Universal Screening for Non-Accidental Trauma in the Emergency Department

July 15, 2022

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Objectives

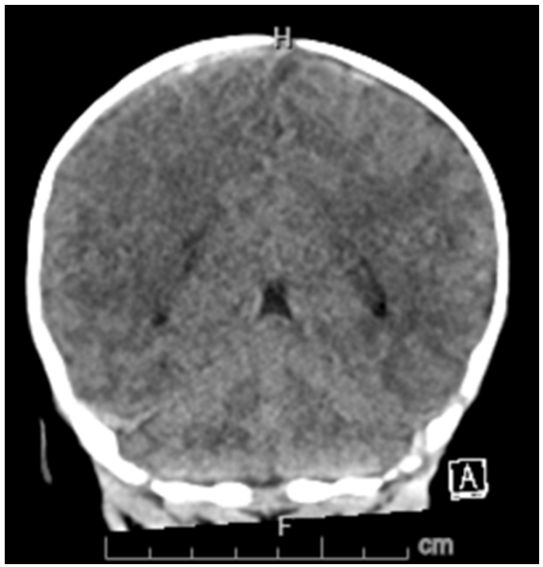
- Review epidemiology of child abuse in young children
- Review the evidence that supports ED screening with emphasis on the Bruising Clinical Decision Rules
- Discuss why 'Universal' is so important in evaluation of Child Abuse
- Review our QI process and how we leveraged the EMR

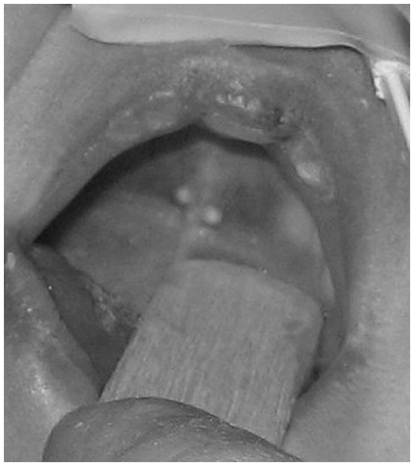
COI

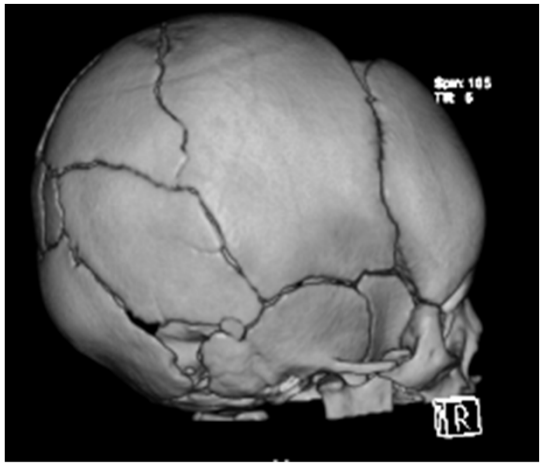
No conflicts to disclose

Case 1

- Jan 7th 2021
- MS 31 day old with 1 episode of bright red spit up
- Subconjunctival hemorrhage since birth by history
- Erythematous non-ulcerative lesion on the palate
- Thought to be ruptured Ebstein's Pearl







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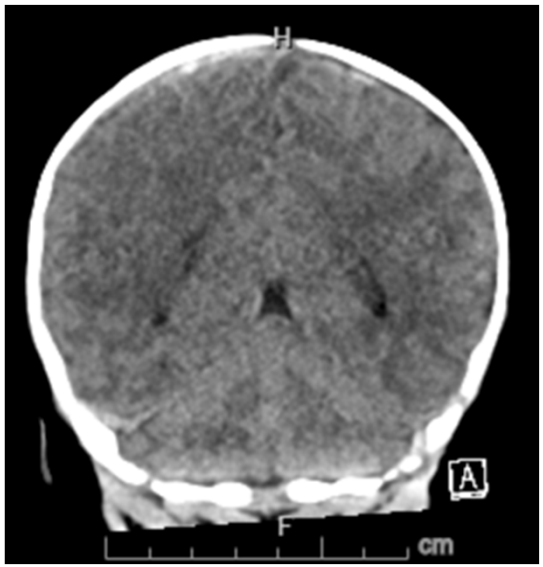
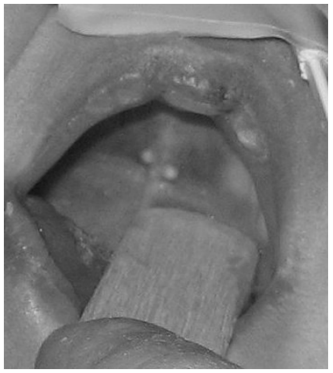
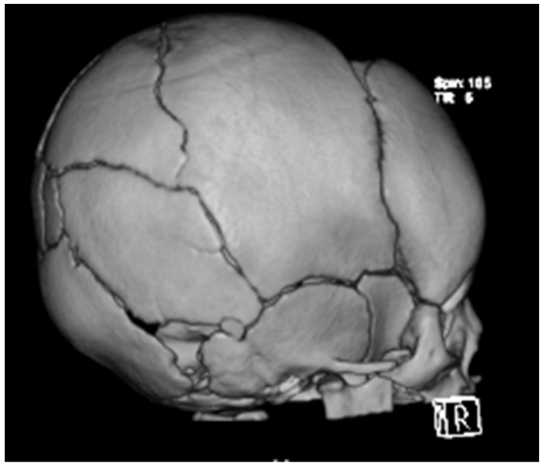
Case 1

- Jan 26th 2021
- 55 day old via EMS for bilateral eye bruising, bleeding from nose
- Patient was with FOC through the day and when MOC got him back he was more tired and fussy.
- CT head R parietal bone fracture, multifocal bilateral extra-axial hemorrhage
- Skeletal Survey- metaphyseal corner fractures R & L femur, R & L tibia, biparietal skull fractures.







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Global Epidemiology

Key facts

- Nearly 3 in 4 children - or 300 million children - aged 2–4 years regularly suffer physical punishment and/or psychological violence at the hands of parents and caregivers
- A child who is abused is more likely to abuse others as an adult so that violence is passed down from one generation to the next. It is therefore critical to break this cycle of violence, and in so doing create positive multi-generational impacts.
- Preventing child maltreatment before it starts is possible and requires a multisectoral approach.
- Effective prevention approaches include supporting parents and teaching positive parenting skills, and enhancing laws to prohibit violent punishment.

World Health Organization Child Maltreatment, June 2020
https://www.who.int/news-room/fact-sheets/detail/child-maltreatment

U.S. Epidemiology

Rate of abuse

Estimated 678,000 unique victims of child abuse and neglect in 2018
9.2 victims per 1,000 child population

Deaths

1,770 children died from abuse and neglect in 2018
2.39/100,000 children
57% male, 42% female

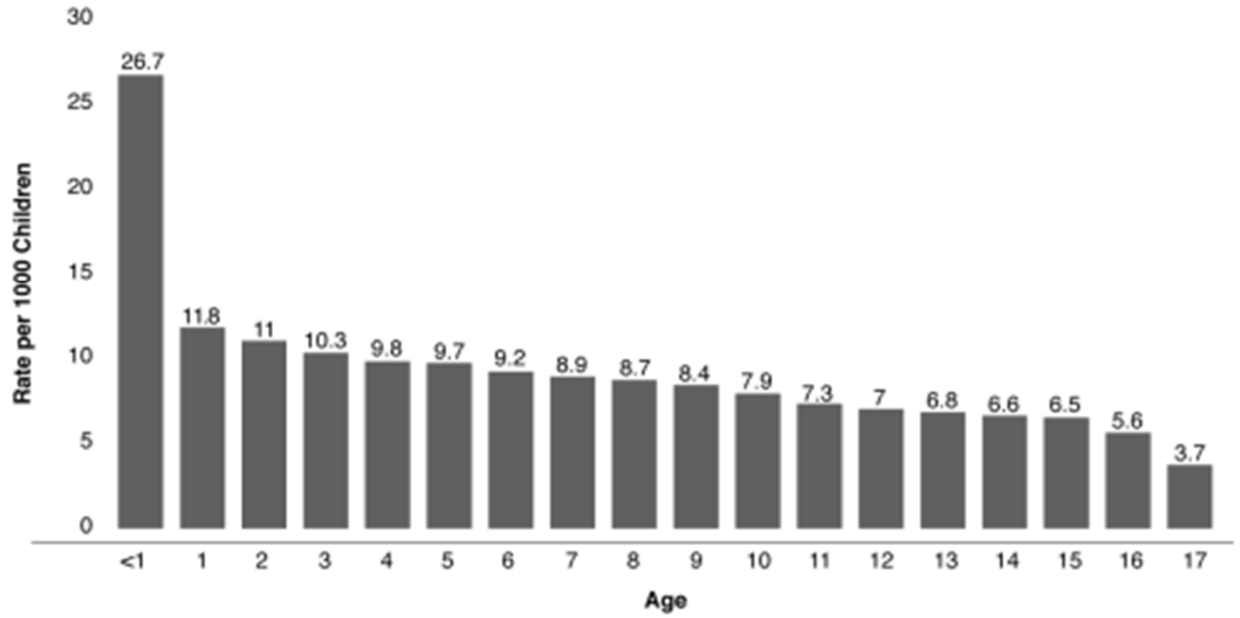
Over 80% of perpetrators are family members.
All ethnicities represented

U.S Dept of Health and Human Services, Admin for Children and Families, Children's Bureau
https://www.acf.hhs.gov/sites/default/files/documents/cb/cm2018.pdf

U.S. Epidemiology

Exhibit 3–D Victims by Age, 2018

The youngest children were the most vulnerable to maltreatment



Based on data from 52 states. See table 3–5. Percentages do not sum to 100.0 due to rounding.

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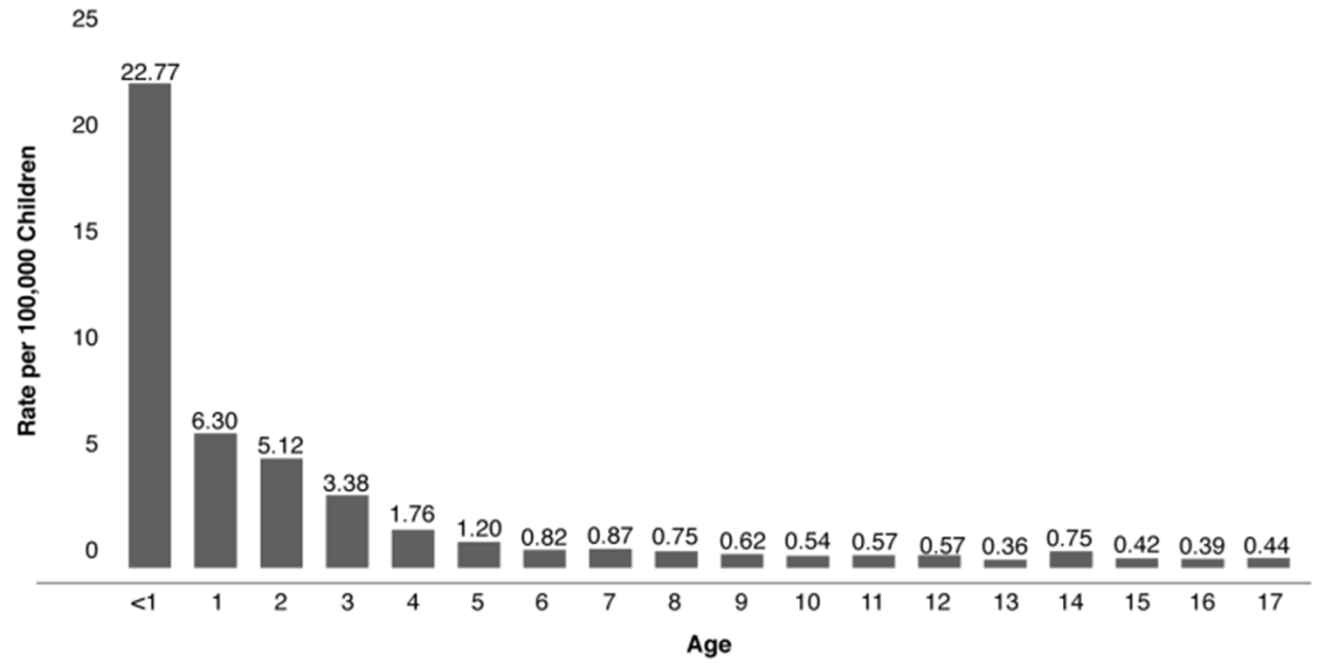
U.S Dept of Health and Human Services, Admin for Children and Families, Children's Bureau
https://www.acf.hhs.gov/sites/default/files/documents/cb/cm2018.pdf

U.S. Epidemiology

Exhibit 4–B Child Fatality by Age, 2018

Children <1 year old died from abuse and neglect at 3.6 times the rate of children who were 1 year old.



Based on data from 44 states. See table 4–3

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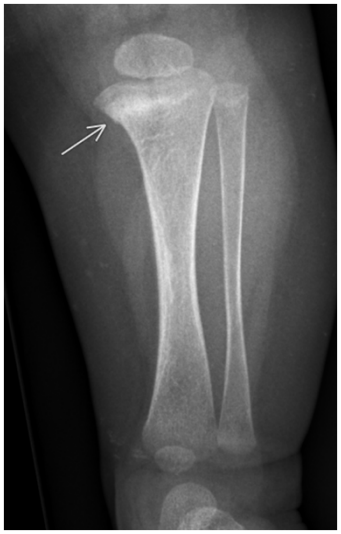
U.S Dept of Health and Human Services, Admin for Children and Families, Children's Bureau
https://www.acf.hhs.gov/sites/default/files/documents/cb/cm2018.pdf

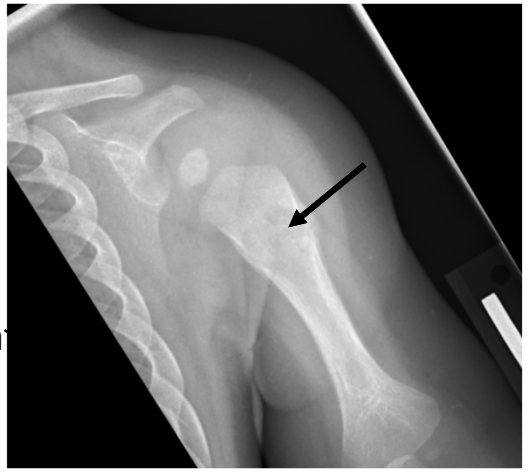
Financial Cost of Abusive Head Trauma

- The estimated 4,824 incidents of AHT cases in 2010 had an estimated lifetime cost of
  - $13.5 billion
    - $257 million for medical care
    - $552 million for special education
    - $322 million for child protective services/criminal justice
    - $2.0 billion for lost work
    - $10.3 billion for lost quality of life
- Discounted lifetime cost of abusive head trauma 5.7 million for a death, 2.6 million for survivor.

  - Lifetime Cost of Abusive Head Trauma at Ages 0-4, USA
    - Miller et al. Prevention Science 2017



Case 2

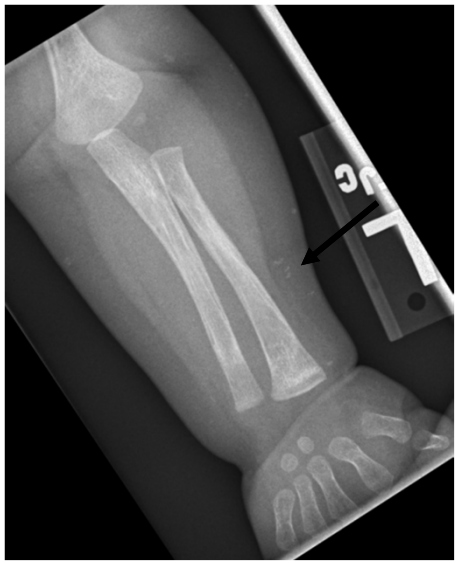


3/31/2020

- 5 month old male with thrush being treated with Nystatin presen for evaluation of mouth lesion.
- Seen by APP, PEM and pediatric ENT.
- Discussion of but overall very low concern for NAT
- Had follow up with PCP on 4/2 and 4/7.

4/7/2020

- At PCP follow up found to have concerning bruising and sent to ED for further eval.
- Eval showed normal head CT, L proximal humerus fracture, healing distal R radius fracture, L tibia healing fracture, L 3rd rib fracture.



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Understanding ‘Missed Opportunities’

- Abusive head trauma (AHT) is the leading cause of death from child abuse and causes lifelong consequences in survivors.

- A number of studies have shown that a significant proportion of children with AHT have had a prior visit to a healthcare provider with a missed opportunity to recognize abuse.

Missed Opportunities- AHT

- Jenny et al. JAMA 1999. Analysis of Missed cases of Abusive head Trauma.
  - 173 abused children with abusive head trauma
  - 54 cases (31.2%) had a prior 'miss' opportunity where they were seen by a medical provider and with signs or symptoms that were suggestive of abuse (in retrospect)..
  - Of the missed cases more often in white children than minorities.
  - Of the missed cases more often in families where both parents lived in the house.

  - Unclear how many were in ED's or PED's

Missed Opportunities- AHT

- Letson et al, Child Abuse and Neglect 2016. Prior Opportunities to identify abuse in children with abusive head trauma.
  - 2 ½ years of all Abusive Head Traumas at Nationwide, Cincinnati Childrens and Seattle Children's.
  - 232 patients with a 10% mortality.
  - 59 children (25%) found to have 98 prior opportunities in a medical setting.
  - 41% of the prior opportunities occurred in an Emergency Department general or adult.
  - Specifics of how many were general vs pediatric centers is not known (personal communication with the author)

Missed Opportunities- Severe skeletal injuries

- Thorpe et al, Pediatric Emergency Care 2014. Missed Opportunities to Diagnose Child Physical Abuse.
  - 7 years of data at Children's Hospital of Pittsburgh
  - 100 patients with healing fractures on skeletal survey and an ultimate diagnosis of abuse.
  - 25 patients (32%) were found to have missed opportunities at previous visits
  - 86% had head CT's of which 52% had bleeds, fractures or both
  - Of the previous visit with a missed opportunity 17% were at a dedicated Pediatric ED.

Why Universal for all things NAT?

- Rangel, E et al. Journal of Pediatric Surgery 2009. Eliminating disparity in evaluation for abuse in infants with head injury: use of a screening guideline.
- Implemented standard skeletal survey for infants under 12 months with unwitnessed head injury (fx or ICI)
  - Pre-guideline implementation (2003-2006, N=208)
    - 69.3% white and 90.5% African American (p=0.01) underwent skeletal survey
    - 20% of all infants screened found to be probable NAT
  - Post-guideline implementation (2007-2008, N=52)
    - 92.3% white and 84.6% African American (p=1.00) underwent skeletal survey
    - 22% of all infants screened found to be probable NAT
- Small population but does demonstrate success of a hospital policy to decrease an observed disparity in care

Can anything be done?

- Is there a way to recognize the patients at that previous visit?
- Are there less severe injuries that point to abuse that could be used to find these patients early?

Bruising Clinical Decision Rules

"**Bruising** is the most common injury from child physical abuse and the most common injury to be overlooked or misdiagnosed as non-abusive before an abuse-related fatality or near-fatality in a young child."

"Several studies identified bruises as the preceding injury to abusive head trauma."

"Failure to recognize bruising caused by physical child abuse is a **missed opportunity** and an error in medical decision-making that contributes directly to poor patient outcomes."

"Published evidence confirms that measurable differences exist between bruising from non-abusive and abusive injury in infants and young children."

JAMA Network Open. 2021;4(4):e215832. doi:10.1001/jamanetworkopen.2021.5832

Bruising Clinical Decision Rules

- Pediatrics 2010
- Development of a bruising clinical decision rule that has a high prediction for NAT.
- TEN-4
  - Bruising on the torso, ear, or neck for a child ≤4 years of age
  - Bruising in any region for an infant <4 months of age.
- Sensitivity of 97%
- Specificity of 84% for predicting abuse.

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Bruising Characteristics Discriminating Physical Child Abuse From Accidental Trauma

Mary Clyde Pierce, MD; Kim Kaczor, MS; Sara Aldridge, MSN, ARNP; Justine O'Flynn, RN; Douglas J. Lorenz, MA, MSPH

Address correspondence to Mary Clyde Pierce, MD, Northwestern University Feinberg School of Medicine, Department of Pediatrics, and Children's Memorial Hospital, 2300 Children's Plaza, Box 16, Chicago, IL 60614-3363. E-mail: mpierce@childrensmemorial.org

Pediatrics (2010) 125 (1): 67–74.
https://doi.org/10.1542/peds.2008-3632 **Article history**

Bruising Clinical Decision Rules

- Most recent update of the bruising clinical decision rule 2021

JAMA Network Open

Original Investigation | Pediatrics

Validation of a Clinical Decision Rule to Predict Abuse in Young Children Based on Bruising Characteristics

Mary Clyde Pierce, MD; Kim Kaczor, MS; Douglas J. Lorenz, PhD; Gina Bertocci, PhD; Amanda K. Fingarson, DO; Kathi Makoroff, MD, MEd; Rachel P. Berger, MD, MPH; Berkeley Bennett, MD, MS; Julia Magana, MD; Shannon Staley, MD; Veena Ramaiah, MD; Kristine Fortin, MD; Melissa Currie, MD; Bruce E. Herman, MD; Sandra Herr, MD; Kent P. Hymel, MD; Carole Jenny, MD, MBA; Karen Sheehan, MD, MPH; Noel Zuckerbraun, MD, MPH; Sheila Hickey, MSW, MJ; Gabriel Meyers, MSW; John M. Leventhal, MD

JAMA Network Open. 2021;4(4):e215832. doi:10.1001/jamanetworkopen.2021.5832

Bruising Clinical Decision Rules

- Update of the bruising clinical decision rule 2021
- TEN-4 is now the TEN-4-FACESp
  - Bruising to the Torso, Ears, Neck in a child less than 4 years old
  - Any bruise in a child less than 4.99 months
  - Injury to the Frenulum, Angle of the Jaw, Cheek, Ears, Sclera
  - Patterned bruises

Better Sensitivity and Acceptable specificity compared to the TEN-4, derived from much more robust data.

JAMA Network Open. 2021;4(4):e215832. doi:10.1001/jamanetworkopen.2021.5832

Can screening be done in the ED setting?

- The Netherlands introduced a universal screening in Emergency Departments using the "Escape Tool"

Is the history consistent?	Yes	No[a]
Was there unnecessary delay in seeking medical help?	Yes[a]	No
Does the onset of the injury fit with the developmental level of the child?	Yes/NA	No[a]
Is the behavior of the child/the carers and the interaction appropriate?	Yes	No[a]
Are the findings of the top-to-toe examination in accordance with the history?	Yes	No[a]
Are there any other signals that make you doubt the safety of the child or other family members?[SEP]*If 'Yes' describe the signals in the box 'Other comments' below.	Yes*,[a]	No
Other comments		

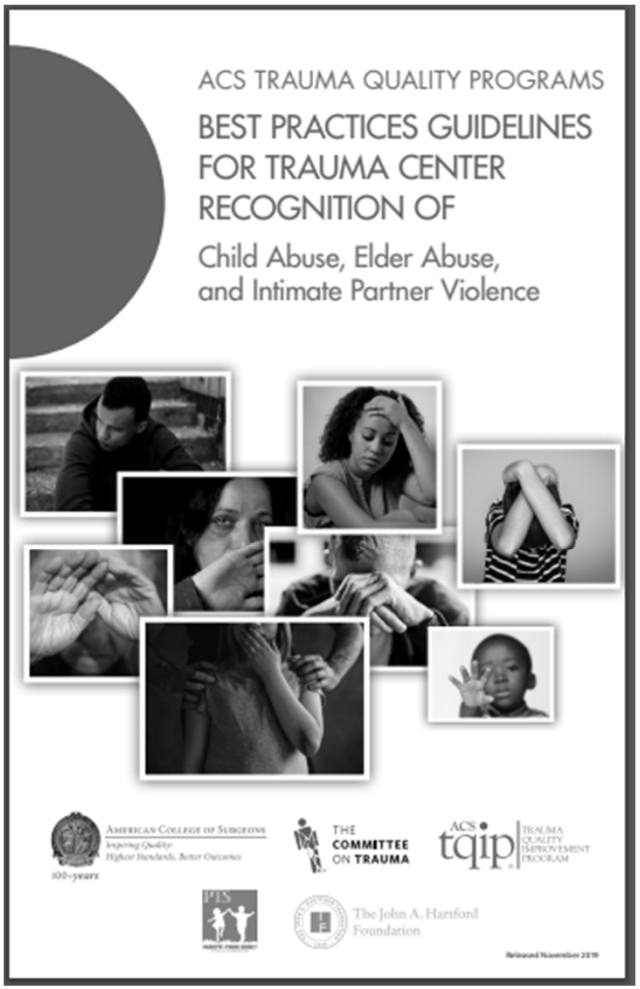
Louwers EC, Korfage IJ, Affourtit, MJ, et al. Effects of systematic screening and detection of child abuse in emergency departments. Pediatrics 2012;130:457-464.

Netherlands implementing the Escape Tool

- Over 104,000 children screened in 7 ED's over 23 months.
- Screening rate for child abuse significantly increased

  Sharp increase after legal requirement for screening in all ED's.
- Detection rate of suspected abuse was about 5 times higher in children who were screened than in those not screened for abuse.

Louwers EC, Korfage IJ, Affourtit, MJ, et al. Effects of systematic screening and detection of child abuse in emergency departments. Pediatrics 2012;130:457-464.



- Implement a standardized tool to screen for child physical abuse at all designated trauma centers and trauma hospitals.

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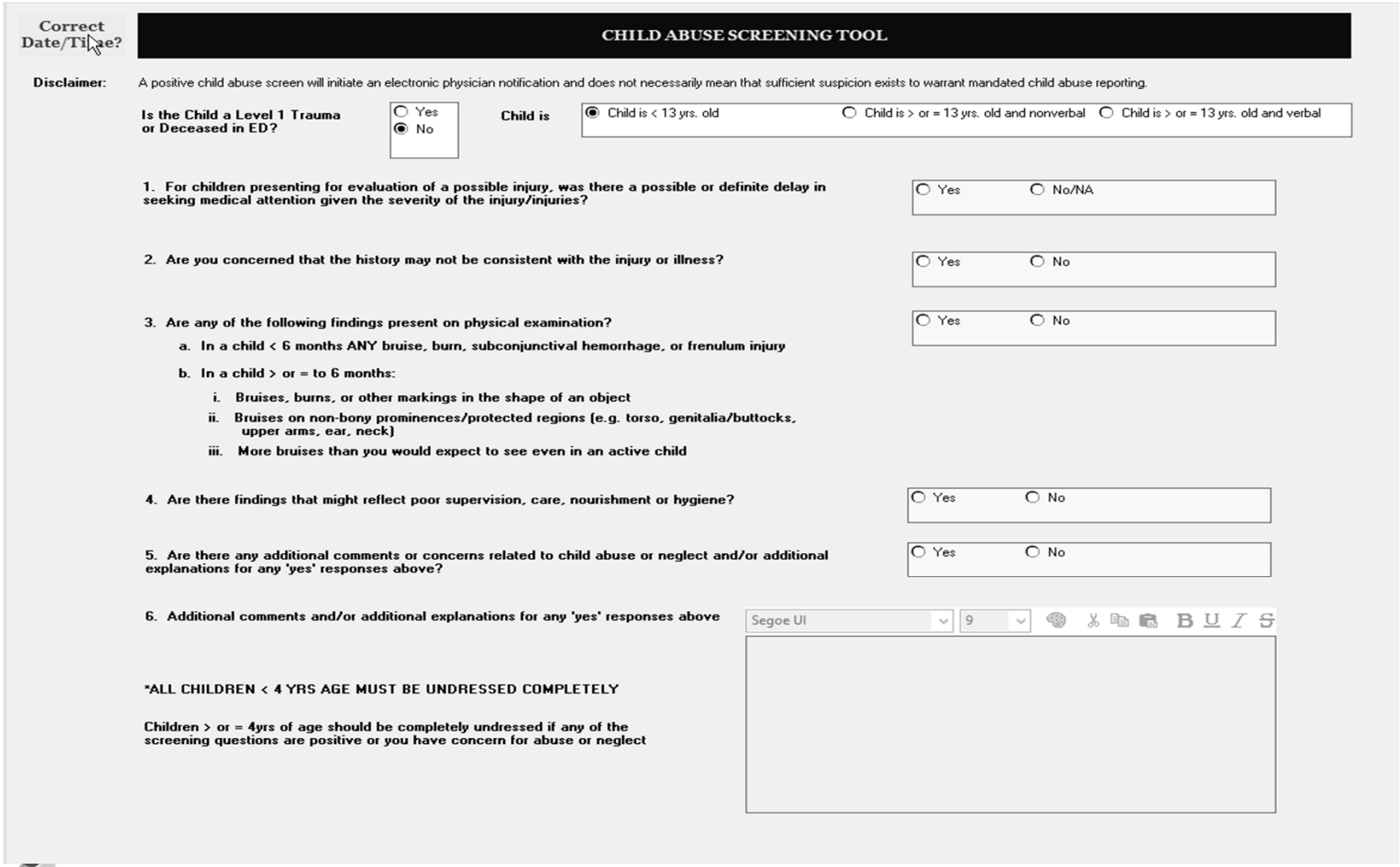

Correct Date/Time?

CHILD ABUSE SCREENING TOOL

Disclaimer: A positive child abuse screen will initiate an electronic physician notification and does not necessarily mean that sufficient suspicion exists to warrant mandated child abuse reporting.

Is the Child a Level 1 Trauma or Deceased in ED? ○ Yes ◉ No

Child is ◉ Child is < 13 yrs. old ○ Child is > or = 13 yrs. old and nonverbal ○ Child is > or = 13 yrs. old and verbal

1. For children presenting for evaluation of a possible injury, was there a possible or definite delay in seeking medical attention given the severity of the injury/injuries? ○ Yes ○ No/NA

2. Are you concerned that the history may not be consistent with the injury or illness? ○ Yes ○ No

3. Are any of the following findings present on physical examination? ○ Yes ○ No
   a. In a child < 6 months ANY bruise, burn, subconjunctival hemorrhage, or frenulum injury
   b. In a child > or = to 6 months:
      i. Bruises, burns, or other markings in the shape of an object
      ii. Bruises on non-bony prominences/protected regions (e.g. torso, genitalia/buttocks, upper arms, ear, neck)
      iii. More bruises than you would expect to see even in an active child

4. Are there findings that might reflect poor supervision, care, nourishment or hygiene? ○ Yes ○ No

5. Are there any additional comments or concerns related to child abuse or neglect and/or additional explanations for any 'yes' responses above? ○ Yes ○ No

6. Additional comments and/or additional explanations for any 'yes' responses above

Segoe UI 9

*ALL CHILDREN < 4 YRS AGE MUST BE UNDRESSED COMPLETELY

Children > or = 4yrs of age should be completely undressed if any of the screening questions are positive or you have concern for abuse or neglect

- **Tool used at Children's Hospital of Pittsburgh**

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What other tools are being used?

- Tool used throughout the UC Health System

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Other triggers used in EMR's to alert team to possible abuse

ED Assessment Form v2: Focused assessment of complaint; Chief complaint/RN	Any of the following words in a CC or focused assessment for a child <12 months of age: *assault*, *abuse*, *bruis*, *burn*, *not moving*, *fracture*, *fx*, *broke*, *injury*, *sprain*, *deformity*, *subconjunctival hemorrhage*, *petechiae*, *arrest*, *hematom*, *ecc*, *echy*, OR *contus*	<1 y (<6 mo for "injury")	Do not trigger if trigger word is preceded by *denie*, *no*, or *not*; if *Burn* is preceded by *Dr*; if *cord* precedes *fall* or *fell*; if *broke* is followed by *out*, *English*, or *or*; if *fever* precedes *broke*
ED Assessment Form v2: Chief complaint; focused assessment/RN	Any of the following words in a child <6 months of age: "fall," "fell"	<6 mo	Do not trigger if *Fall* or *Fell* is followed by *asleep* do not trigger on *fallot*

They additionally have triggers based on imaging ordered by age and certain discharge diagnoses.

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Journal of the American Medical Informatics Association, 26(10), 2019, 1020–1029 doi: 10.1093/jamia/ocz069
Advance Access Publication Date: 14 June 2019

Our QI Project and Universal Screening

- Institute a Universal NAT Screen as part of triage
  - Challenges
    - Is this needed at a tertiary/ quaternary care Children's Hospital?
    - Is this added clicks to the EMR without benefit?
    - Are nurses trained to do this?
    - What are the medico-legal risks of this tool?
    - Does missing abuse put the nurses at risk?
    - Effects on ED flow?
- Multidisciplinary team
  - ED (RN/ providers), CPT, Trauma, EMR, Risk
- Goal- implementation
  - Outcomes of infrequent- prevented outcomes are very difficult

Our QI Project and Universal Screening

- Screening Tool

  Nursing screening tool as part of secondary assessment for all children < age 5.

  Concerning screen triggers a 1:1 conversation with the provider and a BPA to both nurse and provider

  All kids under 2 years are undressed for a full skin exam

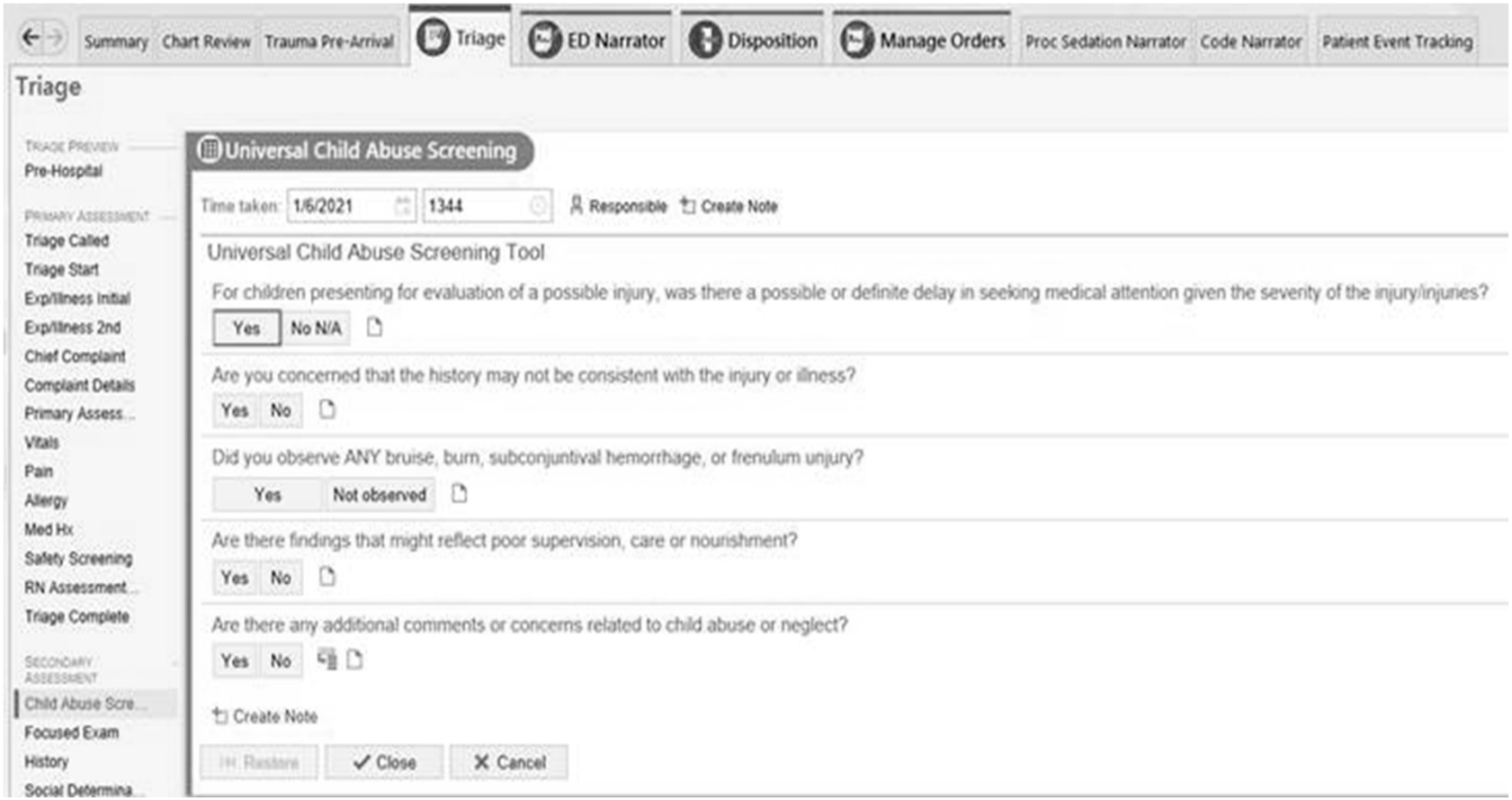
  Provider does a full skin exam and screen for sentinel injuries and documents

- Data Collection

  In addition to % of eligible patients screened, % positive, robust data collection includes race/ payor and zip code

- Provider and Nurse Surveys- REDCap

Nursing Triage Navigator <6 mos



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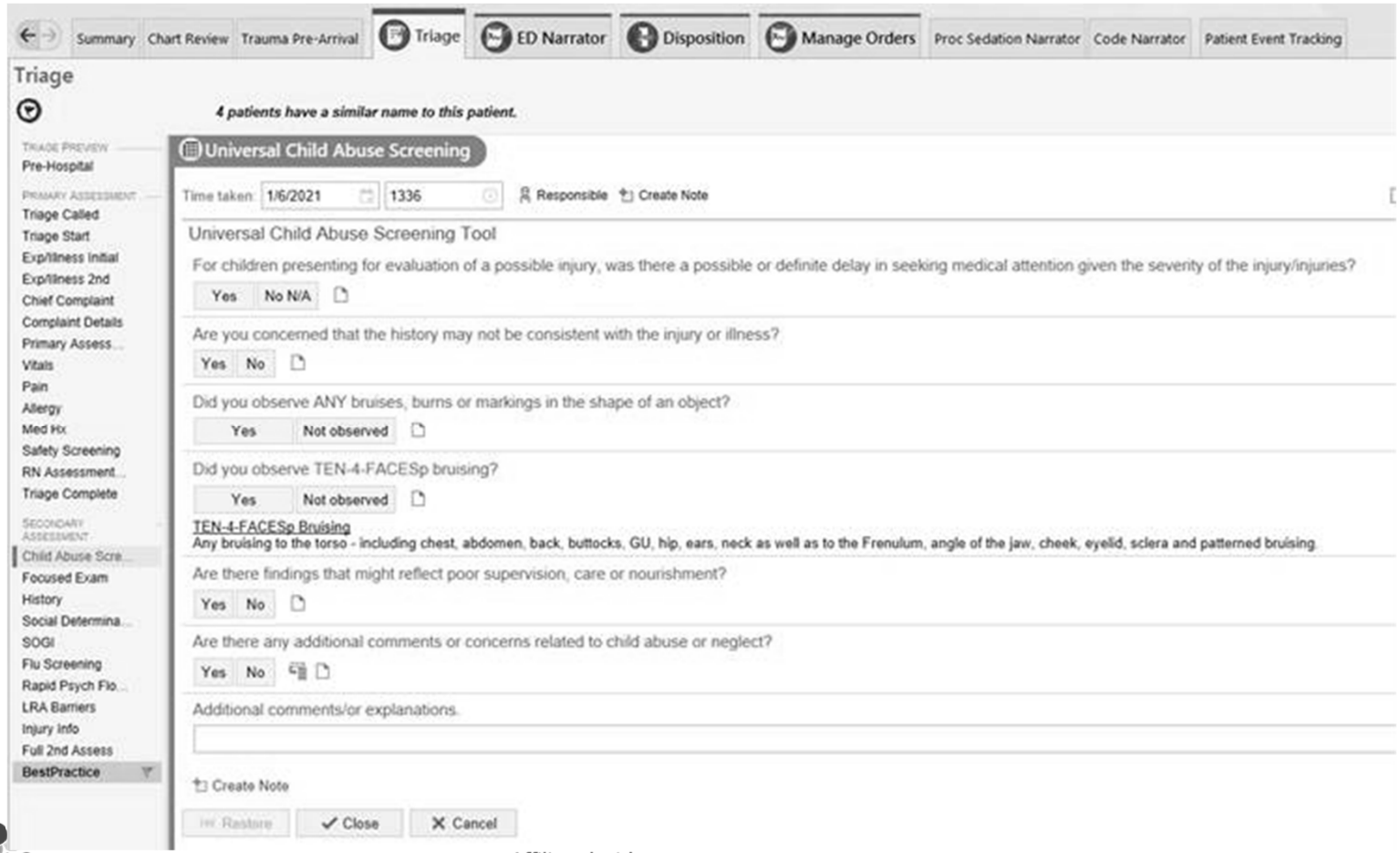
Nursing Triage Navigator 6 mos- 5 years



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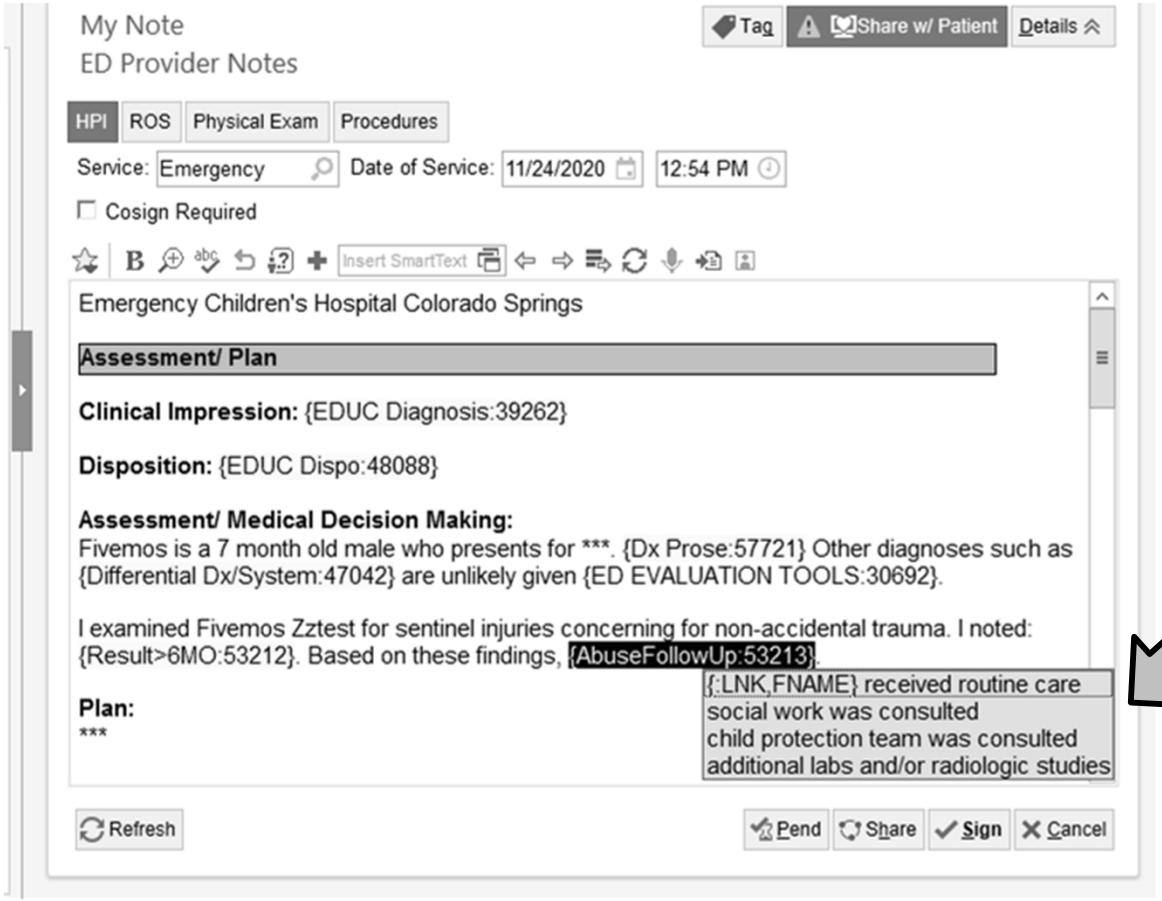
Provider Note with Screening for patients under age 2



Rolled Out Jan 27, 2021

- Educational Module for Nurses and EMT's Power Point Developed by CPT team
- Daily emails for the week leading up to rollout
- Huddle Board
- Badge Buddies
- Live support and treats and pinwheels

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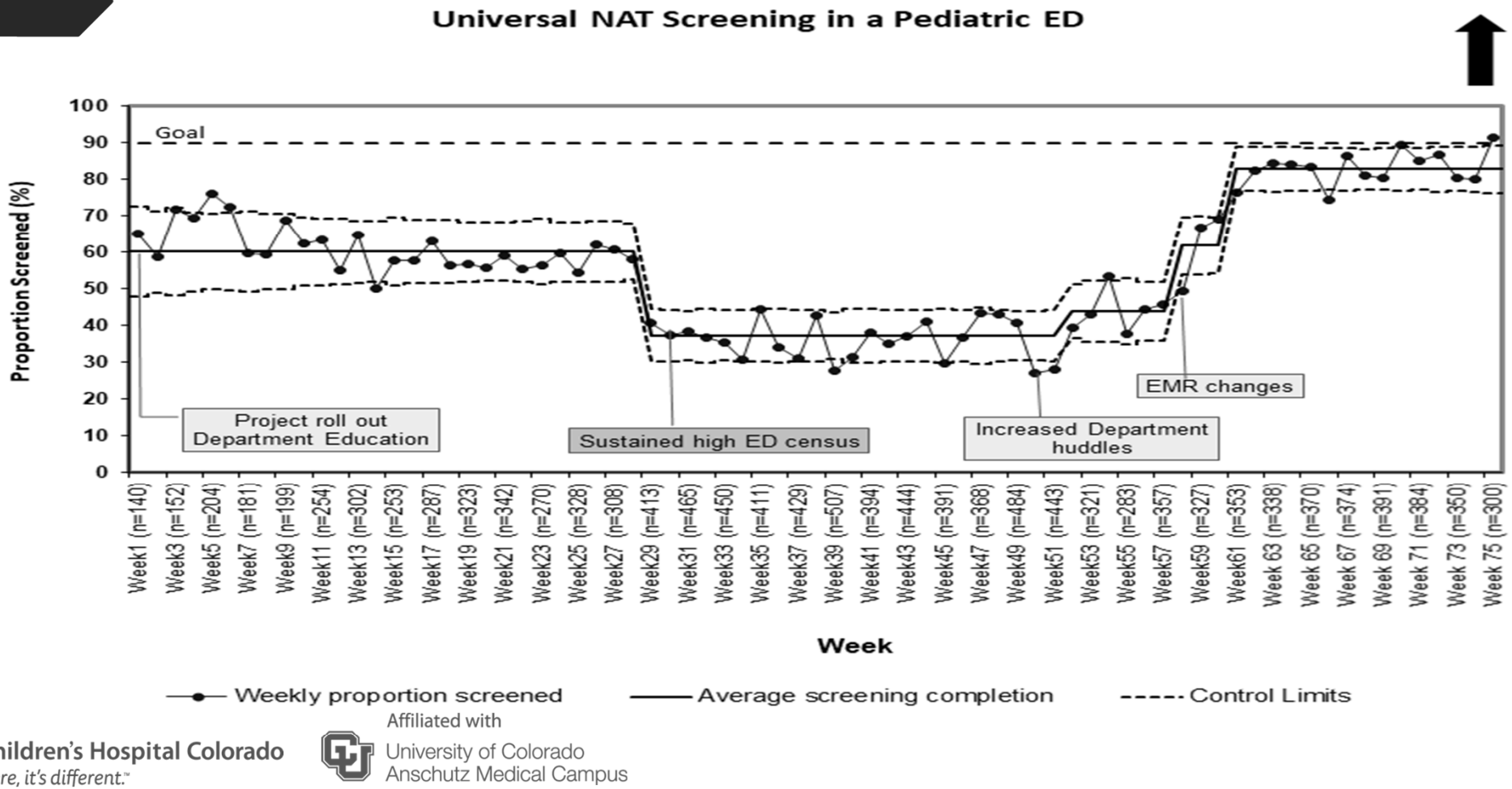
Run Chart



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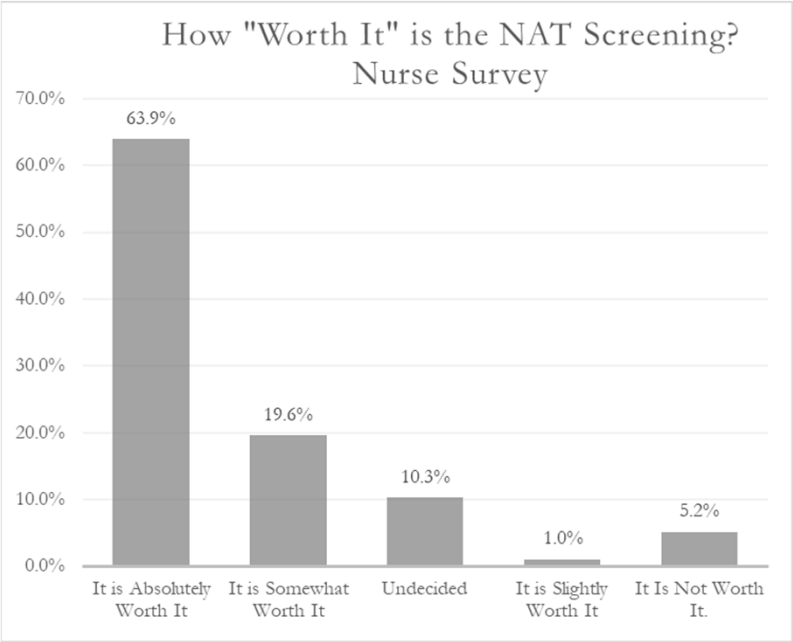
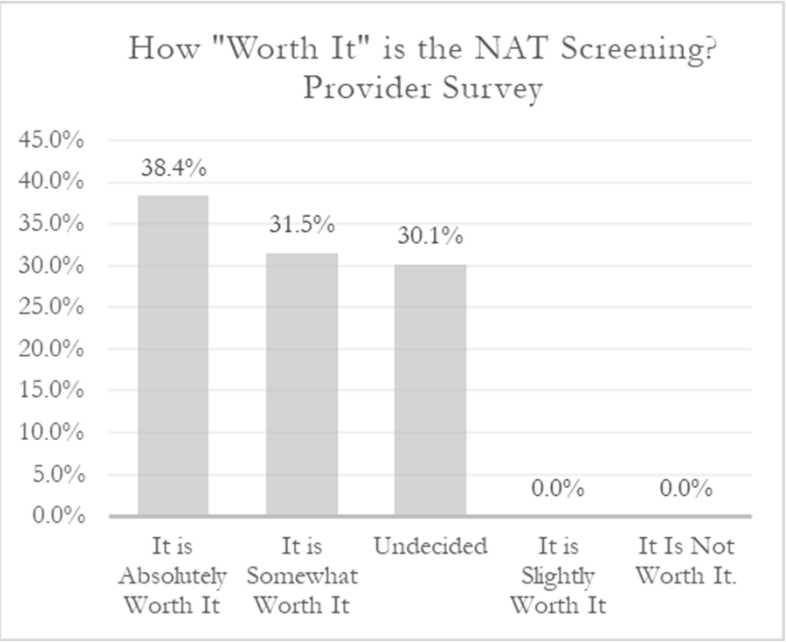
REDCap Surveys- Worth It?





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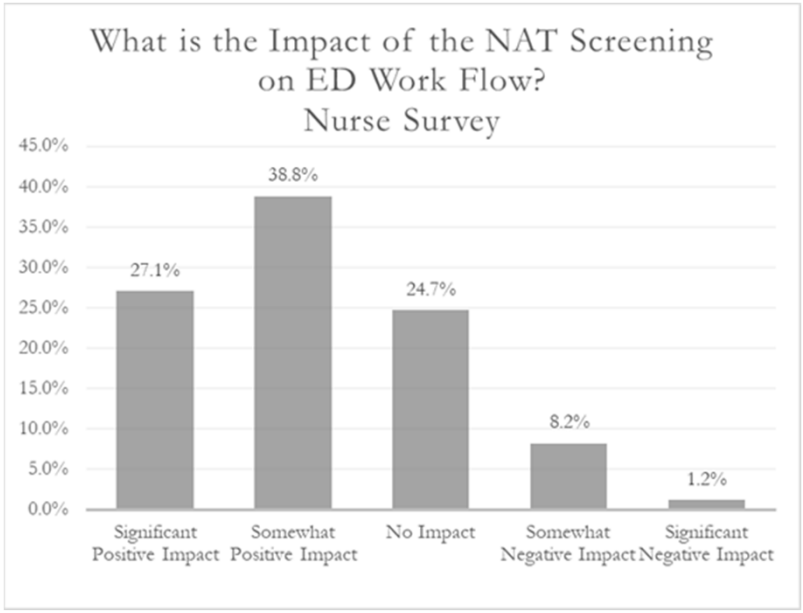
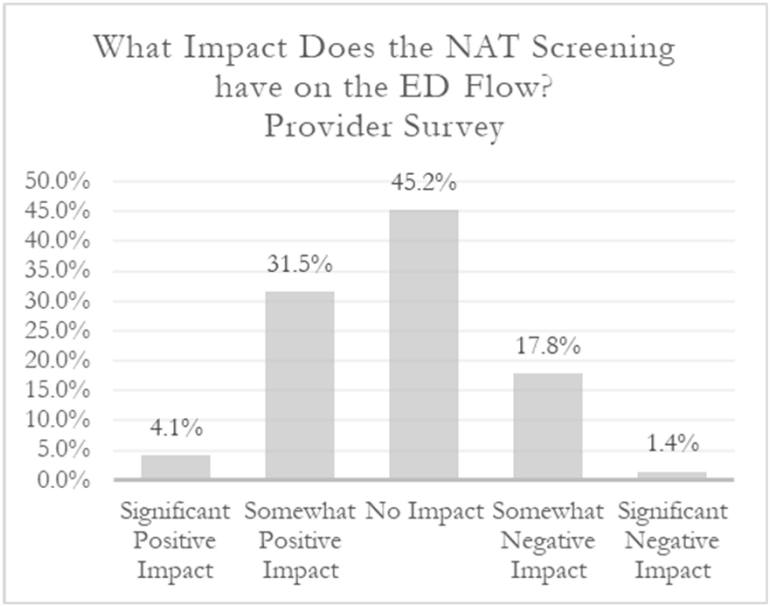
REDCap Surveys- Impact on flow?





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Summary

- Whatever setting you practice in keep a high suspicion for NAT
- Remember the opportunities not to be missed and the TEN-4-FACESp rule
- Universal screening and early intervention may help prevent severe abuse and abusive head trauma
- Universal screening can be successful, and staff has an overall favorable impression
- Employ QI tools and embrace feedback from frontline staff and PDSA

Thank You

- Kelly Beach, RN
- Rachel Berger, MD UPMC
- Dan Lindberg, MD CU Medicine
- Nichole Wallace, MD CPT CHCO
- IHQSE CHCO/ CU Med
- CHCO COS Nurses
- Trauma team (for making us do this)

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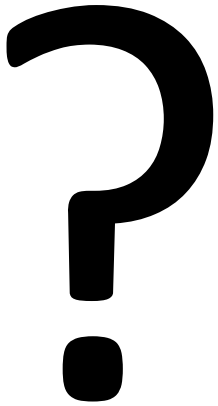

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