Accidental vs. Non-Accidental Trauma? Case Studies

Diane H. Perks, CRNP, MSN
Children’s Hospital of Philadelphia
Objectives

• Recognize risk factors of child abuse
• Identify “Red Flags” of child abuse
• Be familiar with differential diagnoses mimicking child abuse
• Integrate preventive measures of child abuse into practice
Definition

Differ by community, culture, country

Broad definition:

Any act or failure to act on the part of a parent or caregiver that results in death, serious physical or emotional harm, sexual abuse or exploitation, or an act or failure to act that presents an imminent risk of serious harm

(Child Abuse Prevention & Maltreatment Act, US Department of Health and Human services, Administration For Children & Families, 2001)
Oregon State Child Abuse Law

- Code Section 419B.005-100
- What Constitutes Abuse: Any assault of a child and any physical injury to a child caused by other than accidental means (including injuries at variance with explanation given for injury), rape, sexual abuse/exploitation, allowing child to engage in prostitution, failure to provide adequate care, buying or selling child as described in ORS 163.537, negligent treatment, threatening harm to child's health or welfare, any mental injury which includes observable and substantial impairment to child's ability to function or permitting a child to enter or remain in a place where methamphetamines are being manufactured

See more at: http://statelaws.findlaw.com/oregon-law/oregon-child-abuse-laws.html#sthash.yKap2VFh.dpuf
Child Abuse

Incidence & Prevalence:

- Approximately 3.4 million children/year (686,000 confirmed) are referred to Child Protective Services (CPS)- 27% < 3 years old; 20% 3-5 years
  - ~1640 deaths (70% < 3 years of age; 70% neglect, 44% physical abuse)
  - Males = Females
  - All ages, all socioeconomic status
  - >50% suffered from neglect
  - Increase in incidents
  - 80% perpetrators parents of victims

- Many cases are under reported
- Many cases do not present for care with child abuse as chief complaint
- Societal costs: Total lifetime burden $124 billion

STATISTICS: CDC 2012

Kinds of Child Abuse

- Physical
- Emotional
- Sexual
- Neglect
- Munchausen's Syndrome By Proxy
Case Study 1
23 month old female presents to ED with mother with chief complaint of right elbow pain and swelling.

**HPI:**
- 1 day of right elbow pain and swelling
- No history of trauma
- Not in mother’s care last 3 days; in grandmother’s care
- Oxycodone today

**ROS:**
- No fever
- Runny nose, cough
- No V/D
- No other complaints of pain
- Per mother, not “flexing” right arm secondary to pain?
- Last month with right hand abscess
- Recently completed course of amoxicillin for BOM
Case Study 1

Past Medical History:

- Sickle Cell Disease-SS
- Frequent ED admissions for SC pain crisis (usually in lower extremities)- no hospitalizations. Mother believes pain episodes to be more frequent
- No history of bacteremia
- Right hand abscess 2/2011
- On Penicillin and folic acid
- Allergic to adhesives
- IUTD including flu vaccine
Case Study 1: ED Course

Physical Exam:

- VS: T 37.1, HR 144, RR 32 (no BP documented)
- Happy, interactive
- RUE with mild swelling proximal elbow, FROM, ?TTP
- Other exam unremarkable

Diagnostic Work-up:

- XR right elbow displaced posterior fat pad with joint effusion, no dislocation, no visible fracture. Repeat in 10-14 days if pain persists to evaluate for occult fracture.
- CBC H/H 9.4/30.9 ; LFTs WNL
- CRP1.1/ESR 34
- Skeletal Survey: Same reading as XR r elbow PLUS periosteal new bone formation along medial surface of left humerus concerning for healing fracture
Case Study 2

2 month old male presented to ED with father for concern of swelling, bruising, and blood in left eye.

**HPI:**
- Father just picked up baby from mother’s house.
- He stated he had not seen baby in 2 weeks – no history
- Mother contacted- arrived after admission to inpatient floor.

**ROS:**
- Afebrile
- Left eye red & swollen, no discharge (today)
- No URI symptoms
- Feeding well-no emesis
- No rashes
- Just had 2 month vaccines
- PMH: FT, no pre or post natal complications. No medications
Case Study 2: ED Course

Physical Exam:
- 37.1, 150, 40, 94/54
- Interactive, smiling
- Left eye with swelling, sub-conjunctival hemorrhage, hyperpigmented area lateral to left eye
- Other exam unremarkable

Diagnostic Work-up:
- Skeletal survey done- right femur and b/l tib/fib periosteal reaction
- Dedicated films demonstrated periosteal reaction in right femur and left tibia. No fractures.
- Trauma consulted
- Labs normal- LFTs, CBC, BMP, UA
Case Study 3
8 month old male presented to ED with parents for vomiting.

HPI:
• Vomiting started today
• Any PO intake-vomits
• Emesis progressed to every 15 minutes-bilious, projectile
• When not vomiting, acting normally
• Went to OSH ED-
  – Labs with ↑WBC 19.3, ↑LFTs, ↑lipase 4295
  – AXR: dilated loops of bowel concerning for ?volvulus

ROS:
• Afebrile
• Decreased PO intake
• No URI symptoms
• Feeding well prior to vomiting
• No rashes
• No diarrhea
• No pain
• Slept longer than usual night before vomiting started

• PMH: FT, Takes multivitamins
Case Study 3: ED Course

Physical Exam:
- 38.7, 164, 40, 110/54
- Interactive, quiet, comfortable
- Abdominal exam: no distension, non-tender, no masses palpated
- Other exam unremarkable

Diagnostic Work-up:
- Differential DX: Pancreatitis, volvulus
- Abdominal US: heterogeneous mass (mid-abd) –duplication cyst vs other (oncologic, congenital malformation)
- Antibiotics to cover for infectious source
- NPO, MIVF
- MRI abdomen: Deuodenal hematoma
- Admitted to surgery service
Now What??
How Do They Present?

• Do not usually present with CC of abuse!
• Evaluate every child by considering:
  – Historical indicators of abuse
  – Physical exam findings suggestive of abuse
  – Injuries suggestive of abuse
# Causes/Risk Factors

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Age < 4 years at greatest risk for severe injury or death

"For the last time - don't throw him in the air so roughly!"
Historical Indicators or “Red Flags” of Abuse

- History inconsistent w/ clinical exam and/or developmental ability ("magical injuries")
- No explanation for injury
- Denial of trauma
- Unrealistic explanation of injury
- Significant inconsistencies or changes in history
- Blame of sibling for injury
- Delay in seeking care (inappropriate)
- Blame of sibling for injury

- Injury occurred as a result of inadequate supervision
- Numerous healthcare providers
- Inappropriate parent-child interaction
- Previous history of inflicted injury
- History of repeated injury
- Lack of adequate medical care for previous injuries or illnesses

**LOOK BEYOND THE OBVIOUS!**
Physical Exam Findings Suggestive of Abuse

Soft Tissue Injuries
- Bruising/Contusions
- Burns
- Bite marks
- Torn frenulum in young infants

Other
- Retinal hemorrhages
Soft Tissue Injuries

• Bruising

  Stages of bruising

  Location
  - Peripheral vs Central

  Pattern Injury
PE: Bruising

- Bruising in non-ambulatory patients
- Bruising in unusual locations
  - Ear pinna
  - Buttocks
  - Under chin
  - Torso
  - Neck
  - Flexor surfaces
- Patterned bruises
PE: Burns

- Cigarette burn
- Immersion burn
- Patterned contact burns (without history)
- Stocking & glove pattern (circumferential)
- Mirror image on extremities
- Splash/Spill Burn patterns
- Burns in unusual places (buttocks/genital, posterior)
PE Findings

Bite Mark

Torn Frenulum

Retinal Hemorrhages
Case Study 1
23 month old female presents to ED with mother with chief complaint of right elbow pain and swelling

- Hematology consulted (humerus fracture vs. VOE)
- MRI arm recommended for definitive diagnosis-scheduled for following morning.

- Social Worker in ED---
  - Filed CY47
  - SCAN consult
  - Admitted to floor on Trauma service

Mother attempted to take patient home—stress-looking for shelter, financial, mistrust
## Case Study 1: Causes/Risk Factors

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**LOOK BEYOND THE OBVIOUS!**
Case Study 1: Accidental or Non-Accidental???

• MRI—no fracture, acute hemorrhagic bone infarct in distal humerus diaphysis and metaphysis with surrounding soft tissue edema secondary to SCD
• Opportunity for resources for mother-shelter found, help to get her on own benefits
• Transferred to hematology service
• Accidental
Case Study 2
2 month old male presented to ED with father for concern of swelling, bruising, and blood in left eye.

- SCAN consulted – will evaluate in morning
- D/W radiology imaging findings - normal physiologic periosteal healing
- Ophthalmology consult - no retinal hemorrhages
## Case Study 2: Causes/Risk Factors

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**LOOK BEYOND THE OBVIOUS!**
Case Study 2

2 month old male presented to ED with father for concern of swelling, bruising, and blood in left eye.

- SCAN interviewed mother
- Spoke with PCP - had 2 visits, facial mark - mongoloid spots since birth
- Accidental — no report filed — d/ced to home with mother

Father has never seen child - incarcerated
Went over events with mother
Case Study 3
8 month old male presented to ED with parents for vomiting.

- After determination of duodenal hematoma in addition to bony changes on skeletal survey, transferred to trauma service
  - SCAN Team consulted
  - Many consults: Orthopedics, Bone Health (endocrine), Metabolism, Hematology, Gastroenterology
  - Many labs, more imaging

***Patient determined to have rickets********
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**LOOK BEYOND THE OBVIOUS!**
Case Study 3
8 month old male presented to ED with parents for vomiting

Abuse

Not Abuse
SCAN (Suspected Child Abuse Neglect) Team

Who Are they?

- Pediatricians with specialty in Child Abuse: Attendings and fellows
- Social Worker

What do they do?
Injuries Suggestive of Non-Accidental Trauma (NAT)

- Multi-organ system trauma w/o sufficient history
- Head Injuries
  - Subdural hematoma +/- skull fracture
  - Unexplained intracranial injury
  - Traumatic alopecia
  - Eye injuries
- Specific skeletal injuries
Injuries Suggestive of NAT: Fractures

Accidental vs. Non-Accidental?

• Long bone fracture
  - femur fracture < 1 year age
  - Humeral shaft fracture < 3 years age
• Metaphyseal corner fractures (Buckle Fracture)
• Rib fractures especially posterior
• Any fracture in non-ambulatory infants
• Hands and feet fractures in young
• Scapula, sternum, vertebral fractures
• Multiple fractures; Fractures in different healing stages
Abusive Head Trauma*

"Shaken Baby/Impact Syndrome"

- SDH
- Retinal Hemorrhages
- No signs of external trauma
- May have long bone fracture
- B/L rib fractures
- other intracerebral injuries
- small “chip” fractures major joints of extremities (shaking)
- Other findings: poor feeding, altered mental status, seizures

Abdominal Injuries

• Accidental vs. Non-Accidental
  - Abused children significantly younger (>36 months)
  - Hollow organ injuries were significantly more likely to occur in abused children.
  - Presence of both hollow organ and solid organ injury occurred exclusively in abused children = HIGHER index for suspicion of abuse.
  - Delay in care? Abuse more likely but……..other factors?

## Screening for Occult Injuries

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<th>Skeletal Survey</th>
<th>Labs</th>
<th>Abdominal CT</th>
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<tbody>
<tr>
<td>0-12 mo</td>
<td>CT if symptoms, MRI if no symptoms</td>
<td>Yes</td>
<td>Yes</td>
<td>Obtain in ED if symptomatic or suggested by physical exam</td>
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<tr>
<td>12-24 mo</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>2-6 yrs</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<td>7-18 yrs</td>
<td>No</td>
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Labs: CBC, PT/PTT, BMP, AST, ALT, Amylase, Lipase, U/A

*If admitted & SCAN involved, other labs may be obtained such as the Bone density labs and metabolic screening labs.*
Differential Diagnoses That Can Mimic Child Abuse

**Burns:**
- Accidental burns
- Severe diaper dermatitis
- Cupping (cultural)
- Moxibuston (cultural)
- Impetigo
- Phytophotodermatitis

**Fractures:**
- Accidental injury
- Osteogenesis Imperfecta (OI)
- Rickets
- Congenital syphilis
- Prematurity-osteopenia
- Metabolic disorders (Menke’s)

**Head Trauma:**
- Accidental injury
- Hemophilia
- Glutaric aciduria type 1

**Bruises:**
- Accidental injury
- Idiopathic Thrombocytopenia Purpura (ITP)
- Leukemia
- Hemophilia
- Vitamin K deficiency
- Purpura fulminans (meningococcemia)
- Mongolian Spots
- Coining (cultural)
- Erythema multiforme
- Eczema
- Allergic “shiners”
Coining

Mongolian Spots

ITP

Bug Bite Ecthyma
Phytophotodermatitis

Osteogenesis Imperfecta (OI)

Rare, inherited disease
Physical/Diagnostic Findings:

- Poor wound healing
- Blue sclera
- Abnormal dentition
- Joint hyperlaxity
- Hearing impairment
- Short stature
- Wormian bones of skull
- Easy bruising
- Hx frequent fractures
Disposition

- Decision made by attending, social work, Child protective services
- Safety admission (no medical concerns) or all old injuries → gen peds with trauma consult
- Medical admission / acute injuries → consider trauma
Mandatory Reporting

- For all healthcare providers
  - Penalized for not reporting
  - Required in all 50 states
  - Be familiar with your county’s child protection resources
  - Protected against civil & criminal liability for those who report
  - Under-reporting
Documentation

Documentation is key to successful interventions

Detailed, objective
- Who is providing history?
- Pain?
- PMH, SHX, Meds, Allergies
- Any activities that may impact forensic evidence collection (bathing, showering, urinating)
- Photos (actual + drawings)

- Speaks in the child’s best interests！！!
Reporting: CY-47 Form

- Demographics
- Description of injuries & why abuse suspected
- Actions taken
Effects of Child Abuse/Maltreatment

Mental & Physical (acute & chronic)
Visible such as bruises, burns, etc

BUT

• ↑ rates adolescent suicide
• Drug & alcohol abuse
• Depression Violence
• Eating disorders
• Difficulties in making friends
• ↓ School performance
• Criminal behaviors
• Learning problems
• Low self-esteem
• And more & more....
Prevention/Health Promotion In Primary Care & Community

• Education to healthcare providers; education to community by healthcare professionals (this can be done in any encounter such as ER, med/surg, well visits, etc)

• Prevention
  – Parenting classes: technique, normal growth & development, community resources, teaching children to be “resilient”
  – Educational materials (nurseries re: Shaken Infant Syndrome)
  – Programs re: “Good Touch/Bad Touch”, Project Safe Care
  – Visiting nurse programs (Nurse Family Partnership)

• Screening for risk factors
  – Domestic abuse! Part of anticipatory guidance
  – Corporal Punishment
  – Include child abuse as a differential diagnosis
Summary: Take Home Points!

• Evaluate every child for Non-Accidental Trauma
  – Historical indicators & physical exam findings suggestive of abuse

  Risk Factors & Red Flags
  – Do not usually present with CC of abuse

• If you find a concerning injury:
  – Screen for occult injury
  – Screen for medical conditions
  – Ask for help!
ULTIMATE GOAL

• Through adequate assessment, recognition, reporting, and timely interventions

PREVENT ABUSE OR FURTHER ABUSE BEFORE IT HAPPENS!!!!!!
References


• Kellogg, N. and Committee on Child Abuse and Neglect. *Pediatrics* 2007;119;1232-1241
References


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