Child Abuse from a Trauma Service Perspective

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St. Johns Hospital
Detroit, MI
Who am I?

- General Pediatrician with a fellowship completed in Child Abuse at Cincinnati Children’s Hospital
- Will provide any support necessary for inpatient or outpatient cases to St. Johns physicians
What are child abuse specialists?

- Now over 20 University supported fellowship programs in the country
- Are officially a Board Certifiable sub-specialty of Pediatrics (since November 2009)
- Able to support physicians for physical and sexual abuse, neglect, Munchausen’s and other related child abuse cases.
Why talk about abuse?

➤ You are mandated reporters:
  • Who Must Report?
    • Physicians, including hospital interns or residents; dentists; podiatrists; practitioners of limited branches of medicine or surgery; registered nurses; licensed practical nurses; visiting nurses; other health care professionals; speech pathologists; audiologists; coroners
  • Under What Conditions?
    • When they are acting in their official or professional capacities and know or suspect that a child under 18 years or a mentally retarded, developmentally disabled, or physically impaired child under 21 years has suffered or faces a threat of suffering any physical or mental wound, injury, disability, or condition of a nature that reasonably indicates child abuse or neglect.
Why talk about abuse?

- Unfortunately, failure to report is a crime.
  - ‘Two local physicians charged with felony charges for failure to report child abuse.’ Detroit, 2003
  - ‘Nurse charged with two counts of misdemeanor failure to report child abuse in Greene County, Missouri.’ 2003
  - ‘Jury awards $5 million in damages after finding that three doctors failed to detect symptoms of child abuse in an infant who was later permanently disabled.’ Washington DC, 2004
What to know about child physical abuse

- If you SUSPECT you must REPORT
  - Most cases need to be admitted for medical and medical-legal reasons
  - File 3200, order appropriate studies and ask for help!
Physical Child Abuse

Any non-accidental injury inflicted by a caretaker
1/3 of reports are substantiated = 18 cases / 1000 children
1271 deaths in 1994
Risk Factors

- Infants and young children
- Mental or physical disabilities
- The “challenging” child
- Dysfunctional or isolated families
- Substance abuse in the home
- Unrealistic parental expectations
Indicators of Possible Abuse

- Lack of concern for child’s injuries/pain
- Inability/unwillingness to comfort child
- Delay in seeking needed medical care
- Incompatible or absent history
Bruises

**Abuse**
- on padded areas
- pattern injuries
- many lesions

**Accidental**
- on poorly padded areas
- non-specific patterns
- few lesions
Differential Diagnosis

- Bleeding disorders
- Mongolian spots
- Henoch-Schonlein Purpura
- Coin rubbing, cupping
Fractures Suspicious of Abuse

- rib
- metaphyseal (corner or bucket handle)
- acromion
- spinous process
- sternum
- hands and feet
- vertebral body fractures & subluxations
- complex skull fractures
Rib Fractures

posterior
lateral

transverse process of adjacent vertebrae is the fulcrum
CHMC Rib Fracture Study

- retrospective
- 39 infants
- < 1 year

<table>
<thead>
<tr>
<th></th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-intentional</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Birth injury</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Bone fragility</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Child abuse</td>
<td>32</td>
<td>82%</td>
</tr>
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</table>
Metaphyseal Fractures

- Also referred to as
  - corner fracture
  - bucket handle fracture
- Classic abuse injury
  - shaking the trunk
  - yanking the extremities
CHMC Humeral Fracture Study

- retrospective
- 124 children
- < 3 years old

<table>
<thead>
<tr>
<th>Age</th>
<th># pts</th>
<th># abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15 month old</td>
<td>25</td>
<td>9 (36%)</td>
</tr>
<tr>
<td>Supracondylar</td>
<td>10</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Spiral/oblique</td>
<td>12</td>
<td>7 (58%)</td>
</tr>
<tr>
<td>&gt; 15 month old</td>
<td>99</td>
<td>1 (1%)</td>
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</table>
Findings that Suggest Abuse

- multiple fractures
- fractures of different ages
- fracture not adequately explained
- occult fracture
- fracture in an infant
Dating Fractures

- soft callus appears in
  - 7-10 days in infants
  - 10-14 days in older children
  - affected by fracture instability & repeat injury
- metaphyseal fractures are difficult to date unless there is periosteal new bone growth
Non-abusive Causes of Fractures

- **Birth trauma:** clavicle, humerus, skull, rib, femur-w/NM disease
- **Prematurity:** osteopenia, rickets
- **Neuromuscular defects:** osteoporosis, contractures, decreased or absent pain perception
Non-abusive Causes of Fractures

- Menkes kinky hair syndrome
defect in copper metabolism,
metaphyseal-epiphyseal fractures,
wormian bones, periosteal reaction,
sparse & kinky hair, FTT, developmental delay
- Neoplasm
- Hypophosphatasia
Osteogenesis imperfecta (OI) deficiency of type I collagen, results in increased bone fragility

1. blue sclera, family history, osteopenia, wormian bones
2. blue sclera, family history, lethal by perinatal period
3. wormian bones & osteopenia ± blue sclera/family history
4. blue sclera/family history /osteopenia/wormian bones
   - 1:50,000 live births

biochemical collagen test positive in 80% of
Conditions Mistaken for Fractures

- Congenital syphilis and osteomyelitis
  - metaphyseal irregularities
  - periosteal new bone growth

- Drug toxicity
  - methotrexate  periosteal reaction, metaphyseal fx
  - prostaglandin E  diaphyseal periostitis
  - hypervitaminosis A  diaphyseal periostitis
Conditions Mistaken for Fractures

- **Scurvy**
  - painful swollen limbs, metaphyseal irregularity,
  - extensive periosteal new bone formation,
  - thin cortices, demineralized bones

- **Rickets**
  - generalized and symmetric skeletal changes,
  - metaphyseal irregularity and widening
Normal Radiographic Variants

- 2-8 months old infants
  - periosteal new bone along the shafts of long bones
  - spurring and cupping of the metaphyses
- Other variants can appear as fractures
Fractures: Abuse vs Non-abuse

- **Abused children:** young and multiple fractures
  - 55%-70% of fractures occur before age 1 year
  - > 50% have multiple fractures

- **Non-abused children:** older with fewer fractures
  - >98% of fractures seen after 18 months of age
  - multiple fractures are uncommon
<table>
<thead>
<tr>
<th>Osteogenesis imperfecta</th>
<th>Child abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/50,000 live births have OI Type IV</td>
<td>1/1000 abused children have fractures</td>
</tr>
</tbody>
</table>
Other Abusive Injuries

- Burns
- Blunt abdominal trauma
  - Liver, spleen, pancreas, bowel
- Abusive Head Trauma (Head injury)
  - Intra-cranial injury
  - Retinal hemorrhage (80%)
  - Absent is external signs of trauma
Diagnosis of Abusive Head Trauma

- Consider AHT in infants with:
  - intracranial injury after minor trauma
    - scan infants with symptoms indicative of head injury
  - retinal hemorrhages

- Does the history explain the injuries?
### Intracranial Injury After Trauma

<table>
<thead>
<tr>
<th>Type of Fall</th>
<th>% with Injury</th>
</tr>
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<tbody>
<tr>
<td>out of bed</td>
<td>0</td>
</tr>
<tr>
<td>out of bed</td>
<td>0</td>
</tr>
<tr>
<td>from bunk beds</td>
<td>1.5</td>
</tr>
<tr>
<td>in baby walkers</td>
<td>1</td>
</tr>
<tr>
<td>in baby walkers</td>
<td>8</td>
</tr>
<tr>
<td>down stairs/walkers</td>
<td>0</td>
</tr>
<tr>
<td>down stairs</td>
<td>4</td>
</tr>
<tr>
<td>from shopping carts</td>
<td>0</td>
</tr>
</tbody>
</table>
Injuries that result in intracranial trauma

<table>
<thead>
<tr>
<th>falls &lt; 3’</th>
<th>falls &gt;3’ &amp; &lt;6’</th>
<th>falls &gt; 6’</th>
</tr>
</thead>
<tbody>
<tr>
<td>couch, bed</td>
<td>kitchen counter</td>
<td>porch</td>
</tr>
<tr>
<td>table</td>
<td>standing, chair</td>
<td>changing</td>
</tr>
<tr>
<td>coffee table</td>
<td>top of slide</td>
<td></td>
</tr>
<tr>
<td>walker</td>
<td>bunk bed, stairs</td>
<td></td>
</tr>
<tr>
<td>Highly</td>
<td>Unexpected</td>
<td>baby</td>
</tr>
<tr>
<td>unlikely</td>
<td>Reasonable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>but possible</td>
<td></td>
</tr>
</tbody>
</table>
Significance of Retinal Hemorrhages in Head Injured Children

- Very unusual after accidental head injury
  - high velocity injuries
  - injuries with high rotational component
  - stairway fall in walker?
- CPR may rarely cause small hemorrhages
- Other conditions may cause RH but abuse is most likely if head injury is also present
Work-up of Suspected Abuse

- **History**
  - Consistent with the injury and development abilities?
  - Past history

- **Social Evaluation**
  - dysfunctional family, substance abuse
  - handicapped child, premature, etc.

- **Complete physical examination**
  - photographs and measurements
Accepted Protocols

- If child is less than 1 year old and you suspect physical abuse you should order:
  - Head CT, skeletal survey, LFT’s and Ophtho consult
- If child is 1-2 years old and you suspect child physical abuse you should order:
  - Skeletal survey, LFTs and others as necessary
- If child is > 2 years old and you suspect abuse you should order tests as indicated by exam:
  - LFTs should be ordered for any child with significant injuries under 5 years old
Work-up of Suspected Abuse

- Laboratory
  - platelets, coagulation studies, liver function tests

- Skeletal Survey, +/- bone scan
  - if under 2 or 3 years of age

- Head C-T / MRI & Ophthalmologic examination
  - consider if under 1 y/o

- Evaluate for abdominal or other injuries

- Social service and police referral/report
Don’t forget siblings!

- All siblings of known or suspected abused patients should be examined and have studies based on the same protocol.
- All siblings of known abuse cases should be placed in a safe environment pending results of the investigation.
Skeletal Survey

- skull: frontal and lateral
- spine: frontal and lateral
- chest
- extremities
- additional views as needed
Skeletal Survey Protocol

- An American College of Radiology accepted protocol since 1997
  - No room for self changes, this is a very specific protocol:
    - AP and Lateral Skull
    - AP and Lateral Chest
    - AP Pelvis and Abdomen
    - AP dedicated of EACH: Humerus, forearms, femurs, tib/fibs
    - Lateral Lumbar Spine
    - Lateral Cervical Spine
    - AP feet
    - PA or AP hands

- Check your own films!!!
Bone Scan

- compliments the skeletal survey
  - non-displaced/subtle fractures
  - rib fractures
- poor for skull & spine
- metaphyses difficult to interpret
Inform the family of your concerns

- These injuries were probably not caused by the events that you are describing.

- I’m concerned that someone may be harming your child. Do you have any of these same concerns?
Mandated agencies

- Juvenile system — Protects the child
  - child protective services
  - juvenile court

- Criminal justice system — Prosecutes crimes
  - police
  - criminal court
<table>
<thead>
<tr>
<th></th>
<th>Juvenile</th>
<th>Family</th>
<th>Criminal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laws</strong></td>
<td>child protection</td>
<td>divorce</td>
<td>criminal code</td>
</tr>
<tr>
<td><strong>Focus</strong></td>
<td>child welfare</td>
<td>custody/visitation while protecting child</td>
<td>offender accountability</td>
</tr>
<tr>
<td></td>
<td>family unity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Proof</strong></td>
<td>injury/neglect by action or omission by caretaker</td>
<td>inappropriate acts or omission impacting on custody or visitation</td>
<td>criminal act by anyone</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trier of fact</strong></td>
<td>referee, judge (maybe jury)</td>
<td>judge, jury</td>
<td></td>
</tr>
<tr>
<td><strong>Max. penalty</strong></td>
<td>removal of child</td>
<td>limit custody or visitation</td>
<td>incarceration</td>
</tr>
<tr>
<td><strong>Rules of</strong></td>
<td>relaxed</td>
<td>semi-strict</td>
<td>strict</td>
</tr>
<tr>
<td><strong>Burden of</strong></td>
<td>preponderance of the evidence, in some instances burden maybe heavier</td>
<td>guilt beyond a reasonable doubt</td>
<td></td>
</tr>
<tr>
<td><strong>Proof</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Paths to Trial

- report made
  - police and CPS social worker
    - prosecutor
      - act within family
        - no divorce pending
          - juvenile court
        - divorce pending
          - family court
      - felony criminal act
        - grand jury
          - criminal court
Expert Witnesses

- A witness is qualified by knowledge, skill, experience, training or education.
- A witness may offer an opinion or conclusion if scientific, technical or other specialized knowledge will assist the trier of fact.
- May act as a teacher to court
When you are subpoenaed

- You are legally hooked to appear
- Obtain the names of those involved
- Review your records
- Prepare your Curriculum Vitae
- Consider a literature review
The Physician’s Role in Child Abuse Detection/Evaluation

- Recognition of suspicious injuries
- Perform physical evaluation
  - obtain supporting evidence
  - find alternative diagnosis
- Report suspected abuse
- Remain objective
- Advocate for the child
Examples

- 2 year old girl with Bilateral black eyes and vomiting for 2 days
Examples

- 4 month old with irritability and lethargy
Examples

- 6 month old accepted from outlying hospital for treatment of a femur fracture
- No other problems noted
Referring hospital’s ‘Skeletal Survey’
How to Report Child Abuse

- 3200 Form to file with Protective services
  - Must fill out form AND call in report
  - Copy goes to police when filed
  - File in county of child’s residence

- Statewide hotline for reporting suspicions to DHS: 855-444-3911
How to contact me

- Office 313-343-3481
- Pager 313-609-0177