UNIVERSITY OF LOUISVILLE
SCHOOL OF MEDICINE

Understanding Abusive Head Trauma: A Program for Professionals

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Continuing Nursing Education Disclosures

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House Bill 285 in Kentucky

- Mandates/recommends education for various groups in the state who work with or care for young children
- Helps all caregivers (not just parents) recognize early signs of maltreatment, which can prevent escalation to Abuse Head Trauma
- Provides caregivers with tools for dealing with a crying infant—the most common trigger for Abusive Head Trauma

Objectives

- Review statistics of abusive head trauma
- Define and describe abusive head trauma and its associated injuries
- Describe the anatomy of the infant head and brain
- Understand common presenting scenarios for abusive head trauma

Objectives

- Understand the medical evaluation and follow-up of a child with abusive head trauma
- Understand the range of outcomes for victims of abusive head trauma
- Discuss risk factors for abusive head trauma
- Discuss prevention of abusive head trauma

The Evolution of Terminology

- Nonaccidental Trauma
- Inflicted Neurotrauma
- Inflicted Head Injury
- Shaken Baby Syndrome
- Shaken-Impact Syndrome

Preferred terminology since 2009

- Abusive Head Trauma
- Abusive Head Injury

Incidence/Prevalence

- Abusive head trauma is the most common cause of morbidity (disability) and mortality (death) in physical child abuse.
- Abusive head trauma usually occurs in children younger than 1 year of age, but older children can be victims as well.
- It is the most common cause of death from brain injury in children less than one year of age.

Kentucky Statistics…

- In 2007, Kentucky was **1st** in the nation for child abuse death rate.
- Kentucky averages 30-40 child deaths involving maltreatment per year, with another 30-60 "near fatalities" per year.

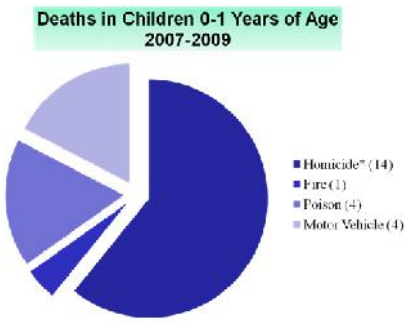
"We Can Do Better." Oct, 2009 report from Every Child Matters Education Fund, a nonpartisan child advocacy organization. Kentucky Child Fatality Review System 2007-2009 Annual Reports and direct CHFS database query.

Kentucky Statistics…

For perspective: More children die under circumstances of alleged maltreatment between the ages of 0-1 years than from all accidental causes of injury! (includes fire, drowning, motor vehicle and poison-related deaths)

"We Can Do Better." Oct, 2009 report from Every Child Matters Education Fund, a nonpartisan child advocacy organization. Kentucky Child Fatality Review System 2007-2009 Annual Reports and direct CHFS database query.

Kentucky Statistics…



Kentucky Child Fatality Review System 2007-2009 Annual Reports and direct CHFS database query.

Incidence/Prevalence

It is very rare for a child to die from or be permanently disabled from maltreatment the first time they are abused/neglected.

All of us are in unique positions to recognize and intervene on behalf of these children!

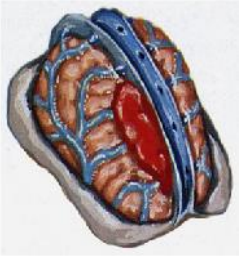
Every Role Is Unique

- Nurses, Doctors, other Healthcare providers
- Social workers, Therapists
- EMT/First Responders, Law Enforcement
- Daycare workers, Teachers
- Parents, Friends and neighbors
- Attorneys, Judges, Guardians ad Litem, CASA volunteers

Abusive Head Trauma: What is it, exactly?

- Global brain injury caused by rotational/angular forces
- Involves shaking, impact or both
- Subdural hematomas, +/- retinal hemorrhage, scalp bruising, skull fracture…but it's the injury to the brain tissue itself that causes death and disability
- Often triggered by crying
- **Again, it is not typically a one-time event.**

How does shaking cause injury to a baby?



- Bridging veins stretch, rupture, and bleed, leading to subdural bleeding.
- Brain tissue is distorted/stretched during the event, causing damage to nerve cells and brain tissue (either temporary or permanent damage).

Why is the infant at such high risk?

- Inside of the infant skull is smoother—fewer 'nooks and crannies' to hold the brain in place
- More space between outside of brain and inside of skull
- Relatively large head:body ratio and weak neck muscles
- Not as much myelin around the individual nerve cells
- Infant brain—25% more water than adult (think under-set gelatin)

What *DOESN'T* cause Abusive Head Trauma injuries/findings?

High-profile court cases, news media, perpetrators and professional defense witnesses have all alleged the following as potential explanations for the injuries found with abusive head trauma:

- Short falls*
- Bouncing a child on your knee
- Rough play
- Immunizations
- Vitamin C or D deficiency
- Birth trauma (special case)
- Toddlers, pets

* Chadwick et al. *Pediatrics.* 2008; 121:1213-1224

"The act of shaking leading to shaken baby syndrome is so violent that individuals observing it would recognize it as dangerous and likely to kill the child."**

****Shaken Baby Syndrome: Rotational Cranial Injuries—Technical Report**. AAP Committee on Child Abuse and Neglect. ***Pediatrics***. July 2001.

Possible Associated Injuries In Other Areas of Body…

- Metaphyseal and other fractures
- Bruising of the skin (can include torso, arms, legs)
- Internal abdominal injury (won't necessarily see bruising!)
- ***OR NOTHING***

Metaphyseal fractures…

Also known as “corner fractures” or “bucket-handle fractures”. This kind of injury is EXTREMELY rare from typical accidental injury.

Rib Fractures

- Posterior rib fractures are caused by violent squeezing of the chest
- Back is *unsupported,* so that ribs bend back over the sides of the backbone
- Posterior fractures are *not* a result of direct impact
- Highly specific for physical abuse

Chest

Spine

Important Key Issues

- Infants with abusive head injury may look completely normal/uninjured from the outside. (Common myth: matching rib cage bruising to size of perpetrator’s hands)
- The signs and symptoms can be vague and easily mistaken for a more benign problem.
- Therefore, abusive head trauma is sometimes missed and/or misdiagnosed by medical professionals.

TEN-4 BRUISING RULE

ANY bruising of the

- **T**ORSO
- **E**ARS

or

- **N**ECK

in a child 4 years of age or younger

OR

ANY bruising, ANYWHERE, on a child 4 months of age or younger

Pierce et al. **Bruising Characteristics Discriminating Physical Child Abuse From Accidental Trauma**. *Pediatrics*. December 2009.

What is Normal?

- Normal accidental bruises in toddlers and older children are typically
  - On the front of the body
  - Over bony prominences (forehead, elbows, knees, shins)

Bruising Summary

- Bruising is extremely rare in infants less than 6 months of age and uncommon in pre-ambulatory infants.

❖ Bruising in infants is a significant indicator of abuse, **must be reported to DCBS** and must be medically evaluated.

❖ Bruising is the most overlooked sign of abuse.

❖ Remember the TEN-4 Bruising Rule.

Sugar, Taylor, Feldman et al. **Bruises in Infants and Toddlers *Those Who Don't Cruise Rarely Bruise.*** ARCH PEDIATR ADOLESC MED/VOL 153, APR 1999.

AHT: Common Presenting Scenarios

- Infants with bruises*
- Vomiting without diarrhea
- Apparent life-threatening event (ALTE)

*This especially important for PREVENTING escalation of violence and AHT.

AHT: Common Presenting Scenarios

- Sudden increase in head circumference
- Occult (hidden) fracture/incidental finding
- Developmental delay

Severity of symptoms can vary by severity of brain injury

- Vomiting
- Irritability
- Lethargy/difficult to arouse
- Unusual sleepiness, sluggishness, or seeming "spaced out"
- Seizures
- Breathing difficulty/gasping respirations/apnea (stopped breathing)
- Bradycardia (slow heart rate)/cardiac arrest/death

The Medical Evaluation

- Head CT (looking for subdural bleeding, brain swelling)
- Skeletal survey and follow-up skeletal survey in 10-14 days (NOT a babygram!)
- Eye exam (to look for retinal hemorrhages)
- Trauma and bleeding labs to screen for signs of internal injury or bleeding disorder
- MRI of the brain and spinal cord if CT is abnormal (MRI can demonstrate subtle brain injury that CT can miss)
- Photograph all visible injuries and call DCBS immediately

The Medical Evaluation

- Not all medical facilities or medical providers have the training and expertise to complete this evaluation.
- Regardless of your role in the process, you should feel empowered to advocate for the appropriate medical evaluation for suspected victims.
- This is one of our biggest challenges in the medical community: training all the providers who see and care for children about the recognition and evaluation of child physical abuse/AHT.

Outcomes

- Mortality rate approximately 20-30%*
- Long-term morbidity (disability) high amongst survivors—up to 90% affected*
- Disabilities include learning disabilities, emotional/behavioral issues, speech and language delays, vision/hearing, hormone/growth problems (due to pituitary injury)

* Visual Diagnosis of Child Abuse on CD-ROM 3rd Edition

Supporting the Survivor

- **Establish a medical home.**
- Monitor closely for developmental issues (First Steps), emotional/ behavioral issues (esp. attachment problems), hormone problems (panhypopituitarism), learning disabilities
- Older siblings that might have witnessed violence may need ongoing therapy/counseling

Common Triggering Situations

- Crying baby
- Child's misbehavior
- Argument/family conflict
- Toilet training
- Parental stressors outside the home
- Discipline gone awry

Family Factors

- Domestic/family violence
- Single parent/military deployments
- Unemployment/financial stressors
- Isolation
- Poverty/limited resources
- Animal abuse

Caregiver Characteristics

- Substance abuse
- Criminal history
- Mental illness (Undiagnosed or untreated)
- Low self-esteem
- Poor impulse control
- Teenage parent

Caregiver Characteristics

- **Unrealistic expectations of child's behavior**
- Immature parent/poor coping skills
- CPS history/prior removals
- Caregiver abused as child

Child Characteristics

- 0-3 years of age
- Drug affected
- Premature birth/NICU stays/multiples
- Colic
- Physical/developmental disabilities

Child Characteristics

- Emotional/behavioral difficulties
- Unwanted child (NOT the same as unplanned)
- Result of infertility treatment/long-awaited child

Kentucky Fatality Risk Factors

Top three risk factors for fatal abusive injury include:

- **Substance Abuse**
- **Domestic Violence**
- **Criminal History**

among adult caregivers in the home.

Perpetrator Statistics

Physical abuse:
- **Father**
- **Mother's BF (paramour)**
- **Mother**

"Children living in households with one or more male adults that are not related to them are at increased risk for maltreatment injury death."

(Specifically, they are 8 times more likely to die of maltreatment than children in households with two biological parents. Risk of maltreatment death was not increased for children living with only one biological parent.)

Stiffman et al. Pediatrics. April 2002. *Household Composition and Risk of Fatal Child Maltreatment.*

Case Review

- 4-month-old baby boy presents for well child exam and is noted to have two fingertip-sized bruises on each thigh. Parents explain that they came from a diaper change when the child was squirming. Social history offers no red flags. The doctor has seen the older sibling for the past two years.

.....continued

- **Unfortunately, this pediatrician didn't understand the significance of bruising in an infant.**
- **One week later, the patient was brought to the emergency department unresponsive and having seizures.**
- **He was found to have bilateral subdurals*, and 13 broken bones (inflicted by dad, who was tearful and outraged when told that someone had harmed his son).**
- **Pediatrician described family as "very nice, no concerns." Under social hx: "Family appropriate."**

*Bleeding inside the skull but outside of the brain, caused by abusive head injury.

The Lessons Learned

Bruising in babies is *NOT* normal.

Maltreatment can and does occur in "nice families".

The absence of risk factors is not the same as the absence of risk.

Prevention: What Can I Do?

- Make a report to DCBS when you suspect abuse
- Document any signs/symptoms you see
- Take pictures of injuries
- Document any information you receive from a parent/caregiver when you have suspicions
- Document observations of parent/caregiver reactions to concerns and interactions with the child/significant other

Prevention: What Can I Do?

- Make sure any suspected victim (and sibs) receive thorough medical evaluation
- Be aware of common presenting scenarios so that you can intervene promptly
- Share your new knowledge about this topic with everyone you encounter (professional and nonprofessional)

Prevention: What Can I Do?

- Help parents understand it's okay for a baby to cry—it's how they communicate!
- Help parents understand it is normal to feel frustrated by a crying baby—and it is okay to take a break and ask for help.
- Become a resource for parents--help connect families to support services.
- Have difficult conversations with parents when you have concerns. Encourage non-violent approaches to conflict resolution and discipline.

Prevention: What Can I Do?

- Share tips with parents on how to soothe infants.
- Share tips with parents on taking care of themselves.
- Tell parents about 1-800-CHILDREN.
- Talk openly with everyone you know about the dangers of shaking a child!

Tools: Soothing a Crying Baby

- Meet baby's immediate needs (feed, change, ensure proper environmental temperature, etc.).
- Pay attention to noise and lighting in environment and try a change of location.
- Check baby for signs of illness or injury, and call the baby's doctor if there are any concerns.
- Rock, walk, dance with baby.
- Take a drive with baby (in carseat!)
- Shush in baby's ear, run the vacuum, or place a "white noise" machine near the child.

Tools: Soothing a Crying Baby

- Check to make sure clothing isn't too tight, fingers and toes aren't bent or caught, nothing is poking the baby (new clothes with tags, etc.).
- Try swaddling the baby.
- Place baby on her back in safe sleeping environment (crib without padding, toys, stuffed animals or pillows), close the door, turn on TV or radio, and check on baby every 10-15 minutes. ***Crying will not hurt the baby.***

Tools: Soothing *Yourself*

- Recognize babies cry and they usually cry more from 2-8 weeks of age
- Rest—sleep when the baby sleeps—give yourself permission to make sleep and your baby your first priorities.
- Give yourself permission to be frustrated—having a baby is hard work!
- Take a deep breath, count to 5, 10, or 20
- Ask for help—get a sitter, ask a family member or friend to watch the baby.

Tools: Soothing *Yourself*

- Do something you enjoy—walk, hike, read, take a bath, call a friend.
- Talk with other new parents about being a new parent.
- Listen to soothing music via earbuds or headphones (and check on child periodically).
- When feeling frustrated, place baby on back in crib and go to another room—check on the baby every 5-10 minutes.

Prevention Models

- **The Happiest Baby Model/Harvey Karp:**
  The "Fourth Trimester" concept
  Multiple soothing techniques
- **Period of Purple Crying:**
  Walk away when frustrated
- **The Dias Model/Portrait of a Promise:**
  Education of new parents/caregivers during the birth hospitalization. Teaches caregivers about the dangers of shaking and parents are asked to sign a commitment statement. Combines soothing techniques with permission to walk away.

Key Prevention Message

Education about infant crying:

- Crying is normal in infancy. *Instill realistic expectations.*
- Provide specific tools for soothing a crying infant, including permission to place the infant in a safe place and walk away/take a break.
- Teach caregivers how to soothe *themselves.*

AHT: Take-Home Messages

- Abusive Head Trauma is the most dangerous and deadly form of child physical abuse.
- Experience tells us that we often fail to recognize early warning signs—and we therefore miss opportunities to intervene and prevent further harm to abused children.
- Many people in various roles play a vital part in observation, documentation, and intervention.
- The absence of risk factors is NOT the same as the absence of risk.

AHT: Take-Home Messages

- TEN-4 Bruising Rule
- A thorough medical evaluation is crucial—and not every medical facility or provider is equipped to do it.
- Long term effects from AHT vary from subtle learning and behavioral issues to complete dependence for all care.
- Education of caregivers regarding techniques for soothing a crying infant and the dangers of shaking can be an effective prevention tool.

AHT: Take-Home Messages

- Contrary to popular belief, Abusive Head Trauma is rarely a one-time event. It is more often the culmination of an ongoing escalation of violence against the child—and non-offending caregivers are often unaware of the abuse.
- Until then, recognition of early warning signs is crucial.

For Assistance

- The University of Louisville Division of Forensic Medicine is available 24 hours a day, every day.
- For assistance with a case or questions, please call the operator at Kosair Children's Hospital and ask for the forensic specialist on call.
- That number is 502-629-6000.

Reporting Abuse

- **24 hour statewide hotline for pediatric and adult reporting: (800) 752-6200**
- **To report actual/suspected abuse in infant, pediatric and/or adolescent cases:**
  - **Child Abuse Hotline (502) 595-4550**
  - **LMPD Crimes Against Children (502) 574-2465**

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Questions/Comments?