively with professional partners
  – Investigation
  – Prevention and Child Advocacy
At the end of the day...

- Child abuse with known perpetrator
- Child abuse with unknown perpetrator
- Not child abuse
- Uncertainty
THE END