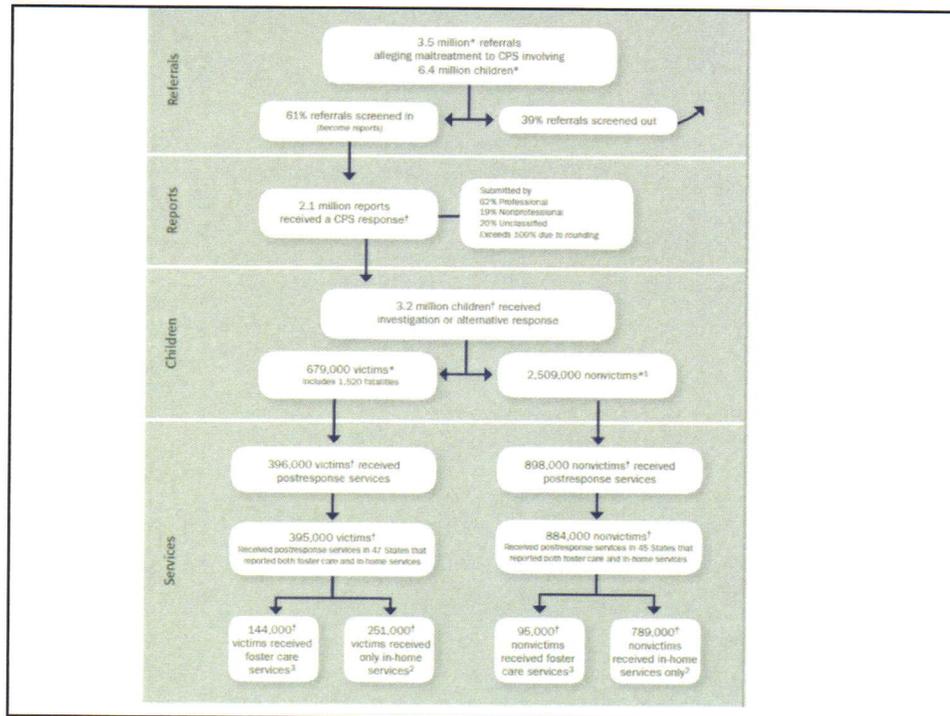


Sentinel Injuries: Recognizing the symptoms of the canary in the coal mine before it's too late

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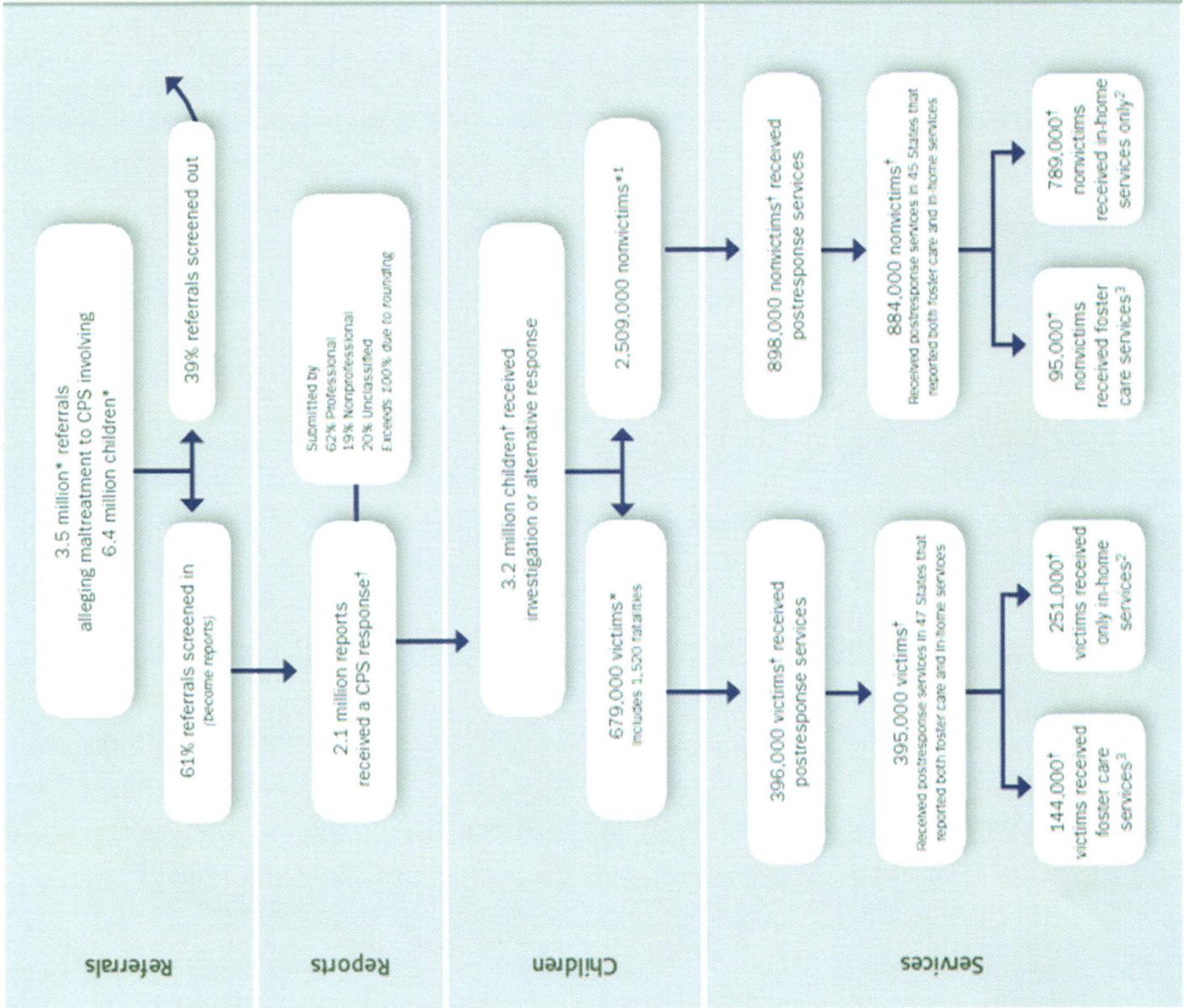
Objectives

- **Identify “sentinel injuries” in the context of possible child abuse**
- **Recognize the necessary evaluation that should happen after a sentinel injury is identified**
- **Describe the possible outcomes associated with sentinel injuries**



Scope of the Problem

- In 2013, 1520 children died as the result of abuse or neglect
- 3.5 million reports were made on 6.4 million children
- 678,932 children were found to be victims of child abuse and neglect
 - Victim rate of 9.1 victims per 1000 children
 - 10 football stadiums FULL



Scope of the Problem

- The US has one of the worst rates of child abuse in the industrialized world
 - 4-7 children die every day due to child maltreatment

Mandated Reporting

- Any person who has **reason to believe** that a child has been subjected to abuse or neglect is required to report
- It is important to remember that mandated reporting is like a screening test
 - It isn't meant to be the final answer as to whether someone is or isn't a victim

Triggers for Abuse

- Crying in infants
- Unrealistic developmental expectations
 - Attributing motives to infants
 - “The baby wasn’t eating just to irritate me”
 - “The baby refused to go to sleep”
 - “The baby peed on me on purpose”

What is a sentinel injury?

- Relatively “minor” injuries identified in a child
- Found typically in a pre-cruising infant
- These injuries may not be serious alone but are warnings of worsening abuse
- Sentinel injuries may be missed or downplayed by medical providers
 - This results in missed opportunities to protect children

What is a sentinel injury?

- Visible or detectable to a caregiver
- Sentinel injuries may be missed or downplayed by medical providers
 - This results in missed opportunities to protect children

What is NOT a sentinel injury?

- Injuries that a caregiver cannot detect
 - Rib fractures
 - Metaphyseal fractures
 - Head injuries with subtle symptoms
 - Vomiting
 - Irritability
 - Sleepiness

Who Might See a Sentinel Injury?

- A parent
- An unrelated caregiver (babysitter)
- A medical person
- Another family member

Sentinel Injuries

- Of 200 definitely abused infants, 27.5% had a previous sentinel injury compared to NONE of the 101 non-abused infants evaluated
- 66% of these sentinel injuries were in infants <3m of age
- 95% were at or before 7m

• Sheets, et al, 2013

Sentinel Injuries

- A medical provider was aware of the injury in 42% of the cases

Types of Injuries

- Bruises in infants
- Intraoral injury
- Ear injury
- Subconjunctival hemorrhage

Cutaneous Injuries

- Bruises or contusions: damage to blood vessels resulting in leakage of blood into tissue
- Petechia (1) or petechiae (multiple): 1-2mm red-purple spots due to broken capillaries; resolve rapidly

Cutaneous Injuries

- Bruises are the most common presenting injury in abused children
- May not ever be brought to medical attention due to the perception that it is a minor injury—even in infants
- If a medical provider sees the injury, they may underestimate its importance and not document it or the history provided for it

Timing the Injury

- Bruises CANNOT be dated clinically
 - Evolution of bruise varies based on body fat, UV exposure, depth and extent of injury, skin complexion
- Guessing at an age is not helpful and may be misleading

Bruises: What is Normal?

- Depends on the developmental age of the child
- Depends on the trauma history offered
- Therefore, take a thorough history
- Document what you see and hear

Bruising by Age

- “Those who don’t cruise, rarely bruise”
- Study of almost 1000 children <36m of age
 - 20% had bruises on exam

Bruising by Age

- By age, however, their developmental status was key
 - 0.6% <6m
 - 1.7% <9m
 - 2.2% in non-cruisers (not up on 2 feet)
 - 17.8% cruisers
 - 51.9% walkers
- Sugar, et al, 1999

Bruising by Location

- Patients <48m old admitted to an intensive care unit because of trauma were evaluated for bruising
- Abuse patients were more likely to have bruising of the
 - Torso
 - Ear
 - Neck
 - Anywhere if they were less than 4m old

Bruising by Location

- The decision rule is called TEN-4
- Bruising over “soft parts”
 - Cheek
 - Ears
 - Neck
 - Buttock
 - Abdomen
 - Hand

Additional Injuries

- One large study found that among infants <6m with apparently isolated bruises
 - 23% had a fracture found on skeletal survey
 - 27% had a head injury found on CT or MRI
 - 3% had an abdominal injury
 - 50% had at least one additional serious injury

• Harper, et al, 2014

Petechiae

- Result from a variety of mechanisms
 - Slaps
 - Suffocation/Smothering
 - Twisting
- Rapidly resolve so early photodocumentation and repeat documentation is necessary

Hand/Foot Squeeze

- Usually an injury seen only in infants
- May be missed due to the infant's tendency to keep their hands tightly fist
- May be associated with difficult to detect metacarpal and metatarsal fractures
- Does not result from routine handling

Oral Injuries

- Frena/Frenula/Frenum: piece of tissue attaching the lip to the gum (top and bottom) and the tongue to the floor of the mouth
- May be injured accidentally in a mobile child
 - Running with something in the mouth
 - “Face plant” with a drag
 - Falling on the face

Oral Injuries

- If torn in an infant, very frequently associated with inflicted trauma
 - Shoving something (pacifier, bottle, medicine dropper) in the mouth
 - May be seen with suffocation/smothering
- Bleeds “a lot” due to blood mixing with saliva
- Heals rapidly
- May look like an isolated spot of thrush when healing

Ear Injuries

- Ears tend to be in protected location and are not commonly injured in falls
- Injuries often from being hit or pinched/pulled
- Often painful
- Can be permanently disfiguring depending on severity
- Accidents can happen but wouldn't be “unknown”

Eye Injuries

- Conjunctiva is the thin tissue overlying the eyeball
- Bleeding underneath the conjunctiva is called subconjunctival hemorrhage

Eye Injuries

- Subconjunctival hemorrhages have many causes
- Infants DO NOT sustain subconjunctival hemorrhages from
 - Constipation
 - Coughing (unless they have pertussis)
 - Vomiting
 - Crying

Eye Injuries

- Subconjunctival hemorrhages in infants are often associated with
 - Smothering
 - Suffocation
 - Strangulation
 - Direct injury to the eye

Nursemaid's Elbow

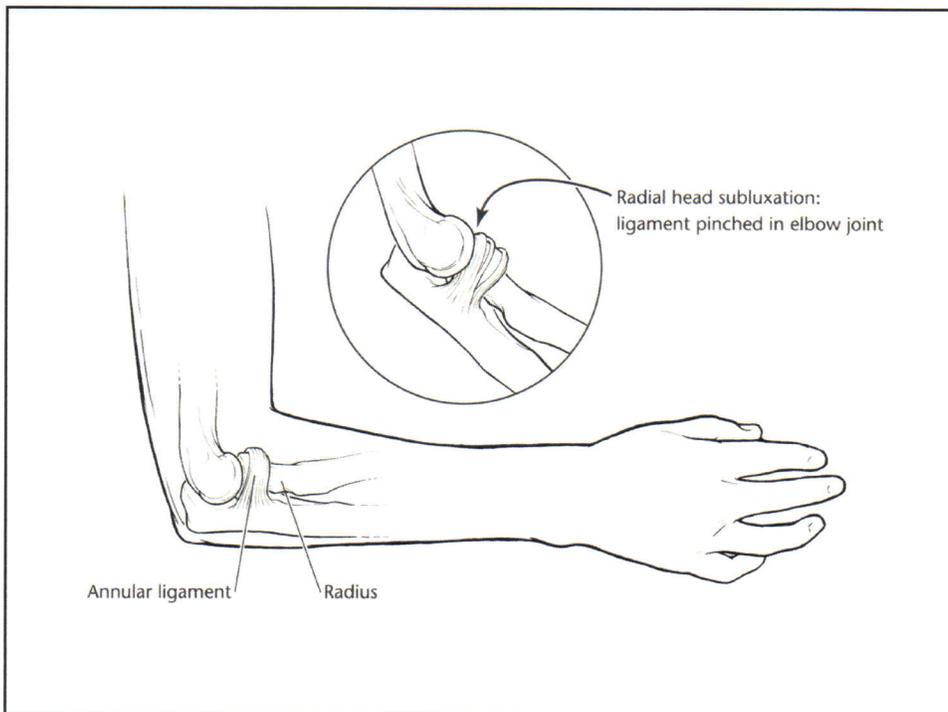
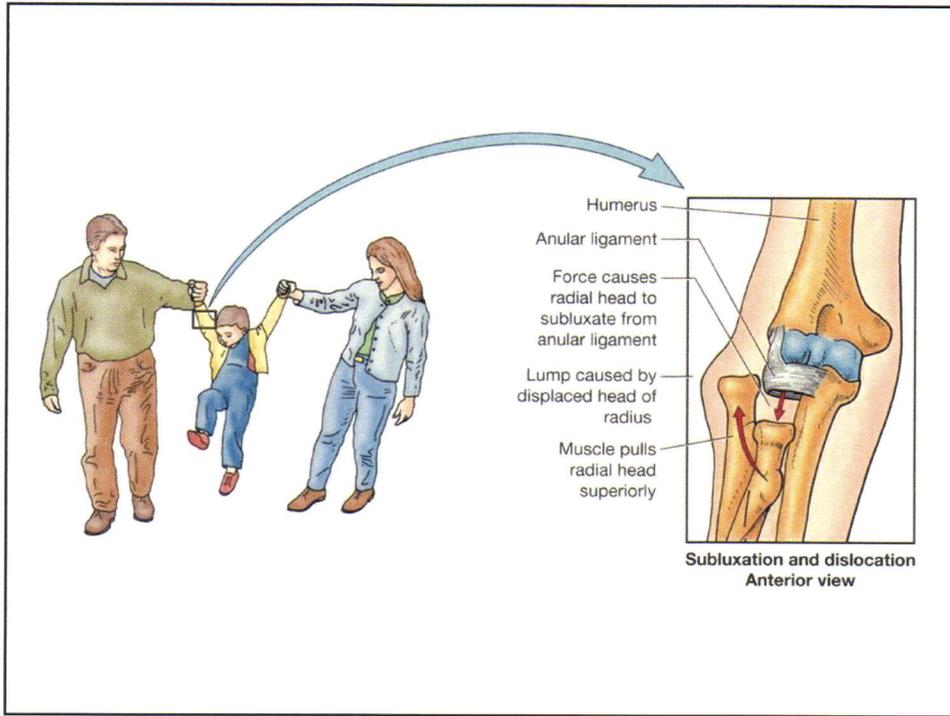
- AKA "Pulled Elbow" or radial head subluxation
- Typically occurs between 1-4 years of age
- Often accidental in walking children
 - Caregiver tries to prevent a fall by jerking the child up by the arm

Nursemaid's Elbow

- Results in a partial separation of the joint allowing a portion of the ligament to become trapped
- Can result in a total dislocation of the joint
- May recur due to increased laxity of the joint after the first event

Nursemaid's Elbow

- Symptoms:
 - Pain on manipulation of arm
 - Child will hold arm straight at their side and won't reach for things



Nursemaid's Elbow

- Causes in infants
 - Forcefully lifting a baby by their arm (excessive force, not routine care)
 - Sudden jerking of a baby's arm
 - Dropping and catching (history is often at presentation)

Evaluation of a Sentinel Injury

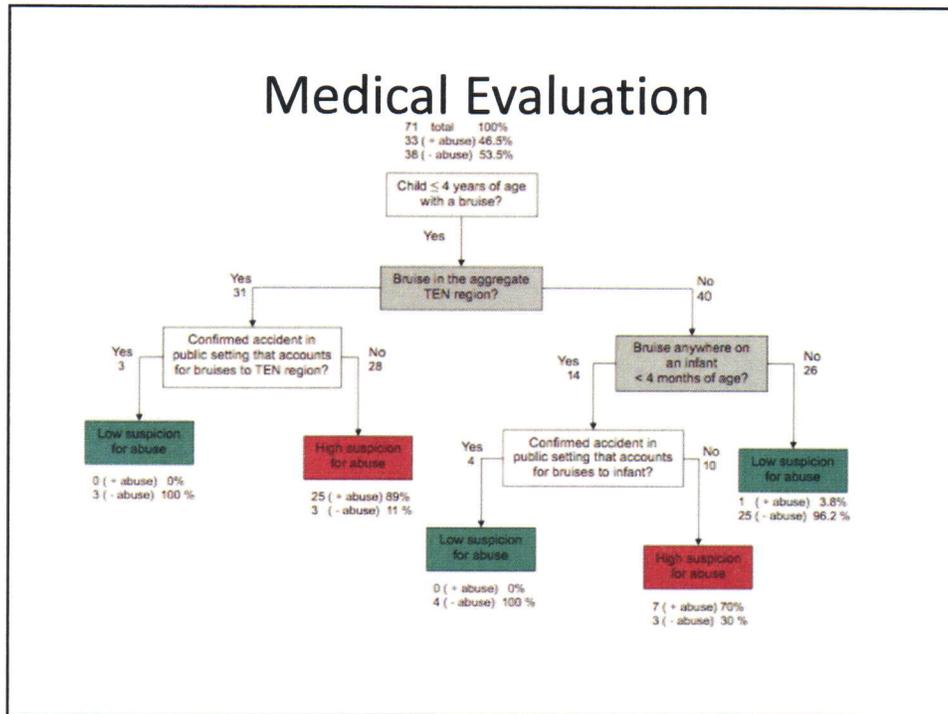
- Trauma history
 - Detailed report of events
 - Accidental injuries often have the trauma history as part of the presentation, not a complete "I don't know what happened"
 - Detailed documentation of who gives the history and who cares for the child

Medical Evaluation

- A complete physical exam is an absolute MUST
 - Complete, head to toe including diaper area skin exam
 - Frenula
 - Hands and feet
 - Eyes
 - Ears

Medical Evaluation

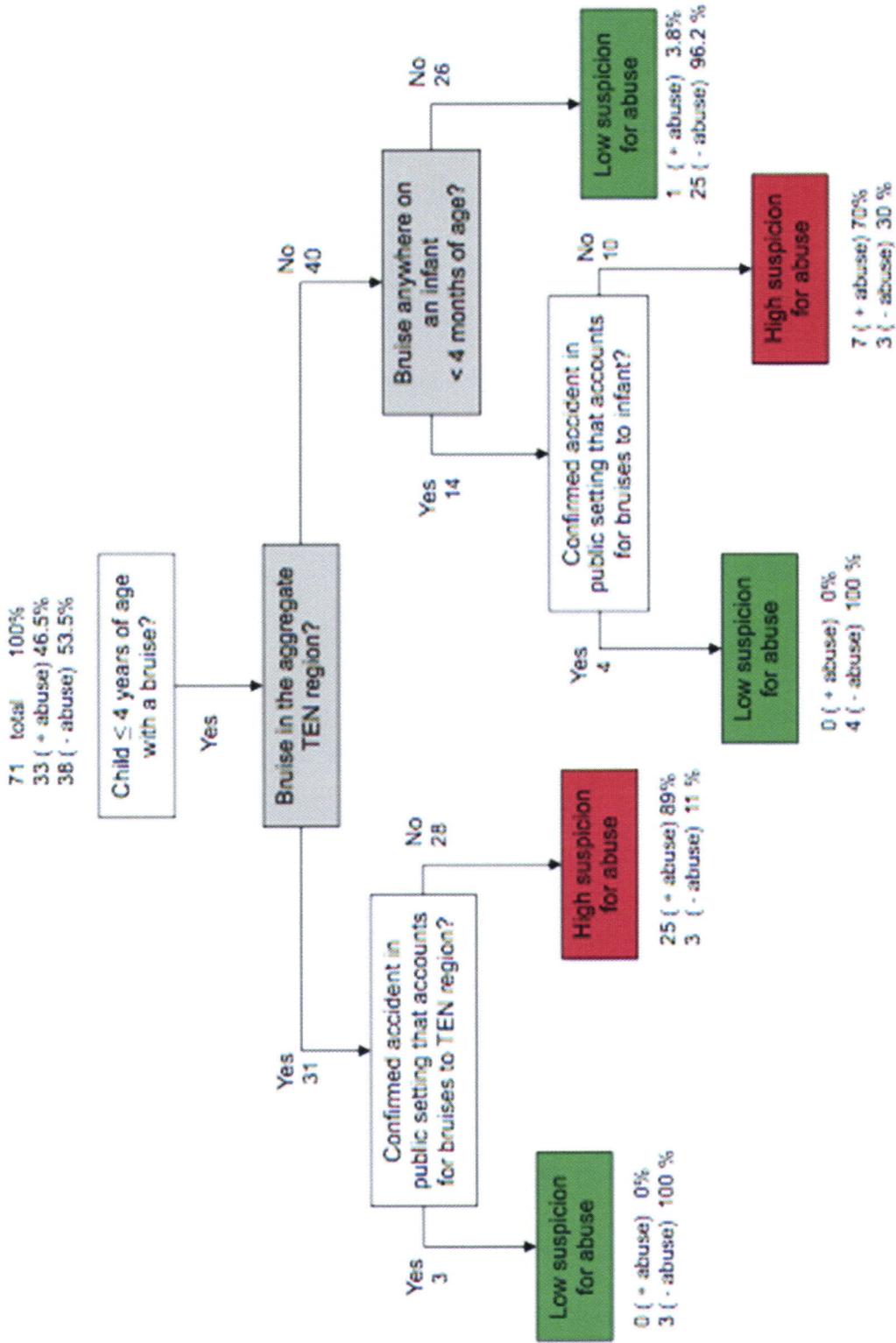
- Head CT if child is less than <6m or has neuro symptoms
- Skeletal survey if less than 2y
- Repeat skeletal survey in 2 weeks
- Lab studies for abdominal injuries



Documentation

- Documentation of everything
 - History
 - Physical
 - Labs
 - Radiology studies

Medical Evaluation



Documentation

- Pictures are crucial
 - Many of these injuries evolve or resolve rapidly
 - It is difficult or impossible for us to interpret verbal or written descriptions of injuries
 - Make the photo count! Don't send blurry or out of context pictures
 - Use a size standard

Drawing Conclusions

- Even if there are absolutely NO other findings besides the sentinel injury, the sentinel injury in and of itself is our warning
- Failing to heed the warning:
 - “Return of this child to the hands of the caregiver who caused these injuries may result in further injury or death”

Protecting Children

- If there is “only” a sentinel injury, the family may actually benefit from help before things escalate
- Maintaining engagement is important
- Recognizing what the trigger was is critical
- Developing respite plans with families can be helpful

Summary

- Sentinel injuries in infants include
 - Bruising
 - Petechiae
 - Oral injuries
 - Eye injuries
 - Ear injuries
 - Nursemaid’s elbow

Summary

- Sentinel injuries can be challenging to recognize as abuse because they don't seem "that serious"
- Research has shown that they are very serious for what they portend: the potential for further abuse and possibly death

Questions?

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