NON-ACCIDENTAL TRAUMA

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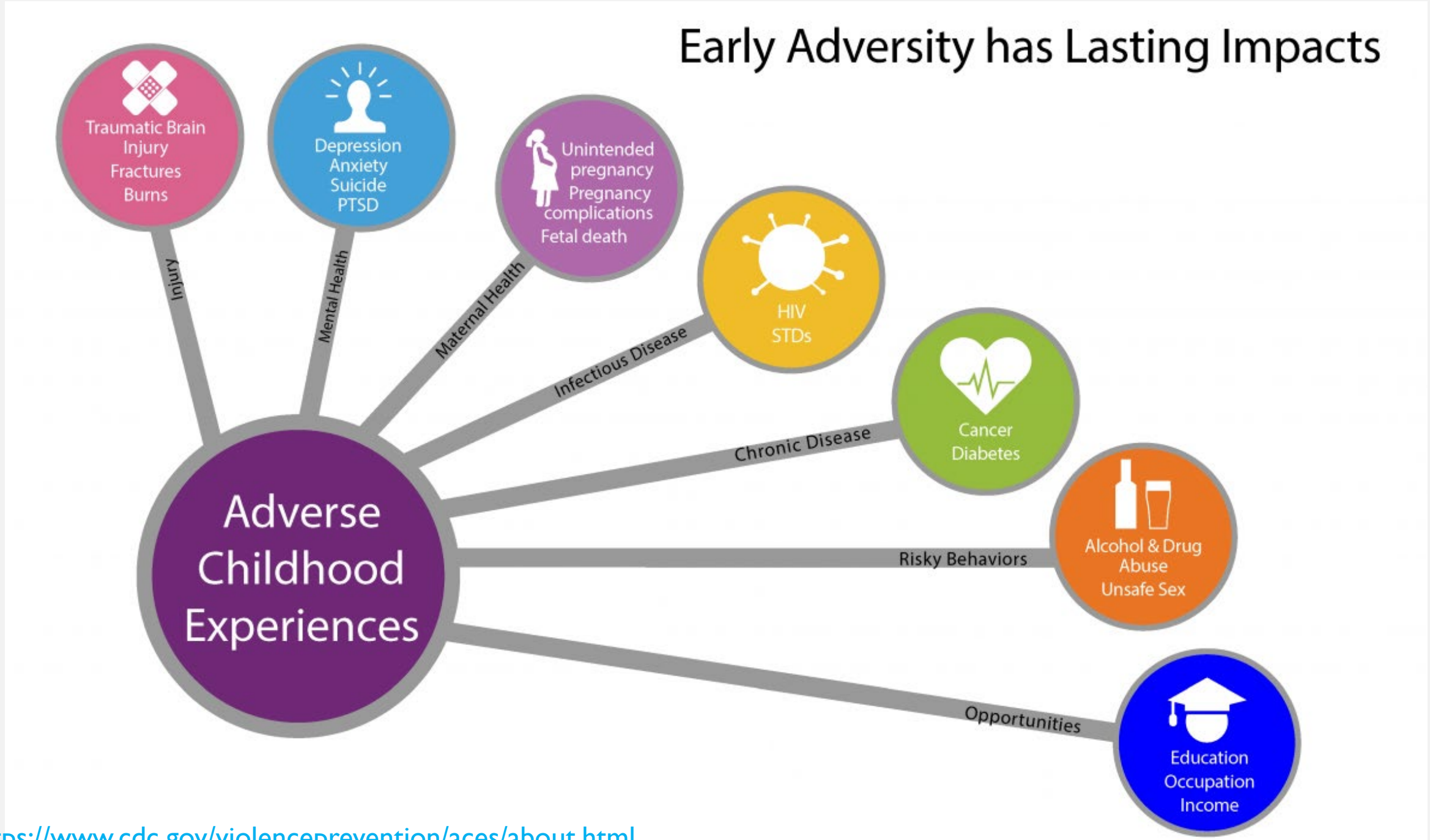
WHY PEDIATRIC PHYSICAL ABUSE MATTERS

- Short term: risk of escalating abuse with increased risk of morbidity & mortality
- Long term: developmental delay, mental health, chronic disease & substance abuse

Felitti VJ , Anda RF , Nordenberg D , et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. Am J Prev Med. 1998;14(4):245–258



https://www.cdc.gov/violenceprevention/aces/about.html

Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

The Adverse Childhood Experiences (ACE) Study

Vincent J Felitti, MD, FACP [A] · Robert F Anda, MD, MS [B] · Dale Nordenberg, MD [C] · ... · Valerie Edwards, BA [B] · Mary P Koss, PhD [D] · James S Marks, MD, MPH [B] ...

Show more

The CDC-Kaiser Permanente adverse childhood experiences (ACE) study from 1995-1997 is one of the largest investigations of childhood abuse and neglect and household challenges and later-life health and well-being.

Examples of adverse childhood experiences:

- Natural disasters
- Violence
- Abuse or assault
- Neglect

- Life-threatening illness
- Loss of a friend or family member
- Parental separation, divorce or deployment
- Witnessing or being involved in a serious accident
- Witnessing the death of another person

- Housing instability or frequent moves
- Feeling unsafe in your community
- Lack of access to good healthcare
- Food Insecurity
- Limited access to quality education
- Financial issues
- Discrimination

What is an ACE score?

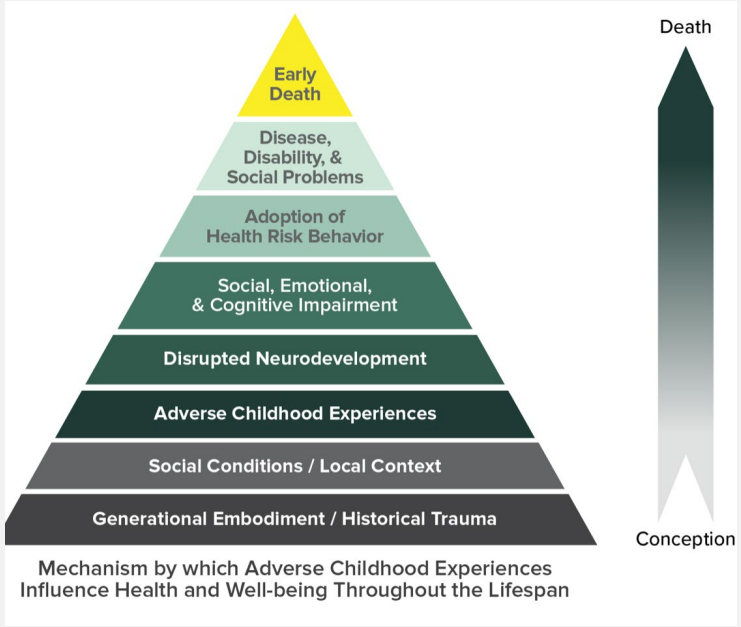
- Total # of adverse childhood experiences
- 10 ?'s about traumatic events during childhood

Purpose: Determine risk for toxic stress

- Start trauma treatment

Adults with 4 or more ACEs were 12x more likely to develop conditions, including:

- **Alcohol use disorder**
- **Substance use disorder**
- **Depression**



Mechanism by which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan

Webster E. M. (2022). The Impact of Adverse Childhood Experiences on Health and Development in Young Children. *Global pediatric health*, *9*, 2333794X221078708. https://doi.org/10.1177/2333794X221078708

https://my.clevelandclinic.org/health/symptoms/24875-adverse-childhood-experiences-ace

RED FLAGS

- **Sentinel injuries are minor injuries with major significance**

- According to **Sheets et al in 2013**, as many as **25% of abused infants** had prior sentinel injuries
  - Bruises
  - Intraoral injuries
  - Simple fractures

EVERY INJURY CAN BE CAUSED BY ABUSE.
NOTHING IS PATHOGNOMONIC FOR ABUSE.

HISTORICAL INDICATORS OF PEDIATRIC PHYSICAL ABUSE

- No explanation for a significant injury
- Changing story
- Inconsistent with child's physical/developmental capabilities
- Injury occurred as a result of inadequate supervision
- Delay in seeking medical care

Risk Factors	
Care Giver Factors	• Criminal History • Mental Health History • Substance Abuse • Young/Single Parent • Former Victims of Abuse/neglect
Child Factors	• Young Age • Behavioral Problems • Non-biologic Relationship to Caretaker • Prematurity/low Birth weight
Family and Environmental Factors	• High local unemployment • Intimate partner violence in the home • Poverty • Social Isolation • Lack of social supports

Be mindful of bias

Webster E. M. (2022). The Impact of Adverse Childhood Experiences on Health and Development in Young Children. *Global pediatric health*, *9*, 2333794X221078708. https://doi.org/10.1177/2333794X221078708

PHYSICAL EXAM FINDINGS SUGGESTIVE OF ABUSE: THE 6 Bs

- **Bruises**
- **Breaks**
- **Bonks**
- **Burns**
- **Bites**
- **Baby blues**

Helman, A, Coombs, C, Holland, A. Pediatric Physical Abuse Recognition and Management. Emergency Medicine Cases. March, 2018. https://emergencymedicinecases.com/pediatric-physical-abuse/. Accessed Oct 28th, 2025.

BRUISES

- Most common abusive injury

- Bruising in the pre-mobile infant → **"if you don't cruise, you don't bruise"**
  - Pierce et al: only **1.3%** of infants less than 5 months old had bruising
  - Feldman et al: over **50%** of pre-mobile infants with bruising were victim of abuse

TEN-4-FACESP BRUISING CLINICAL DECISION RULE

- Pierce MC, Kaczor K, Lorenz DJ, et al. Validation of a Clinical Decision Rule to Predict Abuse in Young Children Based on Bruising Characteristics. JAMA Network Open. 2021;4(4):e215832. doi:10.1001/jamanetworkopen.2021.5832

- **Clinical decision rule was 95.6% sensitive and 87.1% specific for abuse**

TEN-4-FACESp

Bruising Clinical Decision Rule

When is bruising concerning for abuse?

If any of the 3 components (Regions, Ages, Patterns) are observed in a child **under 4 years of age**, strongly consider seeking evaluation by a medical provider with expertise in child abuse.

REGIONS

Torso | **E**ars | **N**eck

FACES

Frenulum
Angle of Jaw
Cheeks *(fleshy part)*
Eyelids
Subconjunctivae
(whites of the eyes)

AGES

4 months and younger

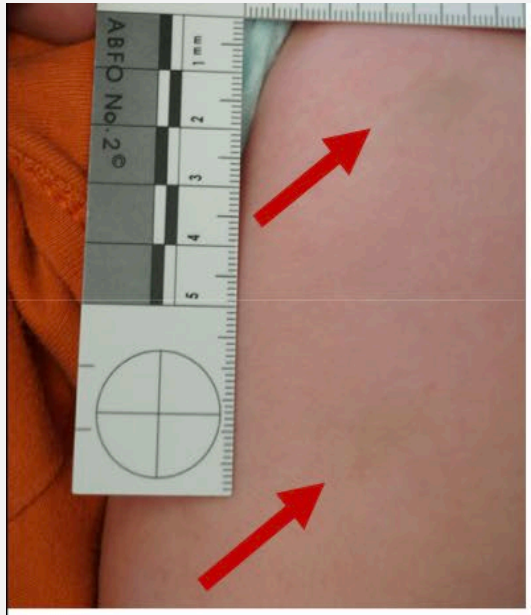
Any bruise, anywhere

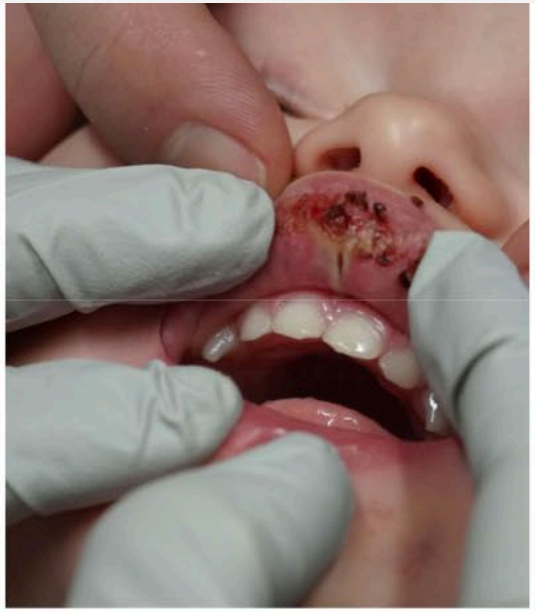
PATTERNS

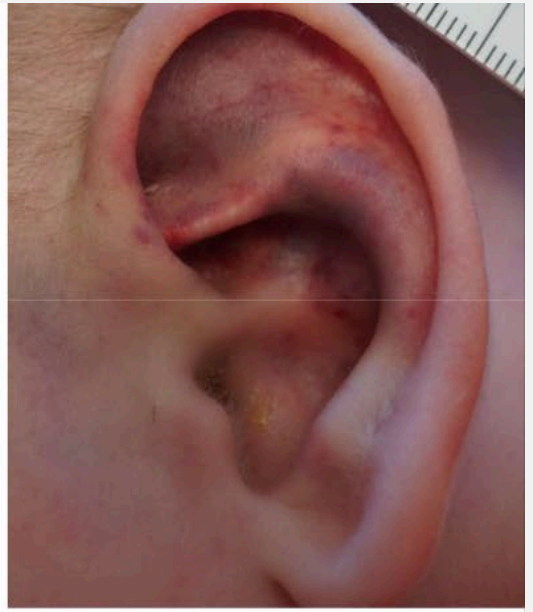
Patterned bruising

Bruises in specific patterns like slap, grab or loop marks

TEN-4-FACESp was developed and validated by Dr. Mary Clyde Pierce and colleagues.
It is published and available for FREE download at **luriechildrens.org/ten-4-facesp**.







TEN 4 FACES-p

- Thigh bruising on an infant
- Frenula Injury
- Subconjunctival hemorrhage
- Ear bruising

Christian CW, COMMITTEE ON CHILD ABUSE AND NEGLECT. The Evaluation of Suspected Child Physical Abuse. PEDIATRICS. 2015;135(5):e1337-e1354. doi:10.1542/peds.2015-0356

Patterned Injury

Slap mark

Loop mark from cord or cable

Human Bite mark

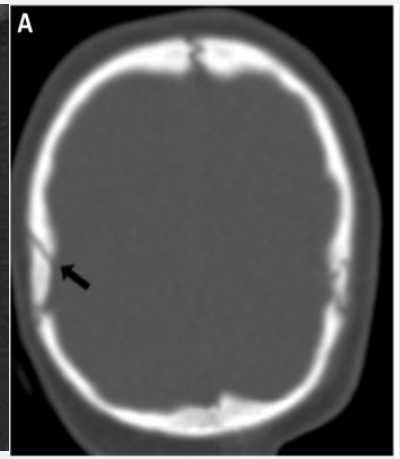
- Adult bite > 2cm between maxillary canines

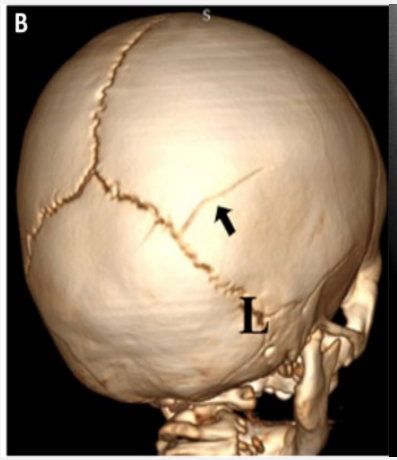
Christian CW, COMMITTEE ON CHILD ABUSE AND NEGLECT. The Evaluation of Suspected Child Physical Abuse. PEDIATRICS. 2015;135(5):e1337-e1354. doi:10.1542/peds.2015-0356

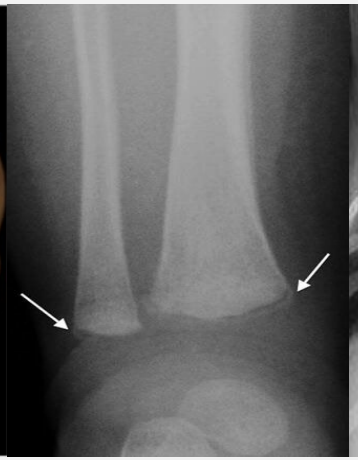
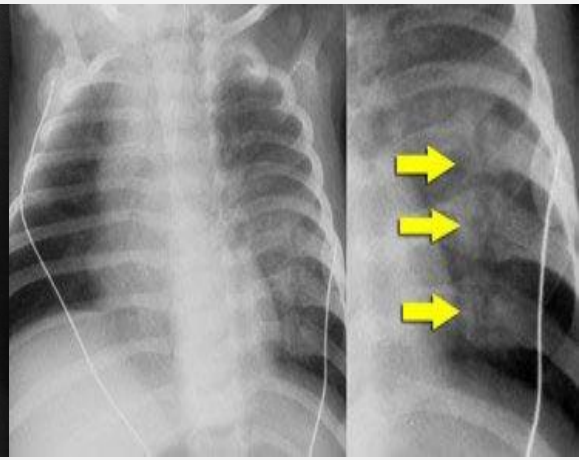
BREAKS

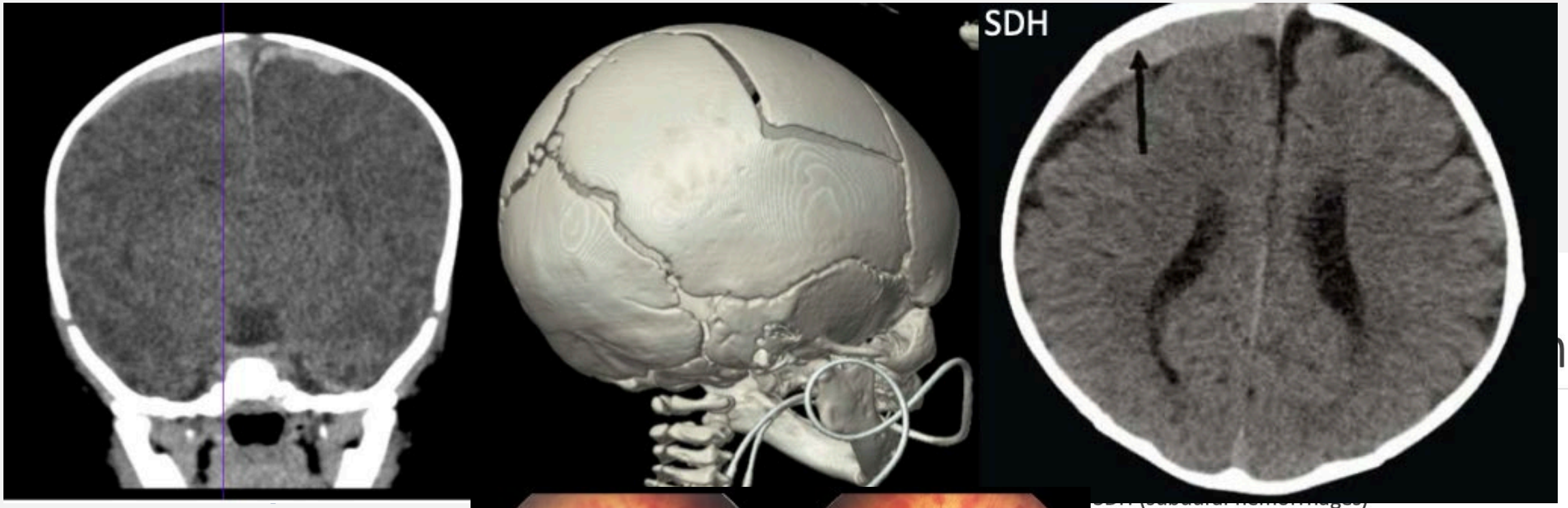
- **Femur fracture in infant < 12-18 months**
  - **Baldwin 2011**: Odds of **a femur fracture being abuse** rather than accidental trauma was **19x greater for children < 18 mo**
- **Humerus fracture in infant < 18 months**
  - **Pandya 2010:** **32x greater odds** of being the victim of abuse
- **Skull fractures, especially if complex or bilateral**
- **Classic metaphyseal fractures** from being shaken violently back and forth (abusive head trauma)
- **Rib fractures,** especially posterior rib fractures



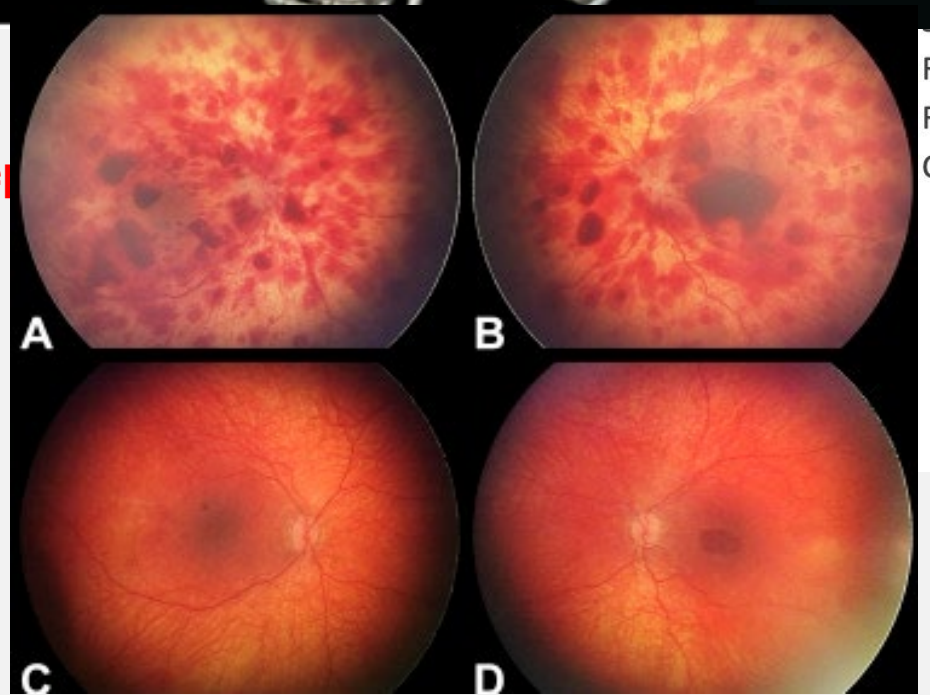






- **Abusive head trauma → Re**
  "shaken baby syndrome"



na

RH (retinal hemorrhages)
Rib fractures
CMLs (bucket handle fractures)

Wang, L., Petrak, M., Holz, F. G., Müller, A., & Krohne, T. U. (2019). Retinal Hemorrhages in Shaken Baby Syndrome. *The Journal of pediatrics*, *207*, 256. https://doi.org/10.1016/j.jpeds.2018.12.054

BONKS

- **Signs and symptoms of abusive head trauma in infants or young child can be subtle/non-specific**
- **Pittsburgh Infant Brain Injury Score (PIBIS)** by **Berger et al.** helps determine which patients need imaging
  - **The 5-point PIBIS**
    - Abnormality on dermatologic examination **(2 points)**
    - Age ≥3.0 months **(1 point)**
    - Head circumference >85th percentile **(1 point)**
    - Serum hemoglobin <11.2g/dL **(1 point)**
  - **Score of 2 or more**
    - **Sensitivity: 93.3%** (95% confidence interval 89.0%–96.3%) for abnormal neuroimaging
    - **Specificity: 53%** (95% confidence interval 49.3%–57.1%) for abnormal neuroimaging
      - Berger RP, Fromkin J, Herman B, et al. Validation of the Pittsburgh Infant Brain Injury Score for Abusive Head Trauma. Pediatrics. 2016;138(1):e20153756

BURNS

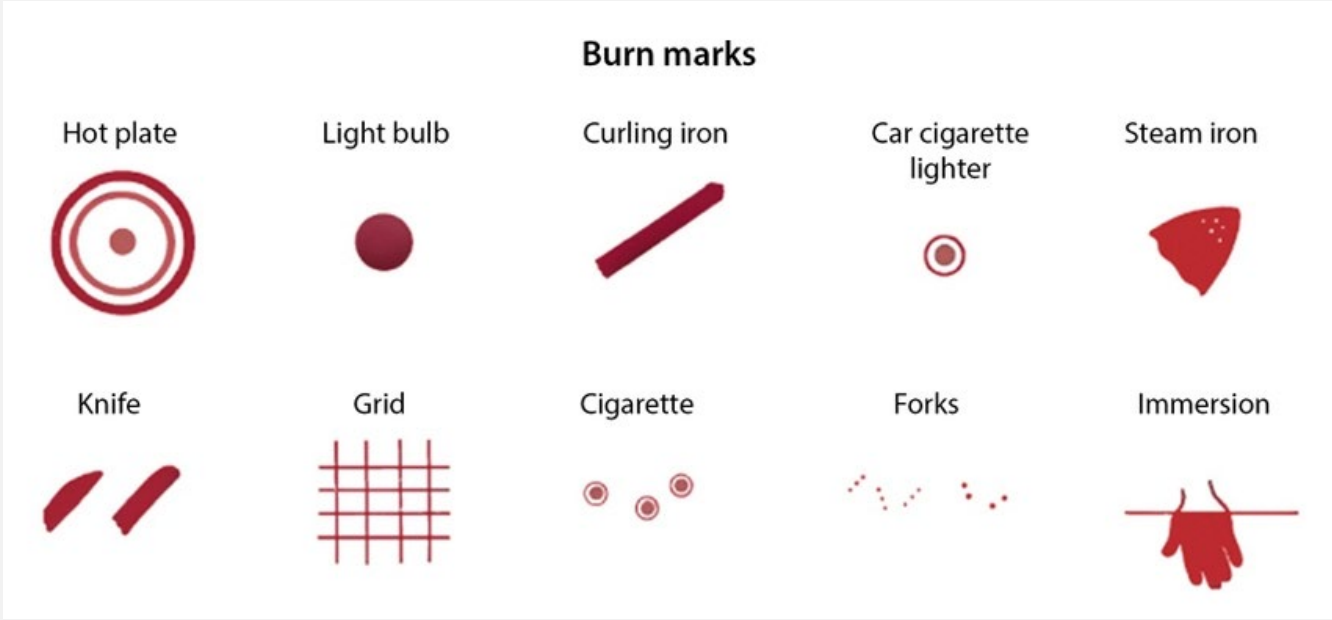
Highly Concerning Burns

Immersion scald burns (especially if symmetric, well-demarcated)

- Stocking and/or glove distribution
- Symmetrically burned buttocks/genitals (often related to punishment during potty training)

Contact burns

- Cigarette burns (especially if multiple and/or in protected locations)
- Other well-demarcated patterned burns mirroring a hot object (e.g. clothing iron, cigarette lighter, curling iron, hair blow dryer, cooking items)



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BITES

BABY BLUES

- **Some severe injuries can present with non-specific symptoms such as irritability, etc**

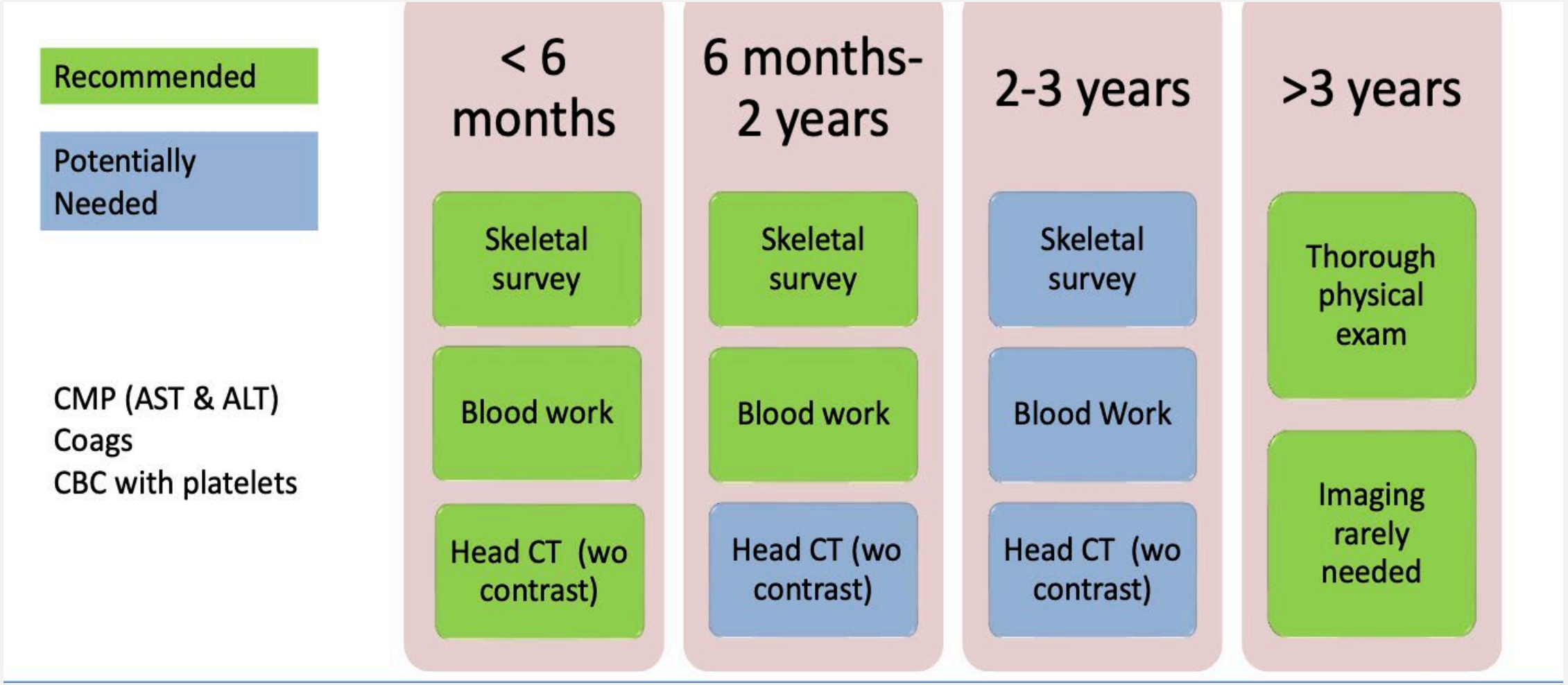
Friedman, S., Morse, C. & Sahler, O. A Three-year Follow-up Study of Abused and Neglected Children. *Pediatr Res* 4, 474 (1970). https://doi.org/10.1203/00006450-197009000-00160

MIMICS

- **Mongolian spots and hemangiomas most common**
  - ***Mongolian spots*** *(congenital dermal melanocytosis)*
    - buttocks/back, present at birth, non-tender, and fade over time
  - ***Hemangiomas***
    - non-tender, subcutaneous, and proliferate over time

- Many conditions may predispose to bruising and bleeding (HSP, ITP, leukemia, etc)
- Fractures from minimal force? → Consider osteogenesis imperfecta, hyperparathyroidism, Fanconi syndrome, etc

WORKUP IN SUSPECTED PEDIATRIC PHYSICAL ABUSE



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CHEST AND ABDOMINAL INJURIES

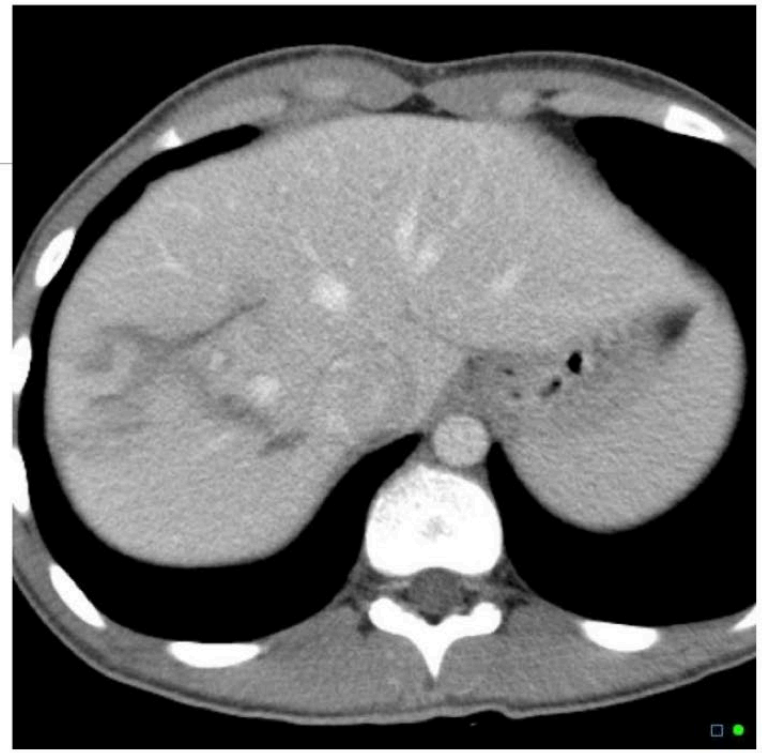
- Abdominal trauma is 2nd leading cause of fatalities from child abuse (AHT is 1st)
  - Signs & symptoms may be subtle or overlooked
- Do laboratory screening
  - If AST or ALT > 80 proceed to abdominal CT

Abdominal Injury

Looking for:

- Liver laceration
- Other solid organ injury (Pancreas, kidney, etc…)
- Duodenal hematoma
- Vascular injury
- Mesenteric injury

Rare to see abdominal bruising!



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SKELETAL SURVEY

- **Any child < 2y in whom you suspect abuse (various recs)**
- **21 to 22 X-rays**
  - **Dedicated films for all long bones**
  - **Hands, feet**
  - **Pelvis**
  - **Spine**
  - **Head**

Initial skeletal survey

Skull	AP / Lateral
Cervical spine	Lateral
Thorax	AP, to include the shoulders. Both oblique's (to include all the ribs, left and right). Lateral to include the whole spine.
Abdomen, lumbosacral spine, pelvis	AP abdomen and pelvis.
Upper extremities	Where possible: AP of the whole arm (centered at the elbow if possible) Coned lateral elbow / Coned lateral wrist In larger children: AP humerus (including the shoulder and elbow) AP forearm (including the elbow and wrist) Coned lateral elbow / Coned lateral wrist
Lower extremities	AP femur / AP tibia and fibula AP knee / Coned lateral knee Coned AP ankle (Mortise view) Coned lateral ankle
Hands	PA Hand and wrist
Feet	AP/PA

Wood JN, Fakeye O, Mondestin V, Rubin DM, Localio R, Feudtner C. Development of hospital-based guidelines for skeletal survey in young children with bruises. Pediatrics. 2015;135(2):e312-20.

3 DS:

DOCUMENTATION, DISCLOSURE & DISPOSITION

- **Documentation** → Proper documentation can be challenging
  - **History** → 1. Who is providing the history 2. What, when, who 3. Use quotes to document statements from child & caregiver 4. Activities that may affect forensic evidence recovery (eg. bathing)
  - **Physical Exam** → Head-to-toe Fully expose the child Describe, draw or even photograph any injuries
  - **Impression**

- **Disclosure**
  - **Be direct & professional.** "As a physician, I worry when I see X, Y & Z & it makes me concerned that someone may have hurt your child."
  - **Refrain from being accusatory.** "It's not my role to say who hurt your child but it is my obligation to report my concern."
  - **Encourage the family to focus on the child.**

- **Call for help** → Discuss the case with social work, child protective services, child abuse consultant (eg. SCAN team) & PCP

- **Disposition**
  - **To admit or not to admit?**

WHAT IS OUR RESPONSIBILITY IN REPORTING OF SUSPECTED PEDIATRIC PHYSICAL ABUSE?

- Rules for reporting abuse vary across jurisdictions, but the fundamental principle is the same → **Healthcare providers need only reasonable suspicion that a child is being harmed to report, not "proof"**

- We are penalized for failing to report suspicion
  - Not for reporting unsubstantiated suspicion

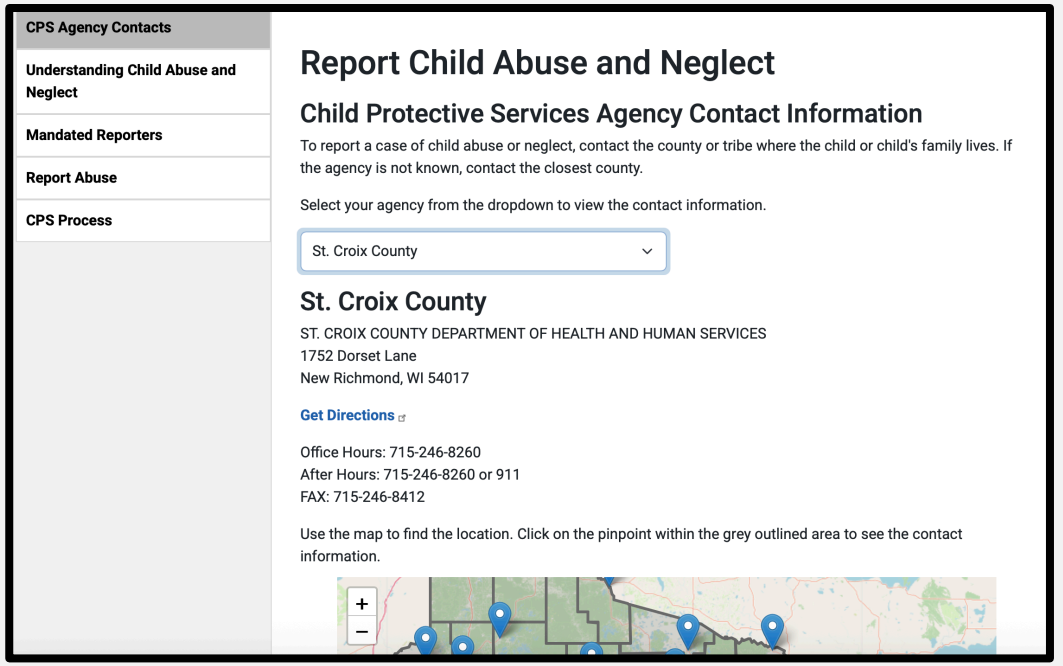
WISCONSIN LAWS

- *Physicians and other health care professionals who have reasonable cause to suspect that a child seen by them in the course of professional duties has been abused or neglected or has been threatened with abuse or neglect must "immediately inform, by telephone or personally," the county department or local law enforcement of the facts and circumstances giving rise to that suspicion. (**Wis. Stat. § 48.981**)*

- Report immediately to CPS or law enforcement
- Reasonable suspicion required
- Good faith reporters are protected
- Failure to report: fine/jail possible

- Wisconsin DCF Mandated Reporter: https://dcf.wisconsin.gov/reportabuse

WACEP
Wisconsin Chapter
American College of Emergency Physicians



Child Presenting with Injury

Historical Indicators of Abuse

- Changing of evolving history
- Injury not consistent with mechanism
- Injury not consistent with developmental stage
- Delay in seeking medical care
- History of past injuries
- Unexplained injuries/deaths in siblings

The Physical Exam's 6 B's of Abuse

Bruises: Pre-mobile; TEN-4 (Torso, Ear, Neck) F.A.C.E.S. (Frenulum, Angle of Jaw, Cheek, Eyelid, Subconjuctival); Pattern; Too many
Breaks: Needs a clear history. Unusual in very young. Ignore Toddler's Fracture
Bonks: Worry if complex, bilateral, depressed, open, suture diathesis or occipital fractures
Burns: Worry if bilateral, well demarcated, immersion pattern (glove & stocking)
Bites: Unlikely to have innocent mechanism
Baby Blues: Unexplained behavioral change

Injuries Suggestive of Abuse

- Posterior rib fractures
- Long bone fractures if <6mo
- Metaphyseal fractures
- Scapular fractures
- Vertebral fractures
- Sternal fractures
- Hand/foot fractures
- Facial fractures
- SDH
- Unexplained TBI

Consider Reporting

Screening For Occult Injuries

0-12mo:
Brain CT if symptomatic or concern of physical exam. Admit for MRI if no symptoms.

12mo to 18 years:
No need for imaging if no symptoms/concerns.

Skeletal Survey Recommendations

In general, perform in any child < 2 years old in whom you suspect abuse.

<24 mo + bruising if
- Concerning Hx or PE findings
- No Hx of trauma to explain fracture, ***except***
Distal spiral or buckle # of tibia/fibula/radius/ulna in ambulatory patients

12-23 mo if:
- Rib #
- Metaphyseal #
- Complex skull #
- Humeral # + epiphyseal separation from fall <3 ft
- Femur diaphyseal # from fall of any height

<12 mo if:
- Concerning Bruising (TEN-4, F.A.C.E.S.)
- Any # ***except*** distal buckle/spiral #, linear, unilateral skull # if >6 months + good hx or clavicle # @ birth

<9 mo
>1 bruise in ANY location

<6 mo + bruising:
Over bony prominences (head T-shaped area, frontal scalp, extremity bony prominences) ***except*** if a single bruise and patient presents with history of fall

Documentation Tips

History
- Who is providing the history
- Use quotations
- Any pain
- Activities that may affect forensic evidence recovery (e.g. bathing)
- ROS – changes in behaviour, non-specific symptoms

Physical Exam
- Head-to-toe
- Fully expose the child – this is a trauma patient
- Describe, draw or even photograph any injuries

Impression
- Summary statement
- If comfortable, offer an interpretation of the findings in the context of the history

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RESOURCES

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