Maine Medical Center
Department of Emergency Medicine
Journal Club Summary – March 22, 2018

Date: 3/22/2018	**Presenter Name:** Christopher Allison, MD

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Lindberg et al – *Yield of Skeletal Survey by Age in Children Referred to Abuse Specialists,* The Journal of Pediatrics; Volume 164; Number 6; June 2014

Country(ies): United States

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Purpose

Research Question(s):
Among children referred to a child abuse specialist, how often are skeletal surveys obtained, stratified by age?
What are the rates of specific injury detection on these studies, and how does this vary between age groups?
How often were specific "features that may have prompted skeletal survey" (e.g. alerted mental status, clinical signs of fracture) present in skeletal surveys that identified new fractures?

Hypotheses: None stated.

Study Purpose:
To gather information on current practices on skeletal survey testing among age subdivisions of patients < 60 months, and to gather information on the yield skeletal survey. Also, to gather information on how well the "features that may have prompted skeletal survey" predict finding injuries on skeletal survey. This information allows hypothesis generation on the adequacy of current practices, and it could support a change in guidelines regarding which age groups of patients with suspected abuse should routinely have skeletal surveys performed.

Methods

Study Design: Retrospective secondary analysis of data prospectively gathered by the Examining Siblings To Recognize Child Abuse (ExSTRA) research network

Dependent Variable:

1. Incidence of skeletal surveys that detect fractures, subdivided by into acute vs. healing, and into specific fracture sites (long bone, rib, classical metaphyseal lesion, skull, hands/feet, other).

2. Presence of “altered mental status,” “radiographic evidence of non-skull fracture before skeletal survey,” and “clinical signs and symptoms related to all fractures identified by skeletal survey.”

Independent Variable:
Patient age, stratified by 6 month groups, from age 0 to 60 months.

Ethics Review:
IRB review – consent waved given analysis of existing data set, patient identifiers removed

Research Setting: United States – multicenter research network

Study Subjects: Children aged 0 – 60 referred to a child abuse physician

Inclusion Criteria: All children in the exSTRA database aged 0-60 months

Exclusion Criteria: None

Study Interventions: None

Study Groups: No intervention groups. Patients analyzed by age groups divided in 6 month intervals (eg. Age 0 -6 months, 6 - 12 months, etc.)

Instruments/Measures Used:

Data Collection:
Investigators in the data set coded “new injuries” on a skeletal survey as one not definitely known prior. A single investigator, blinded to the age of patients, reviewed charts with skeletal survey for the presence of “altered mental status,” “radiographic evidence of non-skull fracture before skeletal survey,” and “clinical signs and symptoms related to all fractures identified by skeletal survey.” 20% of charts were reviewed for the same by a second reviewer and assessed for interrater reliability.

Data Analysis:

***A priori* sample size calculation?** No. A retrospective power calculation was performed.

Statistical analyses used: Descriptive statistics for prevalence of skeletal survey and percentage with fractures identified. Cohen kappa for interrater reliability.

Adjustment for potential confounders? No

Results
Study participants: 2609 study subjects less than 60 months of age.
Brief answers to research questions *[key findings]:* 2036 (78%) of all subjects received a skeletal survey. 88% of subjects aged < 24 months received a survey, vs. 45.1% of aged 24 -60 months. 466 (23%) of all skeletal surveys identified a previously unknown fracture. Rates of identification new fracture were similar in ages 0 -24 mo (12.0%, 95%CI 9.2 -15.3) vs 24-36 mo (10.3%, 95%CI 7.2 – 14.2). Table II shows that rates of all identified fractures having signs on clinical exam increases with age. 70% of skeletal surveys with new fracture in ages 0-6 mo will have a fracture that did not have clinical signs present. Interrater reliability was good for presence of abnormal mental status or all fractures identified having clinical signs (kappa 0.87 and 0.78, respectively); only fair for non-skull fracture identified before survey (kappa 0.55).
Additional findings:
Limitations: Retrospective review. The findings in table 1 are likely reliable, given they rely on radiology reports with a goal of identifying all injuries. The findings in table 2 are highly dependent on provider documentation supportive of the three criteria: “altered mental status,” “radiographic evidence of non-skull fracture before skeletal survey,” and “clinical signs and symptoms related to all fractures identified by skeletal survey.” This is a subset of patient that had been referred to child abuse physician, implying a higher prevalence of fractures to be found on skeletal survey as compared to a broader ED population.

Clinical Implications
The current AAP guidelines currently state that skeletal survey is mandatory in children less than 2 years old with suspected physical abuse. Given the similar prevalence of fractures and same yield of skeletal survey in patients ages 24 – 36 months, it may be reasonable to extend this recommendation to all patients 3 years old or less. The rates of positive skeletal surveys revealing fractures that did not have clinical signs were at least 50% in most age groups, confirming the utility of this test. **Applicable?** Yes – I can’t recall a pediatric patient that I have been concerned enough about to order a skeletal survey on that I haven’t had referred to a child abuse physician. **Feasible?** This is a widely available diagnostic test.

Clinically relevant? Yes.

Comments:

Level of evidence generated from this study

- ☐ Ia: evidence obtained from meta-analysis of randomized controlled trials
- ☐ Ib: evidence obtained from at least one randomized controlled trial
- ☐ IIa: evidence obtained from at least one well-designed, controlled study without randomization
- ☐ IIb: evidence obtained from at least one other type of well-designed quasi-experimental study
- ☐ **III: evidence obtained from a well-designed, non-experimental study ←**
- ☐ IV: expert committee reports; expert opinion; case study; case report

Additional Comments/Discussion/Notes