SENTINEL EVENTS

ARNE GRAFF MN
DIVISION CHILD ABUSE PEDIATRICS
CONTACT INFORMATION:

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DISCLOSURES:

• TESTIFY
  – PROSECUTOR
  – DEFENSE
DISCLOSURE:

- All children in photos are in safe homes

- Pictures of injuries - your comfort?
OBJECTIVES:

• DISCUSS THE “BARRIERS”

• REVIEW WHAT IS A “SENTINEL EVENT”

• REVIEW THE EVALUATION FOR SENTINEL EVENT
OUR JOB

• IT’S NOT OUR JOB TO PROVE IT’S ABUSE

• IT IS OUR JOB TO PROVE IT’S NOT ABUSE

• IT’S OUR JOB TO INSIST ON SAFETY DURING WORK UP
STATISTICS:

• 3,000,000 REPORTED CASES/YR

• 900,000 CONFIRMED CASES

• 1500 “IDENTIFIED” DEATHS
Graph 2: Proportion of children by age group who died as a result of maltreatment

- Under 1: 51% (N=513)
- Age 1: 18% (N=180)
- Age 2: 15% (N=144)
- Age 3: 7% (N=74)
- Age 4: 5% (N=52)
- Age 5: 4% (N=36)
### Figure 4–3 Maltreatment Types of Child Fatalities, 2006

<table>
<thead>
<tr>
<th>Maltreatment Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neglect</td>
<td>41.1%</td>
</tr>
<tr>
<td>Multiple Maltreatment Types</td>
<td>31.4%</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>22.4%</td>
</tr>
<tr>
<td>Psychological Abuse, Other, or Unknown</td>
<td>2.9%</td>
</tr>
<tr>
<td>Medical Neglect</td>
<td>1.9%</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Based on data in table 4–6.
PREMOBILE CHILD NONMOBILE INFANTS:

• HIGH RISK GROUP FOR MALTREATMENT

• MINOR INJURIES ARE UNCOMMON, EXCEPT FOR SUPERFICIAL ABRASIONS
PREMOBILE CHILD

NAOMI SUGAR STUDY
RISKS:

• <6 MOS 2X INCREASED RISK (OVER 1-3 YR OLD)

• 8-31% PA VICTIMS SEEN RECENTLY BY PROVIDER

• 27% OF PA CHILDREN HAVE SENTINAL INJURY
CONCERNS:

• ACE

• DV
Figure 5–3 Perpetrators by Relationship to Victims and Selected Types of Maltreatment, 2003

Based on data from table 5–3. N=38 States.
OFFENDERS

• PEOPLE WHO HAVE ACCESS TO INFANT

• IN GENERAL, NICE PEOPLE; WHO HAVE SIGNIFICANT STRESS AND “REACT”

• MAY BE THE PERSON SITTING WITH THE CHILD!!!
BARRIERS:

• WHITE

• INFANT UNDER 6 MONTHS

• NICE FAMILY; 2 PARENT HOME
BARRIERS:

• PROVIDER’S GESTALT

• NON-MEDICAL
  –BASED ON TRAINING
  –BASED ON EXPERIENCE
  –BASED ON BIAS

Nice people!
BARRIERS:

• CHILDREN HOSPITAL VS NON-CHILD HOSPITAL

  – 2X MORE RECOGNIZED INJURIES (HIGH RISK PT)

  – ABUSIVE FX 7X MORE MISSED IN NON-CHILD

  – ANY HOSPITAL: OTHER NEEDED TESTS
    • TESTING: 40-90% WHEN HIGH RISK
CONCERNS:

- CAROLE JENNY JAMA STUDY: 37%

- FRACTURE STUDY:
  - THORPE STUDY 38%
  - STUDY: 20% ABN FX MISSED FIRST VISIT
• NO DISCLOSURES!
SENTINAL INJURY:

- DEF:
  
  - A VISIBLE MINOR INJURY IN A PRECRUISING INFANT THAT IS POORLY EXPLAINED AND CONCERNING FOR PA

- WITNESSED BY AT LEAST ONE CAREGIVER
SENTINAL INJURY:

- COMMON INJURIES:
  - BRUISE
  - ORAL INJURY
  - SUBCONJUNCTIVAL HEMORRHAGE
SENTINAL INJURY:

- INCIDENCE: DIFFICULT TO KNOW
  - CAREGIVER DOES NOT SEEK CARE
  - CAREGIVER INTERPRETS AS NORMAL/MINOR
  - 42% NOT ACTED ON
SENTINEL EVENTS:

PHYSICAL ABUSED CHILD:

FACIAL AND INTRAORAL TRAUMA

INFANTS: 49%

TODDLERS: 38%
SENTINEL INJURIES:

• HEAD:

  – MOST COMMON BODY PART INJURIED

  – 43% OF ABUSIVE INJURIES
NOT SENTINEL:

• SKIN INJURIES THAT ARE SUPERFICIAL ABRASIONS THAT COULD OCCUR IN THE ROUTINE CARE OF AN INFANT
FUTURE RISK:

• LYNN SHEETS STUDY:

– 27.5% WILL HAVE RISK OF REPEAT AND MORE SIGNIFICANT VIOLENCE
CASE #1

• 3 MONTH OLD
• WELL CHILD VISIT
• NO CONCERNS
• PARENTS BOTH PRESENT
  —DAD: TEACHER
  —MOM: ATTORNEY
SUBCONJUNCTIVAL HEMORRHAGES

• BLOOD IN “WHITE” PART OF EYE

• AFTER NEONATE WINDOW

• MUST CONSIDER MEDICAL CAUSES

• NOTED IN 22-46% OF NAT VICTIMS
SUBCONJUNCTIVAL HEMORRHAGES:

- PRESENTING COMPLAINT IN 6% OF SUSPECTED CHILD ABUSE PATIENT!
SUBCONJUNCTIVAL HEMORRHAGE:

• CAN BE RELATED TO TRAUMATIC ASPHYXIA SYNDROME

• STRANGULATION/SUFFICATION

• BLUNT TRAUMA**

• “SPONTANEOUS” UNLIKELY!!
CASE 2

• 4 MONTH OLD AT DAY CARE

• MOTHER REPORTS MOUTH BLEEDING AT TIME OF PICKING INFANT UP

• NO CAUSE REPORTED BY DAYCARE STAFF
ORAL INJURIES:

• MAY BE A SITE OF INCREASED RISK

• UNCOMMON INJURY SITE 1ST YEAR OF LIFE

• INCLUDES:
  – LIPS, TONGUE, BUCCAL MUCOSA, GINGIVA, FRENULUM, PALATE, OROPHARYNX, TEETH, BONE
ORAL INJURIES:

• TYPICAL INJURIES:
  – BURN, BRUISE, LACERATION
  – 54 % OF INJURIES: LIPS

• OTHER INJURIES:
  – gag: Lichenification, scar to corner of mouth
MECHANICS OF INJURY

- FEEDING
- DIRECT BLOW
- ACCIDENT
ORAL INJURIES:

• INSTRUMENTS OF INJURY:
  – UTENSILS
  – FINGERS
  – FORCED FOOD / HOT FOOD
  – CAUSTIC SUBSTANCE
  – OTHER OBJECT (PASCIFIER)
ORAL INJURIES:

• FRENULUM:
  
  — INJURY MORE COMMON AFTER 15 MONTHS OF AGE
INTRAORAL INJURIES

• DENTAL:

— AGES 1-6: 30% DENTAL TRAUMA

— PEAK AGE 3 YR OLD
CASE #4

• 4 MONTH OLD

• SEEN FOR WELL CHILD VISIT

• MOM: ER DOC ; DAD: TRUCK DRIVER

• NO CONCERNS; NO DAY CARE
BRUISES:

• MOST COMMON PRESENTATION OF CM
“Those who don’t cruise don’t bruise”

- N = 930
- < 1% of infants under 6 months have bruises

Bruising Prevalence in Infants

- Pierce et al (2016) conducted prospective observational study of bruise prevalence in infants seen in 3 Pediatric EDs
  - 2488 infants seen
  - Median age 5 months

- Bruising prevalence 1.3% and 6.4% for infants ≤ 5 months & >5 months

• Bruises on cheeks, ears, neck, buttocks, eyes and genitalia absent or extremely rare (<0.5% of collections) in pre-mobile children** with bleeding disorders, regardless of severity and absent in children without bleeding disorder

• Among children without bleeding disorder and with mild/moderate bleeding disorders, ≤ 1% and 3% of collections, respectively, had bruise in any other location

• Children with severe bleeding disorders had substantially more collections with bruises (>10% of collections) predominantly on upper arms, feet, rear trunk, front of thighs and below knee

** Pre-mobile: not crawling, cruising or walking

ACCIDENTAL BRUISES:

- SKIN OVERLYING BONE AREA
- LEADING SURFACE
- HISTORY OF PLAUSIBLE ACCIDENT LIKE A DROP, ETC
Figure 2  Distribution of percentage of 2570 collections from 328 children with at least one bruise by location and development stage.
Why are sentinel injuries important not to miss

Multiple studies show that the presence of even a single sentinel injury is a marker for more serious concurrent underlying injury

- Harper et al found a 50% rate of unexpected new injuries (skeletal, brain, abdominal) among 146 infants < 6 months of age evaluated for abuse after presenting with isolated bruising

<table>
<thead>
<tr>
<th>Characteristics for study cohort, total = 146 infants</th>
<th>Any new injury identified, total = 73 infants, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of bruises</td>
<td></td>
</tr>
<tr>
<td>1, n = 50</td>
<td>30 (60.0)</td>
</tr>
<tr>
<td>2-5, n = 76</td>
<td>32 (42.1)</td>
</tr>
<tr>
<td>6-10, n = 12</td>
<td>7 (58.3)</td>
</tr>
<tr>
<td>&gt;10, n = 8</td>
<td>4 (50.0)</td>
</tr>
<tr>
<td>Location†</td>
<td></td>
</tr>
<tr>
<td>Face/head, n = 110</td>
<td>59 (53.6)</td>
</tr>
<tr>
<td>Trunk, n = 46</td>
<td>22 (47.8)</td>
</tr>
<tr>
<td>Extremities, n = 39</td>
<td>21 (53.8)</td>
</tr>
<tr>
<td>Patterned bruises, n = 30</td>
<td>9 (30.0)</td>
</tr>
</tbody>
</table>

Differential Diagnosis of Bruises

- Mongolian Spots
- Ehlers Danlos Syndrome
- Erythema Multiforme
- Allergic “shiners”
- Phytophotodermatitis
- ITP
- Leukemia
- Hemophilias
- VW Disease
- HSP

- Cao Gio
- Cupping
- Ink, dye on body
- Meningococcemia
- Urticaria pigmentosa
- Popsicle panniculitis
- Pediculosis
- Accidental Injury
- DIC
- Hemangiomas
DIFFERENTIAL DIAGNOSIS

(Burns, bruises, fractures, head injuries, neglect, FTT)

<table>
<thead>
<tr>
<th>INFECTIOUS</th>
<th>METABOLIC</th>
<th>COAG DEFECT</th>
<th>ACCIDENTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-ACCIDENTAL</td>
<td>CONGENITAL</td>
<td>ENDOCRINE</td>
<td>CONNECTIVE</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>POISONING</td>
<td>MEDICATION</td>
<td>VASCULAR</td>
</tr>
<tr>
<td>RENAL</td>
<td>PULMONARY</td>
<td>CARDIAC</td>
<td>OTHER</td>
</tr>
</tbody>
</table>
HIGH RISK BRUISING

• PREMOBILE CHILD: ANY LOCATION

• FACE, EARS: ANY CHILD

• MOBILE CHILD: PATTERN, LOCATION, MANY

• DIAPER AREA
Characteristics of abusive bruising in children

- **TEN-4 FACES-P:**
  - TEN: Torso, Ear, Neck in child < 5 years
  - ANY bruising in infant < 4 months (4.99 mo)
  - FACES: Frenulum, Angle of Jaw/Auricle, Cheek, Eyelids, Sclera
  - Patterned bruising
TEN-4 DECISION RULE

• Any bruise in child < 4.99 months of age

OR

• Bruising present in TEN (torso, ears, neck) in child < 4 years
  — Torso = chest, abdomen, back, buttocks, GU, hips

AND

• No confirmed accident in a public setting that accounts for above bruising

• Sensitivity of 97% and specificity of 84% for predicting abuse

DESCRIBE BRUISE:

• COLOR
• SHAPE
• SIZE
• LOCATION
  – SOFT TISSUE; OVER BONY PROMINENCE
• TENDER
• SWOLLEN
• ABSENCE OF BRUISES (SHINS, ETC)
MIMICS
WORKUP
WORKUP

• BE AWARE OF SENTINEL EVENTS
STARTING POINTS

• CONSIDER IT: INCLUDE IT OR DISMISS IT

• DOCUMENT, DOCUMENT, DOCUMENT
MECHANICS FOR ALL EVALS:

• MEDICAL REASON?

• ACCIDENT REPORTED?

• CAN CHILD CAUSE TO SELF

• NONACCIDENTAL CAUSE CONSIDERED?
HISTORY

- INCIDENT
- PAST MEDICAL HISTORY
- SOCIAL HISTORY
- DEVELOPMENTAL HISTORY
- SOCIAL SERVICE HISTORY
- PARENT MEDICAL HISTORY
- DIET
- MEDICATIONS
- CPS OR LE HISTORY

- ALL OLD RECORDS***: LOOK FOR PATTERNS
SENTINEL EVENT VS SEPSIS

NEGATIVE SEPSIS WORKUP

NOT THE SAME AS

NEGATIVE CM WORKUP WITH ISOLATED INJURY
EXAM:

• HEAD TO TOES

• DOCUMENT NOT ONLY WHAT YOU SEE BUT ALSO WHAT YOU DO NOT SEE
WORKUP:

• CT HEAD (? MRI HEAD)
• DILATED EYE EXAM (WITHIN 48 HR)
• SKEL SURVEY; REPEAT SKEL SURVEY (3 WK)
• LABS
• SAFETY PLAN
• “CONTACT CHILDREN” EVAL
SKELETAL SURVEY:

- AP OR PA OF CHEST
- 2 OBLIQUES OF CHEST
- COMPLETE SPINE
- 2 VIEWS SKULL
- PELVIS
- INDIVIDUAL ARM/LEG SEGMENTS
- HANDS
- FEET
Skeletal Survey

- <2: all physical abuse victims
- 2-5: if victim has disabilities
  - severe injury
  - otherwise specific bones
- >5: rarely needed; do specific bones
- neglect and drug on case by case
REPEAT Skeletal Survey

- 2-3 WEEK recheck
- (in PA 28% positive on recheck)
- May exclude skull series unless injury
HEAD EVALUATION

- CT HEAD

  - IF AGE >9MOS AND NO TEN-4-FACE-P INJURY AND NORMAL NEURO EXAM; NO MRI OF HEAD OR NECK

  - IF ABNORMAL CT: DO MRI OF HEAD/C-SPINE

  - IF NORMAL BUT NEURO ABN DO MRI HEAD
LABS:

• BRUISING:
  – CBC, PT, PTT, PLT COUNT, VW PROFILE
  – ? D-DIMER, FIBRINOGEN, FAC 13

– PHYSICAL ABUSE:
  • ALT, AST, LIPASE, UA, AMYLASE
NO PARTIAL WORKUPS!
MUST ALWAYS CONSIDER OTHER CO-EXISTING ABUSE:

SEXUAL
PHYSICAL
NEGLECT
MEDICAL NEGLECT
MEDICAL CHILD ABUSE
EMOTIONAL
DENTAL
PHOTOGRAPHS:

- BLUE BACKGROUND BEST

- BIG PICTURE, THEN CLOSE-UP

- TAKE LOTS OF PICTURES
  - MANY VIEWS
Minnesota Child Abuse Network
ASSESSMENT FOR PHYSICAL ABUSE

0 - 6 months
- Head CT (recommended in all)
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Social Work Consult
- Ophthalmology Consult
- Trauma Service Consult

6 - 12 months
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Neuro-Imaging

2 - 5 years
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Skeletal Survey (Extensive Trauma, Developmental Delays, Burns)
- Neuro-Imaging
- Social Work Consult
- Trauma Service Consult

1 - 2 years
- Skeletal Survey
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase)
- Urine Drug Screen
- Neuro-Imaging
- Social Work Consult
- Trauma Service Consult

5 years and older
- Labs (CBC, Metabolic Panel with Liver Enzymes, Lipase, Urine Drug Screen)
- Neuro-Imaging
- Social Work Consult
- Mental Health Assessment

* Clinical Indicators
- Labs – Non-Patterned Bruising or ICH: add PT/PTT; Extensive Trauma: add CPK
- Abdominal Imaging – AST or ALT > 80 and/or abdominal bruising/tenderness
- Neuro-Imaging - Altered Mental Status, Skull Fracture(s), Bruising Face/Head
- Ophthalmology – Positive Neuro-Imaging and/or Altered Mental Status
- Social Work Consult – Suspected Abuse/Neglect, Ingestions, CPS involvement
- Trauma Service Consult – Head, Abdomen and Multi-system Trauma

Updated 12/01/2015
Center for Safe & Healthy Children
safechild@fairview.org
## Assessment for Physical Abuse: Injury Patterns, “Red Flags” & Child Abuse Programs

### ADDITIONAL MEDICAL EVALUATION IS ALWAYS INDICATED:
- Rib Fractures
- Metaphyseal Fractures
- Longbone Fracture (non-ambulatory)
- Oral or Pharyngeal Injury (non-ambulatory)
- Abdominal Injury (non-MVC under 5 yrs)
- Head Injury (unwitnessed, unexplained)

### Patterned Skin Injuries & Unusual Locations of Injury

<table>
<thead>
<tr>
<th>TEN</th>
<th>FACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torso (trunk)</td>
<td>Auricular area (ear)</td>
</tr>
<tr>
<td>Ear</td>
<td>Cheek</td>
</tr>
<tr>
<td>Neck</td>
<td>Eyelids (bruising)</td>
</tr>
<tr>
<td>Frenulum (mouth)</td>
<td>Scleral Hemorrhage (eye)</td>
</tr>
</tbody>
</table>

**4:** Bruises in the TEN distribution in a child under 4 years of age, or ANY bruise in an infant less than 4-6 months of age

### MOST CHILD FATALITIES:
- i. Occur in children under 4 years of age (80%)
- ii. Occur at the instigation of a caregiver (80%)
- iv. Involve head (leading cause) and/or abdominal (second cause) Injury

### What Is An Unexplained Injury:
- i. Injury that is not consistent w/ child’s age, developmental abilities, or injury type
- ii. History that is vague or changes w/ time, repetition, or caregiver
- iii. Delay in seeking medical care

### Signs of Head Injury*:
- i. Bulging fontanelle (soft spot) in an infant
- ii. Rapidly increasing head circumference
- iii. Bruising/Swelling to Face/Head
- iv. Vomiting or fussiness
- v. Unresponsive, “altered mental status”
- vi. Apnea or change in breathing

### Signs of Abdominal Injury*:
- i. Abdominal pain or distention
- ii. Abdominal bruising
- iii. Vomiting
- iv. Lethargic, “altered mental status”
- v. Rectal bleeding
- vi. Presents in shock, low blood pressure

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*Simple household falls rarely result in serious injury.

### Contact a Child Abuse Physician:
- **Univ. of Minnesota Masonic Children’s Hospital**
  - Minneapolis MN
  - Center for Safe & Healthy Children
  - (612) 273-SAFE (7233) or (612) 365-1000
- **Hennepin County Medical Center**
  - Minneapolis MN
  - Center for Safe & Healthy Children
  - (800) 424-4262 Hennepin Connect
- **Children’s Hospitals and Clinics of Minnesota**
  - Minneapolis and St. Paul MN
  - Midwest Children’s Resource Center (MCRC)
  - (651) 220-6750
- **Mayo Clinic**
  - Rochester MN
  - Mayo Child and Family Advocacy Program
  - (507) 266-0443 daytime or (507) 284-2511
- **Essentia Health**
  - Duluth MN (218) 786-8364
- **Gundersen Health System**
  - La Crosse WI 1-800-362-9567
- **Sanford Health**
  - Sioux Falls SD
  - Child’s Voice Child Advocacy Center
  - (605) 333-2226
- **Sanford Health**
  - Fargo ND
  - Child & Adolescent Maltreatment Service (CAMS) (701) 234-2000 or (877) 647-1225

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These recommendations are not a substitute for expert medical evaluation. It should also not take the place of medical decision-making. Injuries that are suspicious for abuse require careful assessment by a physician or medical provider with expertise in child abuse.
KNOW THE LIMITS:
MECHANICS:

KIDS ARE NOT LITTLE ADULTS!!!!

SKIN IS DIFFERENT
RESPONSE IS DIFFERENT
HEALING IS DIFFERENT
ABILITY IS DIFFERENT
LIMITS:

• CANNOT RULE OUT INTRACRANIAL BLEED

• CANNOT RULE OUT 20 FRACTURES

• CANNOT RULE OUT ABDOMINAL INJURY

• CANNOT RULE OUT SEXUAL ABUSE
MANDATED REPORTING

• KNOW YOUR STATE LAWS

• OFTEN: “SUSPECT”, NOT PROVEN!

• IT’S NOT ABOUT PROSECUTION; IT’S ABOUT SAFETY
• CONTACT CHILDREN?

• WORKUP: 12% fx
TAKE HOME POINTS:

• PREMOBILE INFANT AT INCREASED RISK OF PA

• SENTINAL EVENTS/FINDINGS MUST BE EVALUATED (COMPLETELY)

• A HAPPY BABY DOES NOT MEAN “NO INJURY”
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• Sheets,L  Sentinel injuries in infants; evaluation for child physical abuse  Pediatrics  2013: 131 ( 4. ); 701-707
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• Petska,H  Facial bruising as a precursor to abusive head trauma Clin Peds  2013; 52 ( 1): 86-88
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