Overview of Abusive Head Trauma

SERTAC 10/13/21
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- Lynn K. Sheets, MD has no relevant financial relationships to disclose or conflicts of interest to resolve
- Contains disturbing scenarios
- No legal advice is being provided
- Cases are amalgamated for de-identification purposes

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Importance of Early Recognition and Reporting (recognize sentinel injuries!)

- This strategy prevents escalating infant abuse with its toxic outcomes (neurodevelopmental trauma and brain injury from abusive head trauma)
- 2-month-old Abby
  - Bruises - **sentinel injury** in a pre-cruising infant
  - Would you report?
  - Dual reporting is indicated
  - Define sentinel injury
  - What studies are indicated?
  - Even if surveillance is negative, abuse remains the most likely diagnosis (exclude common bleeding disorders)

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Medical Evaluation for Infants and Toddlers Reasonably Suspected of Being Physically Abused

- If bruised or bleeding anywhere, bleeding labs
- Skeletal survey and repeat in 2 - 3 weeks **(a 2-part study)**
- Head CT if <6 or neurologically abnormal/clinical suspicion
- Abdominal screening labs (AST, ALT, amylase, lipase, UA)
- Comprehensive urine drug Investigation with confirmation
- Other lab and x-ray as indicated to consider other diagnoses
- Photographs (medical quality) of any injuries

See handout

- **Dual reports to investigators (both CPS and Law Enforcement) EVEN IF YOU ARE TRANSFERRING CHILD TO A TRAUMA CENTER!**
- Mandated reporting – done by who knows the most and in lay terms (it is an opportunity to educate in order to ensure understanding!

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Abusive Head Trauma

- Previously known as "Shaken Baby Syndrome"
- Abusive head trauma (AHT) is the preferred terminology over Shaken Baby Syndrome (2009 AAP)
- Given that crying is the most common trigger, it recommended that prevention should focus on coping with crying

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Scope of the Problem

- Head trauma is the leading cause of disability and death among abused infants and children.
- Approximately 50% of brain injuries in children <1 year of age are inflicted
- 100% of abused children suffer neurodevelopmental trauma that impacts their lifetime trajectory

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What is Abusive Head Trauma?

- A type of severe physical abuse
- Seen almost exclusively in infants and toddlers, but can be seen up to age 5 years
- Often involves shaking, often with impact
- Most of the severe associated injuries are from severe rotation (angular forces) with acceleration/deceleration

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Infant crying

- Normal developmental stage – peaks around 6 weeks of age (Hunziker, U. A., & Barr, R. G. (1986). Increased carrying reduces infant crying: A randomized controlled trial. Pediatrics, 77, 641–648)
- May indicate something is wrong but not always
- Causes stress and anxiety for caregivers- feelings of frustration, inadequacy, anger
- Abusive caregivers – unable to regulate the stress that is elicited by infant crying (McCanne, T. R., & Hagstrom, A. H. (1996). Physiological hyperreactivity to stressors in physical child abusers and individuals at risk for being physically abusive. Aggression and Violent Behavior, 1, 345–358.)
- 89% of parents contacted the PCP because of excessive crying prior to AHT (Talvik, I., Alexander, R. C., & Talvik, T. (2008). Shaken baby syndrome and a baby's cry. Acta Paediatrica, 97, 782–785)

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The Trauma Event

- Usually triggered by persistent crying in infants or other annoying/frustrating behaviors
- Caregiver grabs child (usually by arms or around chest)
- Child is shaken violently back and forth and/or slammed
- Severe rotational (inertial, angular) forces with acceleration/deceleration act on the head to cause injuries

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How and Symptoms?

- How
  - Tissues move in response to shaking/slamming
  - Different tissues move at different rates
  - The mass of the tissue affects how each tissue moves
  - Injury is usually seen at tissue interfaces, where two different types of tissues come together but are attached (sliding, shearing)
- Symptoms
  - Symptoms are immediate- shaking "works"- Perpetrators sometimes report using it to quiet babies
  - 2.6% of parents shake their infants and toddlers (2008 Runyan Am J Prev Med)
  - Remember that symptoms can subside!
  - Jenny, C et al- Up to 31% of AHT babies were initially missed when they presented for medical care! JAMA. 1999;281:621-626

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Symptoms of Abusive Head Trauma

- A shaken/slammed baby may have <u>any</u> combination of the following symptoms:
  - No obvious symptoms (in some very young infants)
  - No sign of external injury (many infants)
  - Breathing problems
  - Arching back; stiff arms, legs
  - Seizures
  - Does not focus or track movements; pupils of eyes unequal in size
  - Eyes gazing in one direction for prolonged time
  - Unusual cry
  - AMS, coma, or death
  - Sleepy or irritable

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How is AHT Diagnosed?

- Basic criteria:
  - Subdural/Subarachnoid hemorrhage (bleeding around the brain)
  - Primary diffuse brain injury (clinically and/or on radiographs)
  - Retinal hemorrhages in 85%But also:
  - Peer review
  - Absence of adequate accidental history to explain them
  - No evidence of a disease that could explain the findings

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Timing

- Presently, our best tool for estimating the timing of pediatric head trauma is the careful documentation of the onset and progression of the child's clinical signs and symptoms.
- The child was injured just before he/she became *clearly and persistently symptomatic.*

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Talking with Investigators

- Avoid comments that you don't think it is abuse or that you are just making the call because you are mandated to do so
- Avoid saying the injury is consistent with the history
- INSTEAD – defer the medical opinion to those who have advanced education and expertise
- INSTEAD – indicate that more information is needed to further evaluate the infant
- Investigators want you to say is it abuse or not?! Don't get pressured into answering this question. Instead say "These injuries are unexpected given the information I have and need further evaluation."

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Want to learn more?

- Medically-focused monthly webinars
- Sessions are web-based and by telephone so participants can be in office with a phone and a computer (or at home)
- Social work, CME, Part 2 MOC, and Nursing CE
- Website: http://wichildabusenetwork.org/

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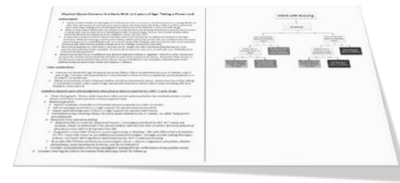
Printable Guide (at end of handout)



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Physical Abuse Concerns in Infants Birth to 2 years of Age: Taking a Closer Look

Sentinel Injuries:

- What are they? Visible, poorly explained small injuries such as **a bruise, red spot in the white of the eye, or mouth injury in pre-cruising infants** are often from abuse and can precede more serious abuse. Cruising means the baby can pull to a stand and take steps holding onto something which babies learn to do between 7 and 12 months of age.
- What do they mean? Babies who are not yet cruising should not be bruising! Any bruise or mouth injury in a pre-cruising infant is unexpected and should raise concerns for abuse or a bleeding disorder (Sugar, N et al., Arch Pediatr Adolesc Med. 1999;153:399-403 and Sheets, LK et al., *Pediatrics*. 2013; 131:701–707).
- A baby with a sentinel injury may seem OK but have severe internal injuries; additional medical screening is necessary. Medical screening is performed to detect hidden (occult) injuries and to rule out conditions that can cause easy bruising such as a bleeding disorder. In a published study, 50% of babies with just a bruise who were evaluated for abuse had other serious injuries (Harper NS et al. *J Pediatr* 2014;165(2):383-388).
- Who should evaluate an infant with a sentinel injury? Ideally the infant should be evaluated by the most experienced medical provider available. If unsure about where to seek care or another opinion, consult with a medical professional at a Child Advocacy Center for further guidance.
- What if the additional medical screening tests are negative (see Medical Evaluation below)? Even if no occult injuries are present, the sentinel injury should be carefully considered as suspicious for abuse. Remember that a sentinel injury may be the first injury from abuse! Injury surveillance is not complete until both parts of the skeletal survey are performed (initial and repeat in 2-3 weeks).

Other considerations:

- Fractures can be the first sign of physical abuse; 55% to 70% of abusive fractures occur in children under 1 year of age. Consider child physical abuse in any child with a fracture that is unexpected or in an infant < 12 months old.
- Sibling or household contacts of abused children should be evaluated for abuse. Research shows that siblings or household contacts under 2 years of age had abusive fractures in almost 12% of cases! (Lindberg, DM et al., *Pediatrics*. 2012;130:1-9)

Occult injury surveillance when physical abuse is suspected in a child < 2 years of age:

- Obtain Photographs. Photos, while important, often cannot replace evaluation by a medical provider. **Include photos of the face, knees and shins in every suspected abuse case with bruising.**
- Medical evaluation:
  - Dilated ophthalmology exam if there is a high suspicion for abusive head trauma (AHT)
  - Head CT routinely < 6 months and if AHT is suspected in a child > 6 months.
  - MRI, trauma sequences, of head and whole spine if there is a high suspicion for AHT
  - Full skeletal survey including oblique ribs and a repeat skeletal survey in 2-3 weeks. So-called "babygrams" are inadequate.
  - Blood and Urine Laboratory testing
    - ✓ Abdominal labs to screen for abdominal trauma – Urinalysis and blood for AST, ALT, Lipase and Amylase. Obtain an abdominal CT for abused children with GCS less than 10 and/or abnormal abdominal laboratory screen (AST or ALT greater than 80)
    - ✓ Coagulation screen *ONLY if* there is concerning bruising or bleeding – CBC with differential and platelets, PT, PTT, von Willebrand activity and antigen, Factor VIII, Factor IX. Consider adding fibrinogen, d-dimer, TT, and Factor XIII if severe bruising or extensive bruising.
    - ✓ Bone labs *ONLY* if there are fractures concerning for abuse – calcium, magnesium, phosphate, alkaline phosphatase, intact parathyroid hormone, and 25-OH-Vitamin D.
    - ✓ Consider comprehensive urine drug investigation testing with lab confirmation of any positive results
- Consider referring the child to the nearest Child Advocacy Center for follow-up

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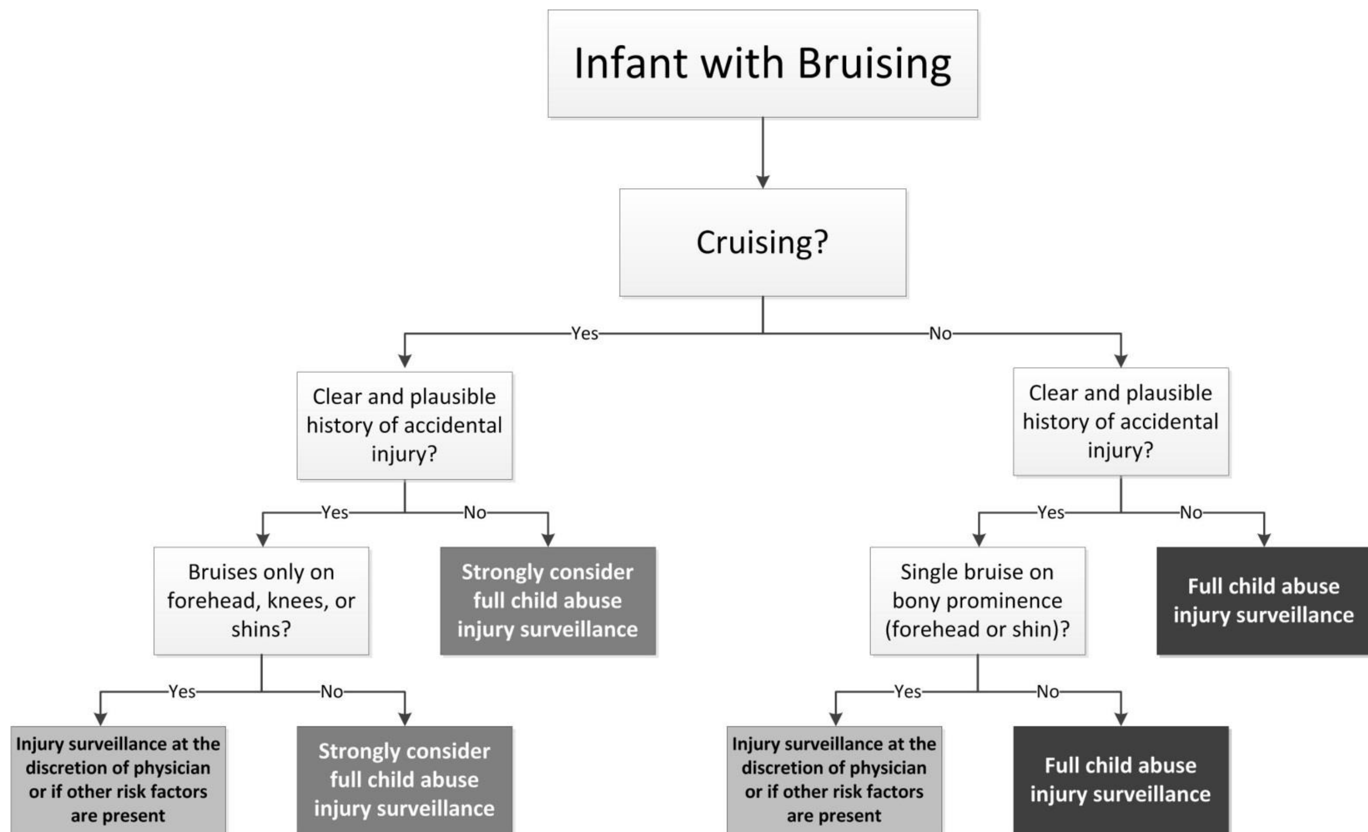

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