MAYO CLINIC

SENTINEL EVENTS

ARNE GRAFF MN

DIVISION CHILD ABUSE PEDIATRICS

CONTACT INFORMATION:

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DISCLOSURES:

- TESTIFY
  - PROSECUTOR
  - DEFENSE

DISCLOSURE:

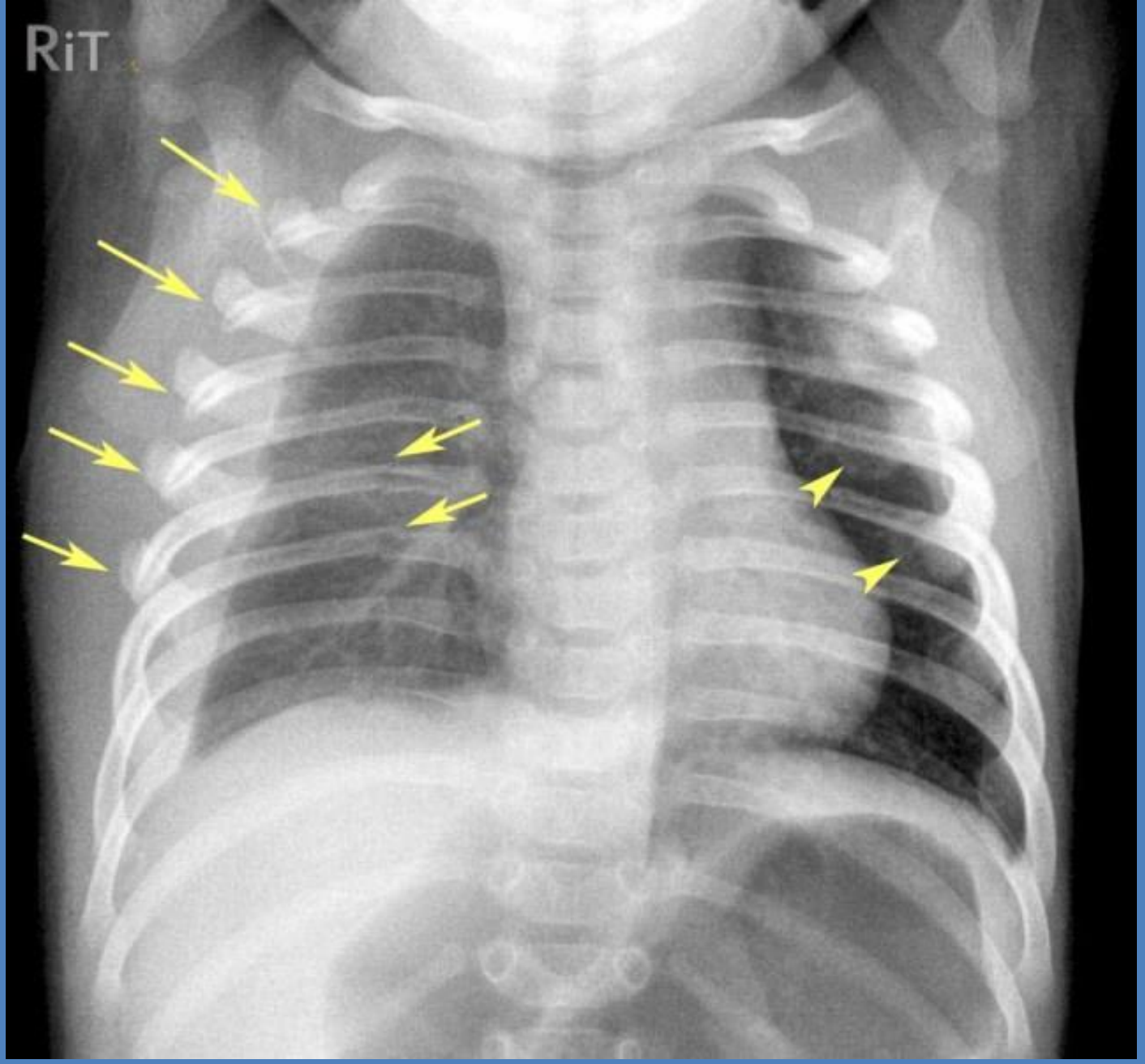
- ALL CHILDREN IN PHOTOS ARE IN SAFE HOMES
- PICTURES OF INJURIES- YOUR COMFORT ?

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


RiT

STATISTICS:

- 3,OOO,OOO REPORTED CASES/YR
- 900,000 CONFIRMED CASES
- 15OO “IDENTIFIED” DEATHS

Graph 2: Proportion of children by age group who died as a result of maltreatment

91%

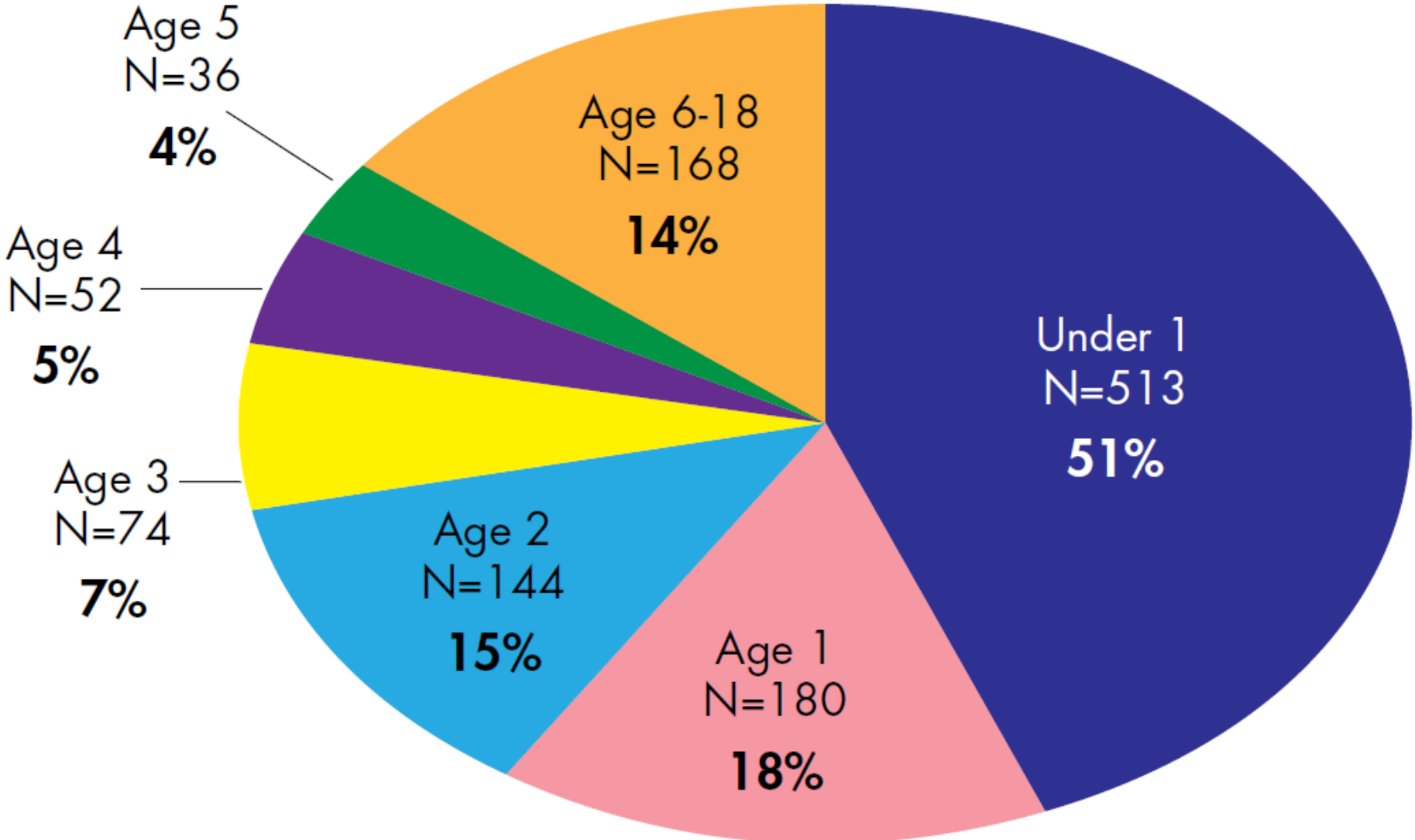
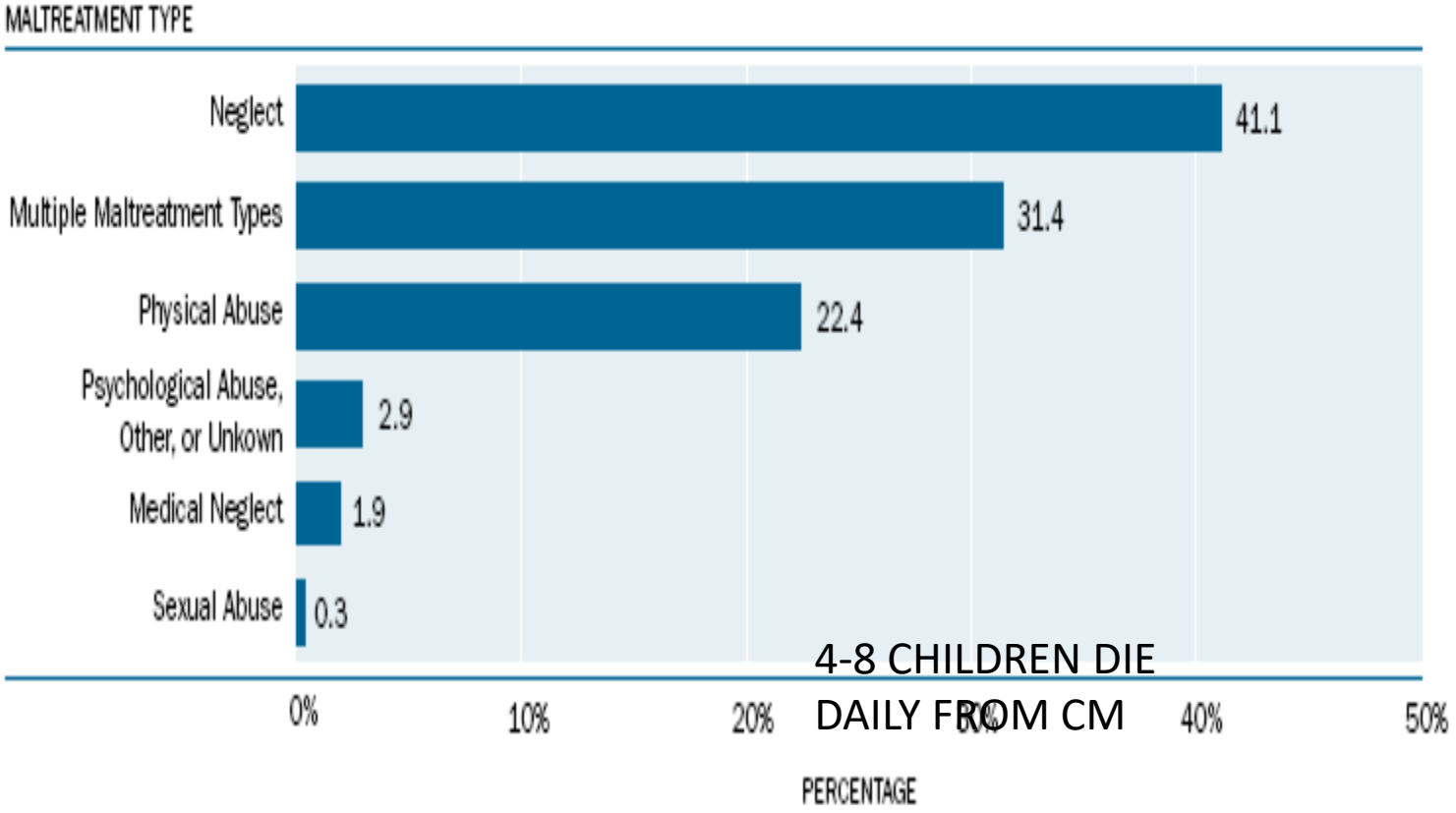


Figure 4–3 Maltreatment Types of Child Fatalities, 2006

69%



4-8 CHILDREN DIE DAILY FROM CM

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

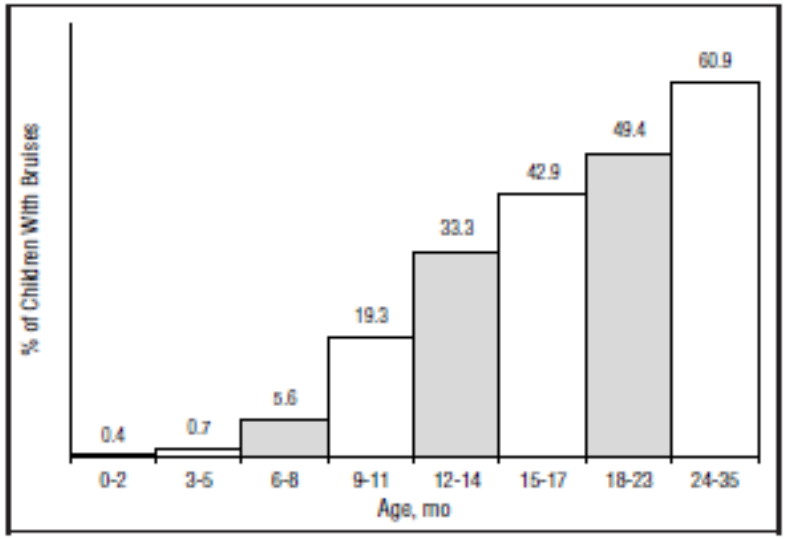


Figure 1. *Percentage of children with bruises by age (N = 930).*

Table 1. Bruises by Age and Developmental Stage of Child*

Age, mo	Precruiser	Cruiser	Walker
0-2	1/225 (0.4)	. . .	. . .
3-5	1/141 (0.7)	. . .	. . .
6-8	4/99 (4.0)	2/8 (25)	. . .
9-11	4/38 (10.5)	12/63 (19.0)	7/18 (38.9)
12-14	1/8 (12.5)	3/24 (12.5)	23/49 (46.9)
15-17	. . .	1/6 (16.7)	26/57 (45.9)
18-23	. . .	. . .	39/79 (49.4)
24-35	. . .	. . .	70/115 (60.9)
Total†	**11/511** (2.2)	**18/101** (17.8)	**165/318** (51.9)

**Data are presented as the number of children with bruises/total number of children (percentage). Precruiser indicates a child who is not walking; cruiser, one who walks with support; walker, one who walks independently; ellipses, not applicable.*

†P<.001.

NAOMI SUGAR STUDY

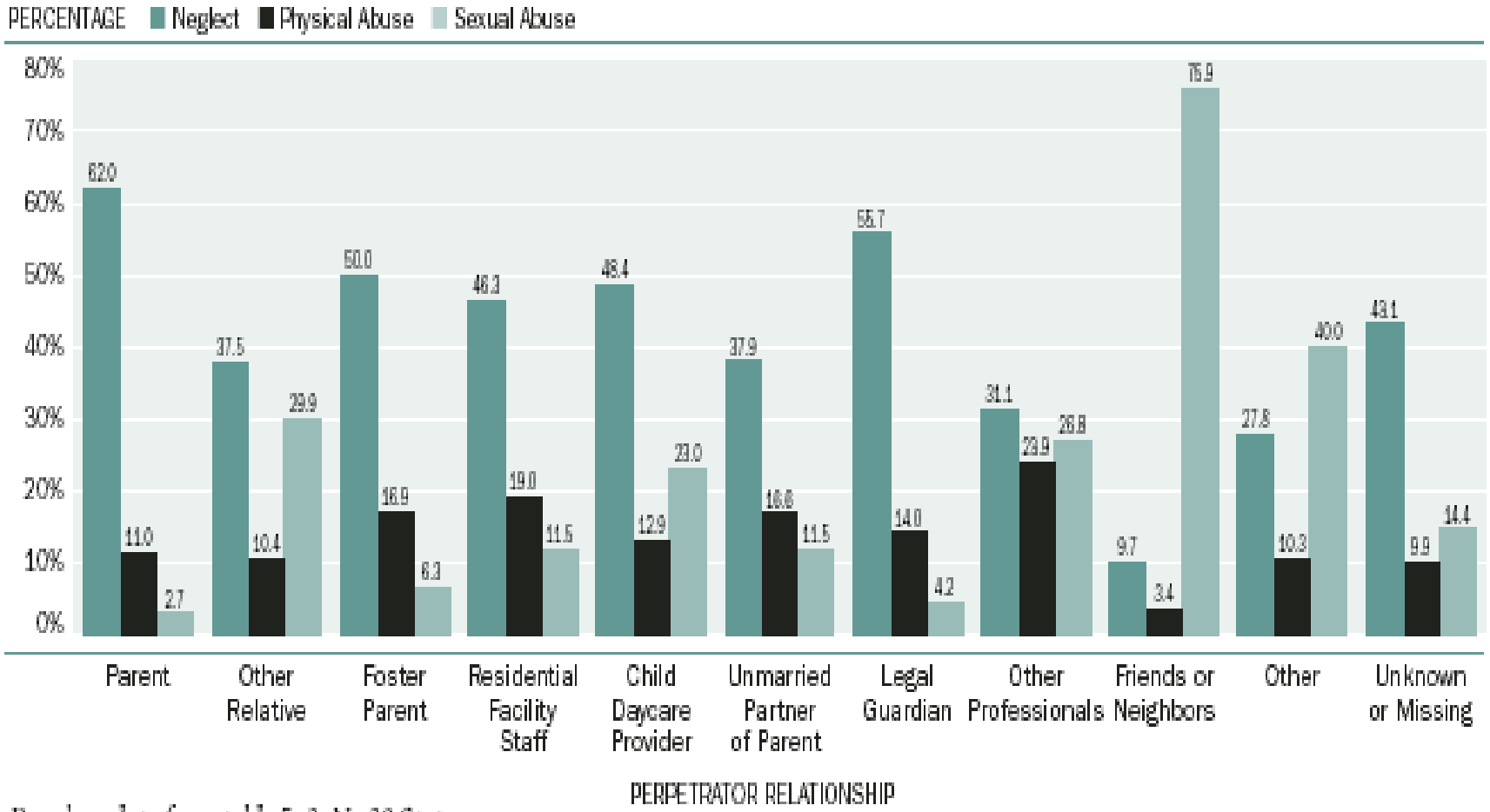
RISKS:

- <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

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:

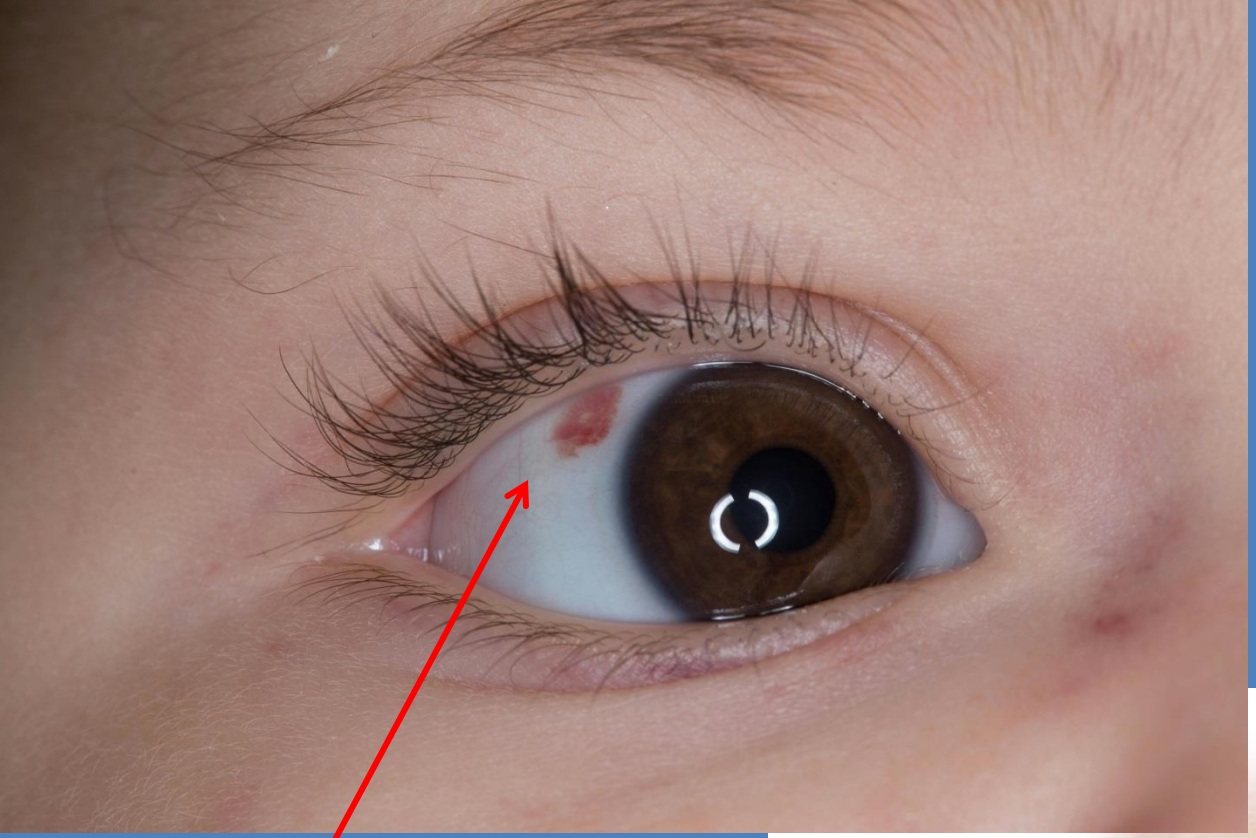
- SKIN INJURIES THAT ARE SUPERFICIAL ABRASIONS THAT COULD OCCUR IN THE ROUTINE CARE OF AN INFANT

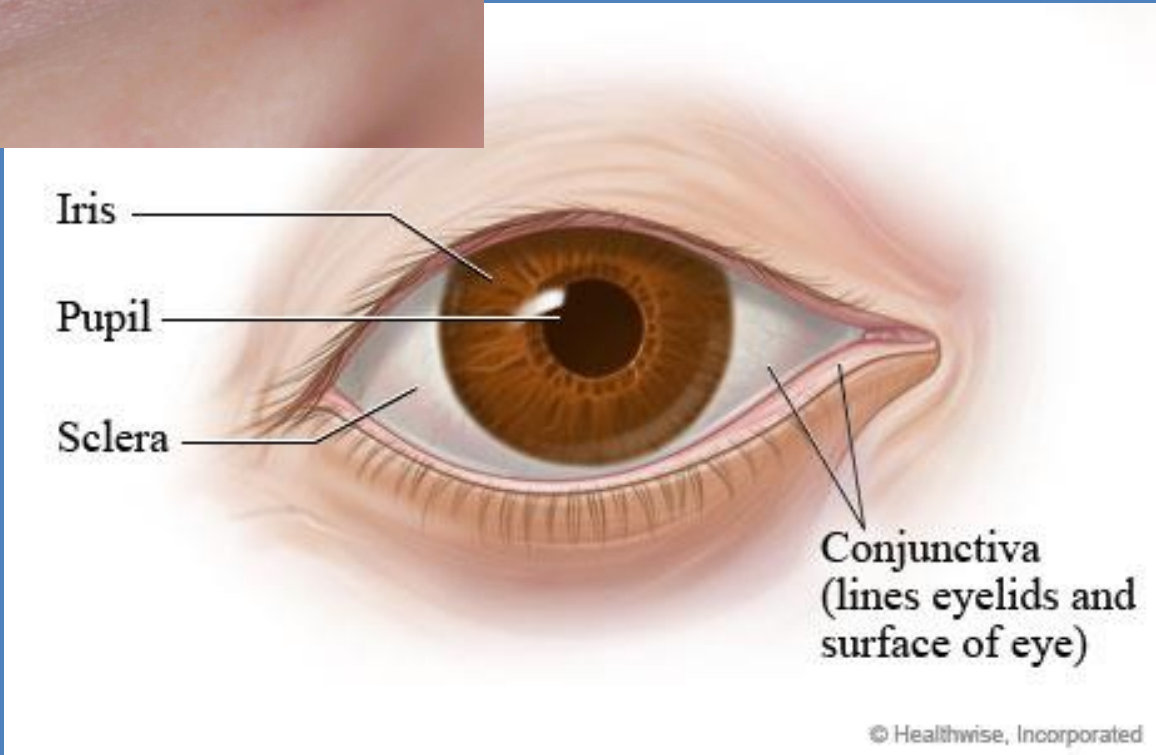
FUTURE RISK:

- 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

- BL0OD 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!

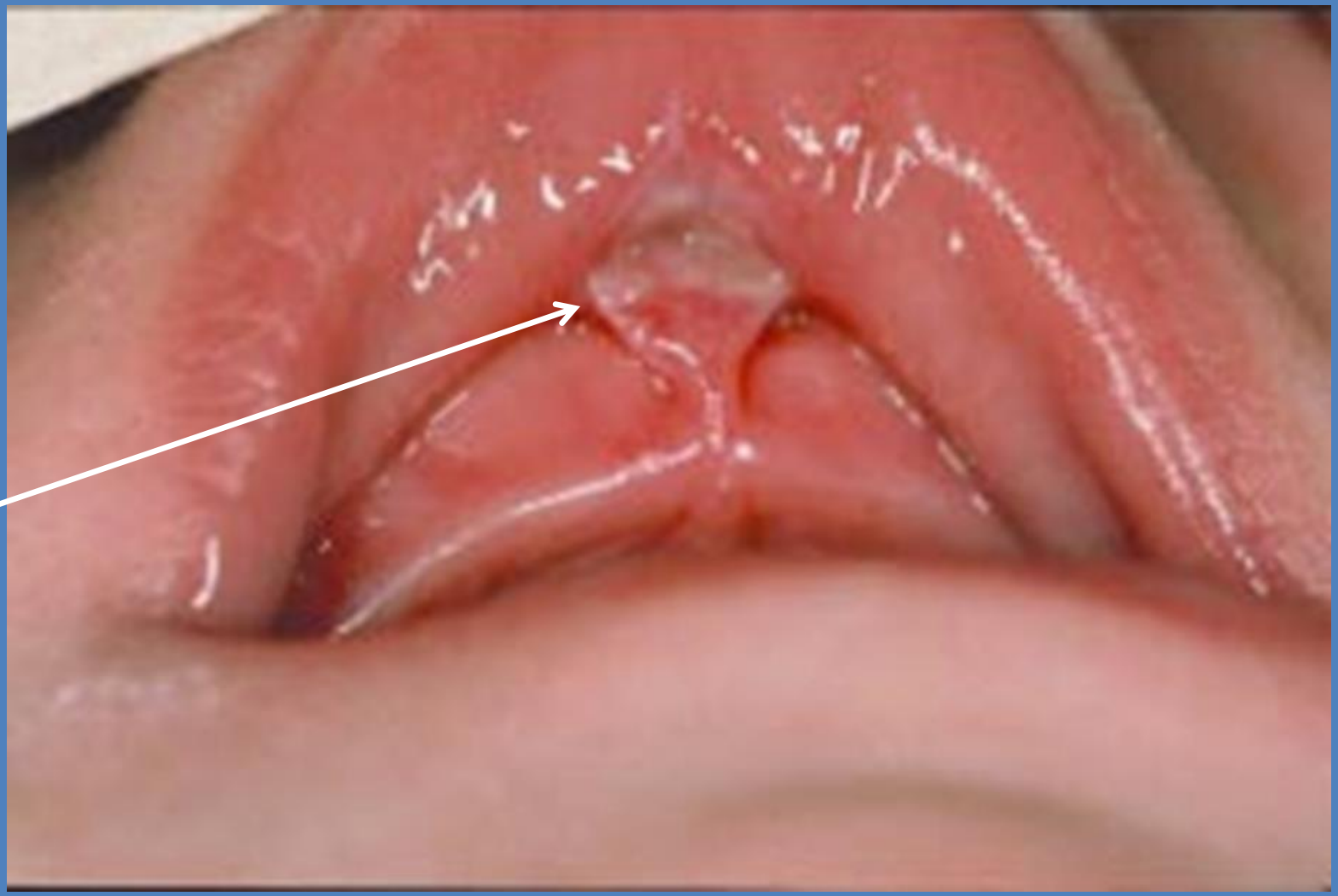
SUBCONJUNCTIVAL HEMORRHAGE:

- 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

CASE 2



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

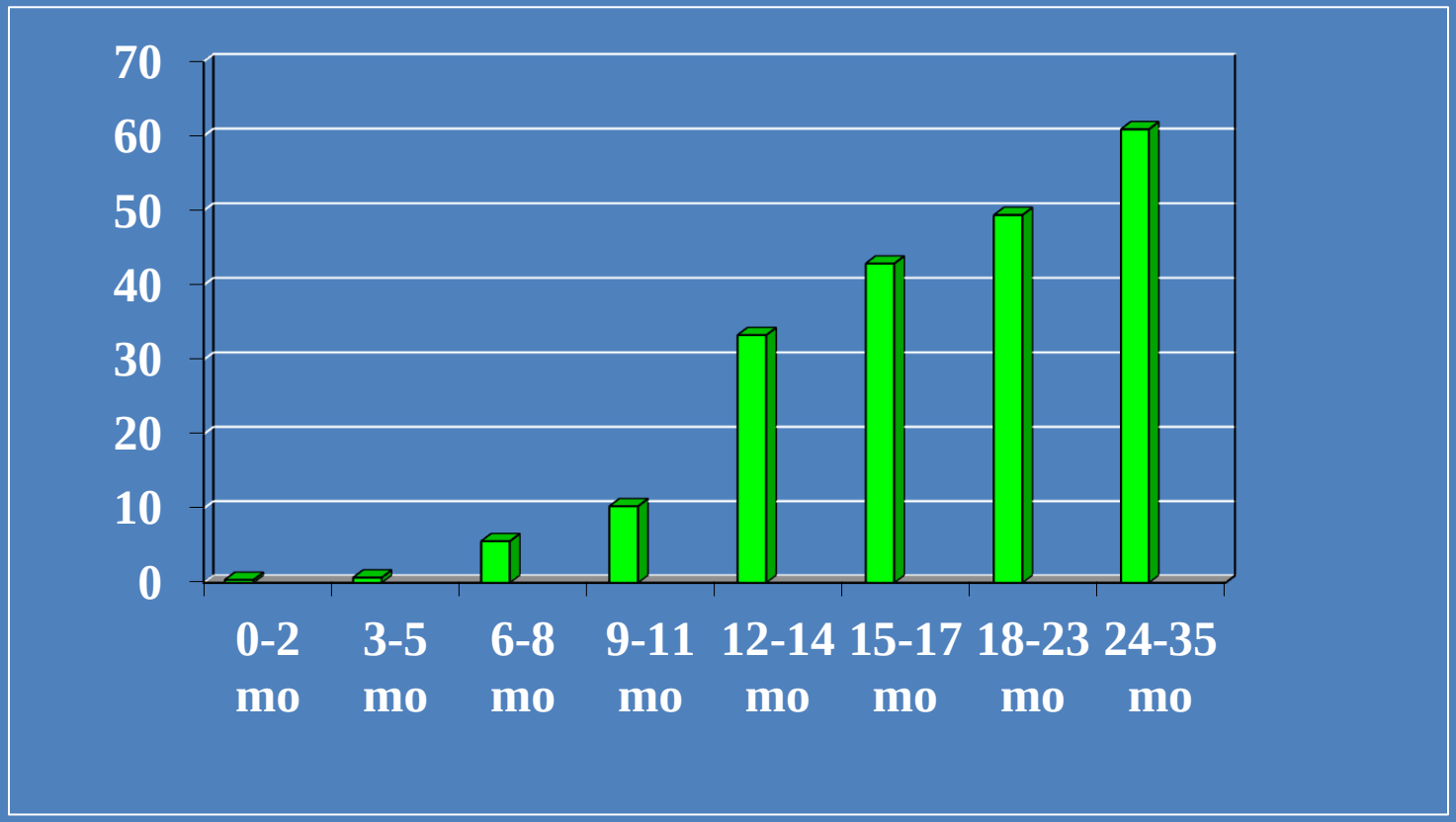
CASE #4

- 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”

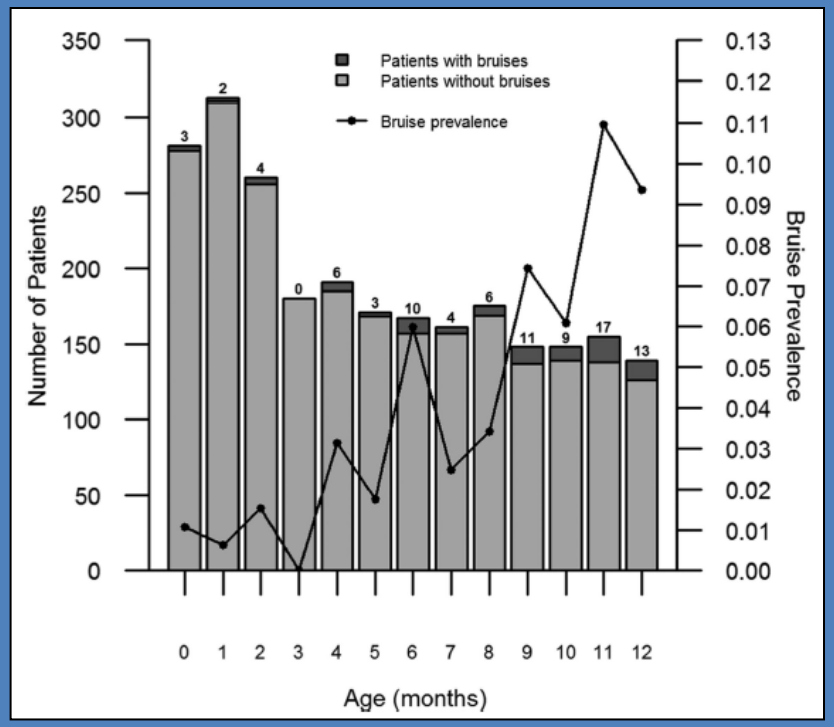


- N = 930
- < 1% of infants under 6 months have bruises

Sugar NF, Taylor JA, Feldman KW, and the Puget Sound Pediatric Research Network. Bruises in infants and toddlers: those who don’t cruise rarely bruise. *Arch Pediatr Adolesc Med*. 1999;153(4):399–403

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



Pierce MC et al. The prevalence of bruising among infants in pediatric emergency departments. Ann Emerg Med 2016;67:1-8

Bruising and Bleeding Disorders

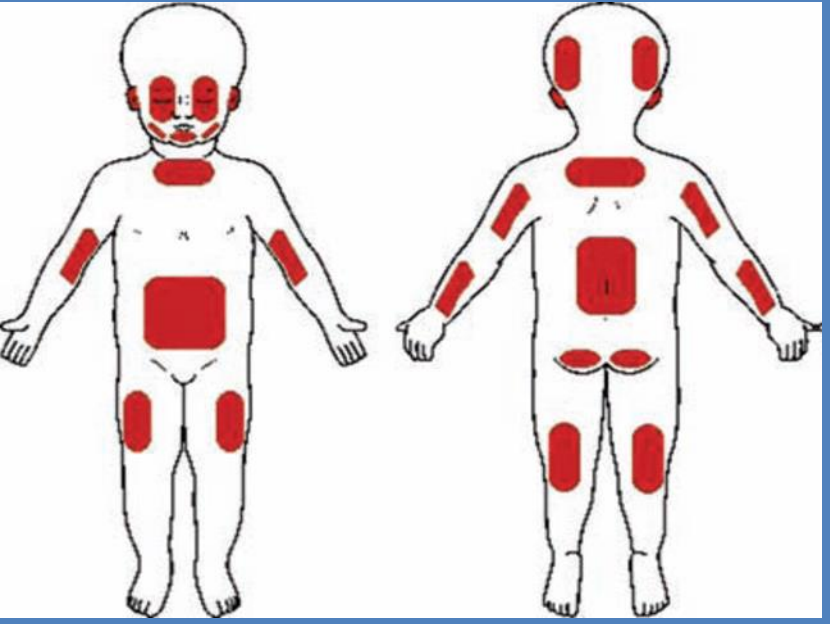
- Bruises on cheeks, ears, neck, buttocks, eyes and genitalia absent or extremely rare (<0.5% of collections) in pre-mobile children** with bleeding disorders, regardless of severity and absent in children without bleeding disorder
- Among children without bleeding disorder and with mild/moderate bleeding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

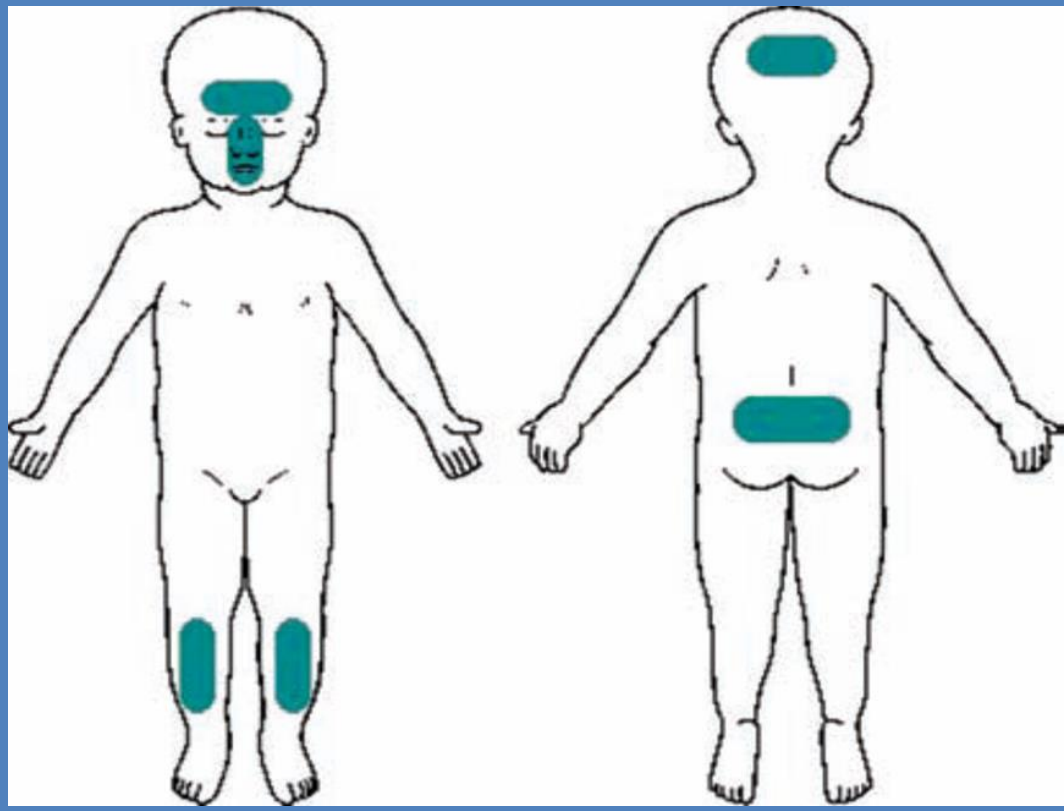
** Pre-mobile: not crawling, cruising or walking

Collins PW, et al. Patterns of bruising in preschool children with inherited bleeding disorders. Arch Dis Child 2017; 102:1110–1117

ACCIDENTAL BRUISES:

- SKIN OVERLYING BONE AREA
- LEADING SURFACE
- HISTORY OF PLAUSIBLE ACCIDENT LIKE A DROP, ETC





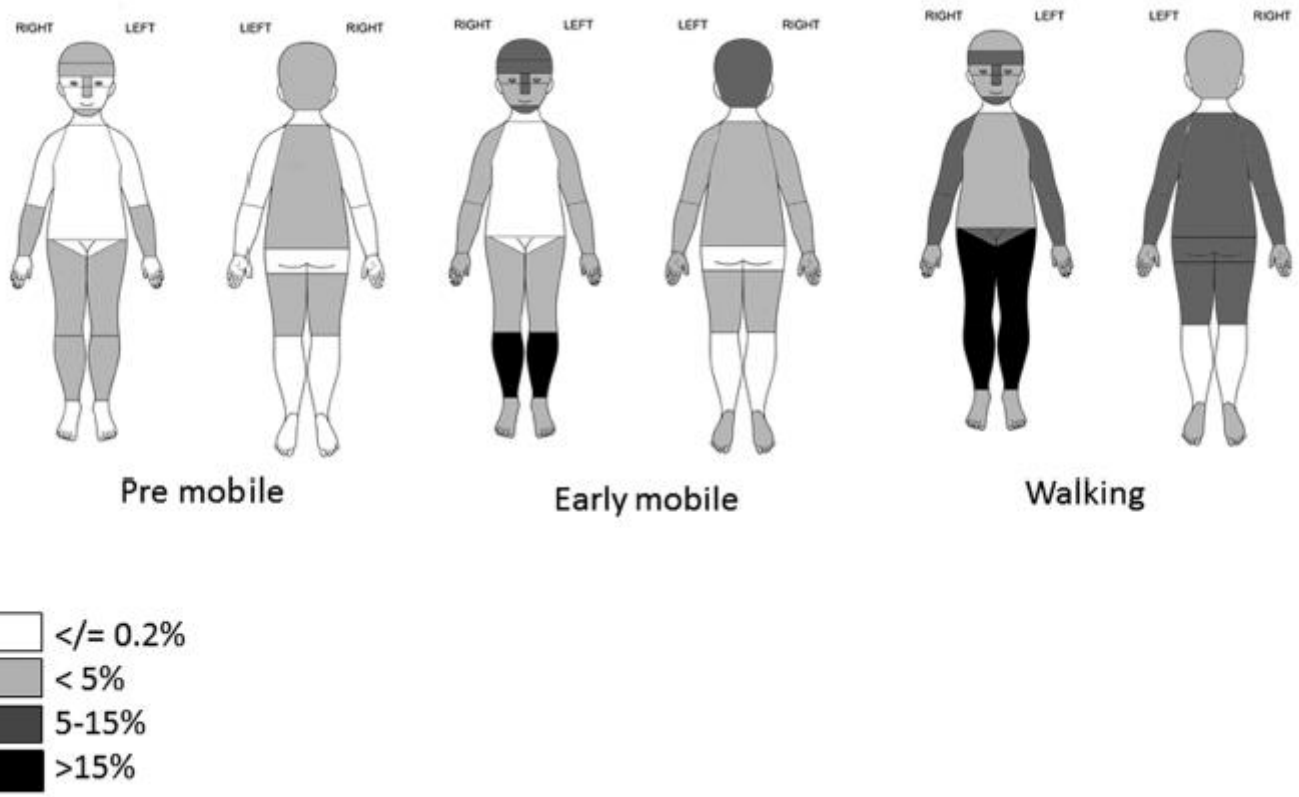


Figure 2 Distribution of percentage of 2570 collections from 328 children with at least one bruise by location and development stage.

Why are sentinel injuries important not to miss

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

- 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[1]

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

[1] Harper NS et al. J Pediatr 2014;165:383-8.

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)

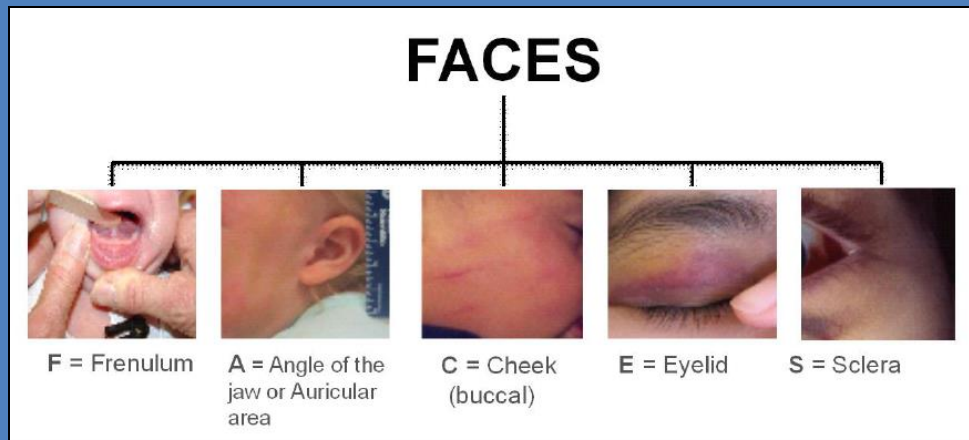
INFECTIOUS	METABOLIC	COAG DEFECT	ACCIDENTAL
NON-ACCIDENTAL	CONGENITAL	ENDOCRINE	CONNECTIVE TISSUE
ENVIRONMENT	POISONING	MEDICATION	VASCULAR
RENAL	PULMONARY	CARDIAC	OTHER

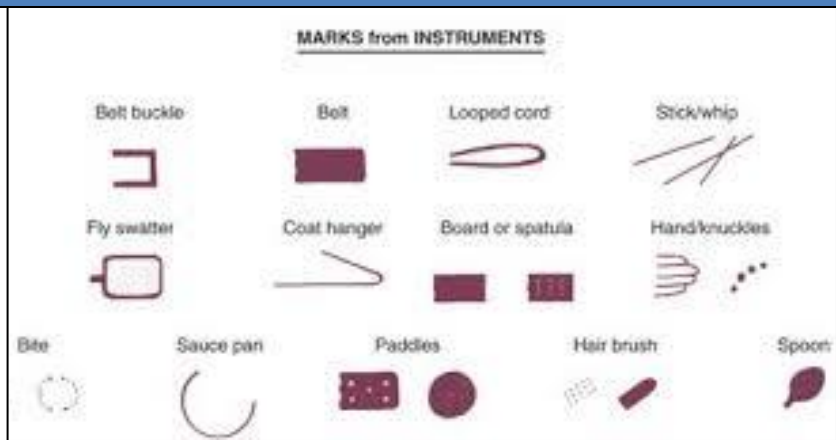
HIGH RISK BRUISING

- 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

Pierce MC, Kaczor K, et al. Bruising characteristics discriminating physical child abuse from accidental trauma. *Pediatrics* 2010;125(67)

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

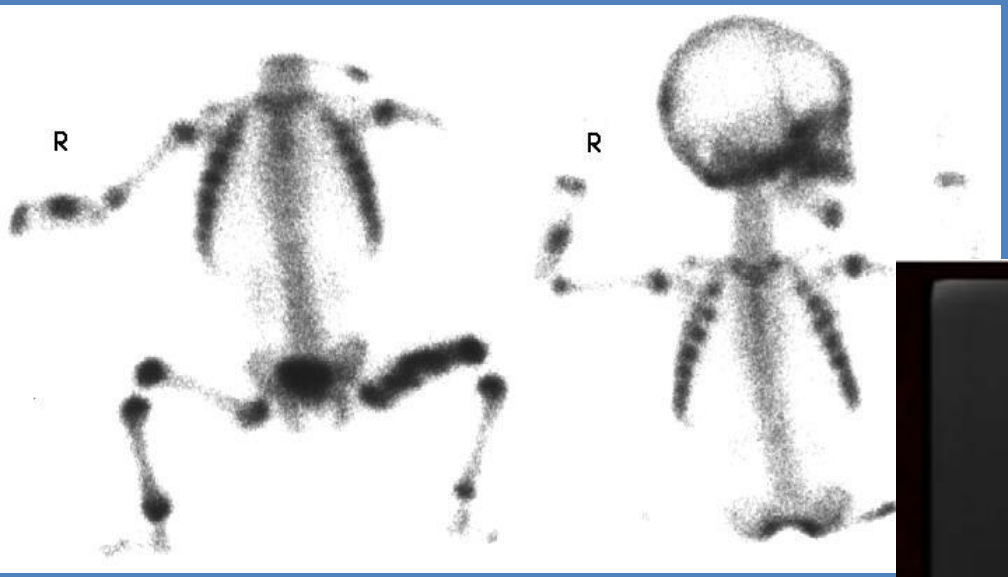
Skeletal Survey

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

REPEAT Skeletal Survey

- 2-3 WEEK recheck
- (in PA 28% positive on recheck)

- May exclude skull series unless injury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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

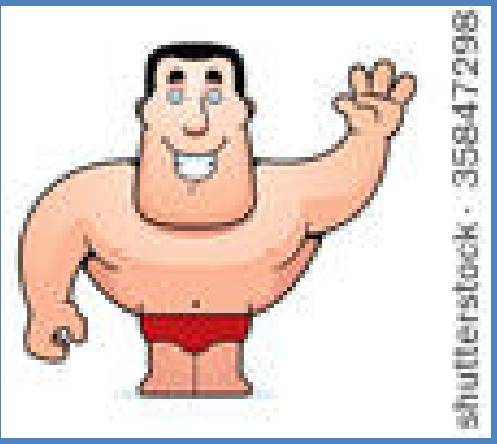
MEDICAL CHILD ABUSE

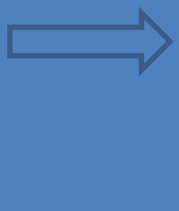
EMOTIONAL

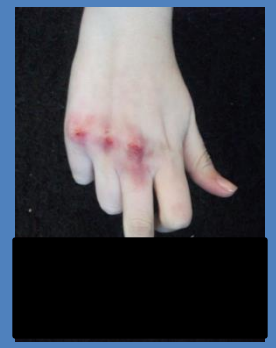
DENTAL

PHOTOGRAPHS:

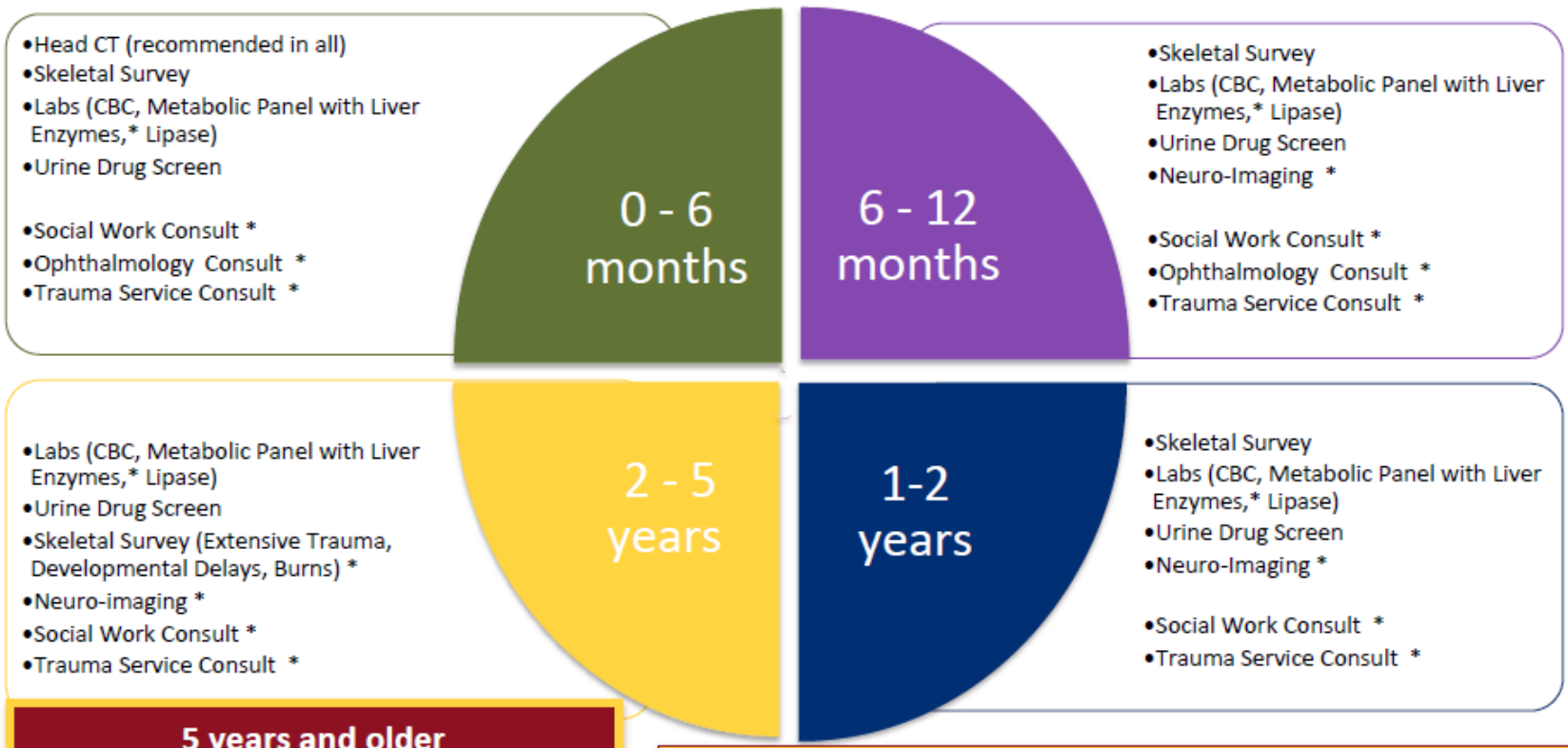
- BLUE BACKGROUND BEST
- BIG PICTURE, THEN CLOSE-UP
- TAKE LOTS OF PICTURES
  - MANY VIEWS







Minnesota Child Abuse Network
ASSESSMENT FOR PHYSICAL ABUSE



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

When the following injuries are present,

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

TEN-4 FACES

TEN	FACES
Torso (trunk)	Frenulum (mouth)
Ear	Auricular area (ear)
Neck	Cheek
	Eyelids (bruising)
	Scleral Hemorrhage (eye)

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

*Simple household falls rarely result in serious injury.

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

*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

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

WORKUP

- 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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