

A Decade of Skeletal Surveys: What have we learned?

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A Decade of Skeletal Surveys: What have we learned?

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Introduction & Objectives

Introduction

- A skeletal survey (SS) is a series of radiographs of the entire body that is vital in revealing indications of occult* abusive fractures (healing or acute) in young children⁴
- Lehigh Valley Hospital mandates children 3 & under admitted to the trauma or burn services to undergo a SS

What the literature says;

- The prevalence of positive SSs* in children with burn injuries is estimated to be between 6% and 20%¹
- Intentional burns are becoming increasingly more common, occurring in about 40% of children with burn injuries¹
- Burn patients are more likely to be older and non-white compared to those with non-burn injuries²

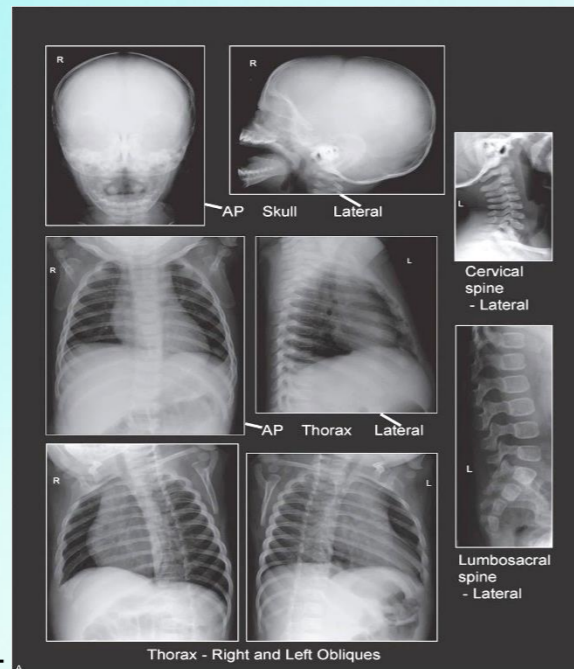
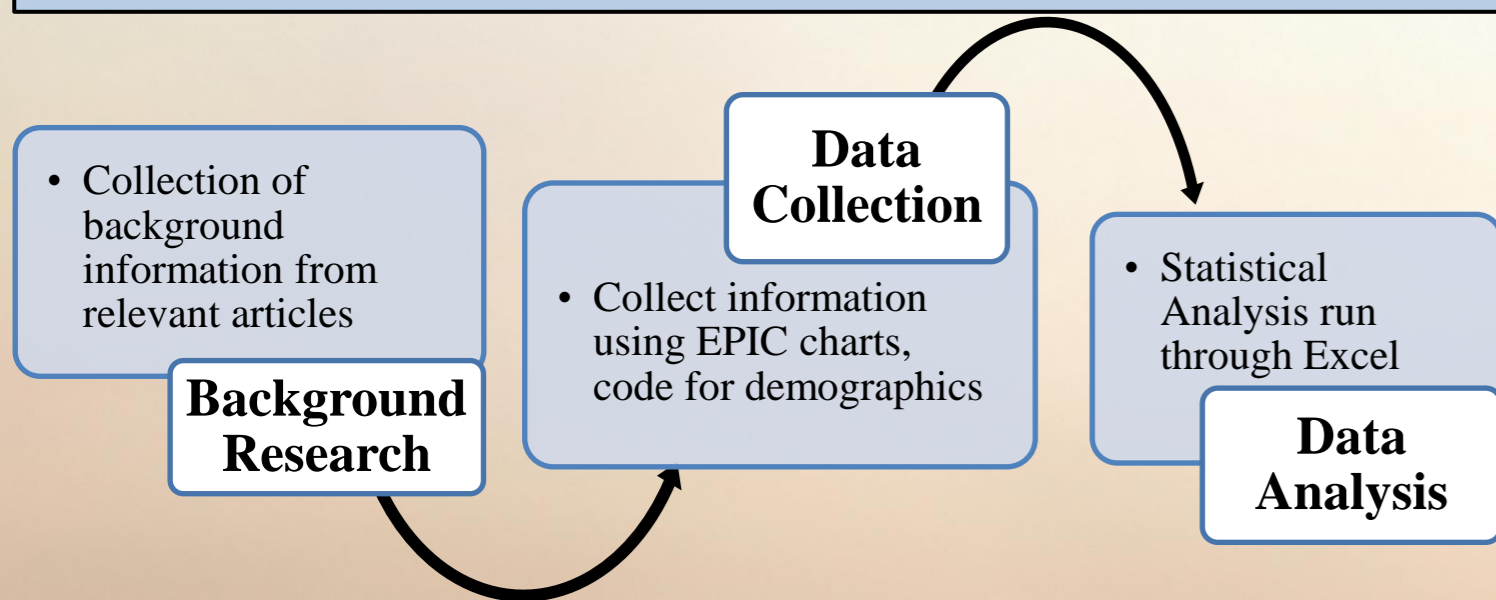


Image 1. Skeletal survey radiographs¹

Objectives

- Demonstrate the prevalence of positive SSs, and more specifically, what percentage of positive surveys come from the trauma service versus the burn service
- Demonstrate that 6%-20% is a high number of positive surveys in burn patients, and that the real prevalence is less
- Determine associated factors for probability of a positive survey or intentional burn, including race and insurance status
- Verify the usefulness of skeletal surveys in burn patients

Methods



Lehigh Valley Health Network, Allentown, Pennsylvania

Results

Overall Positive Skeletal Survey Results

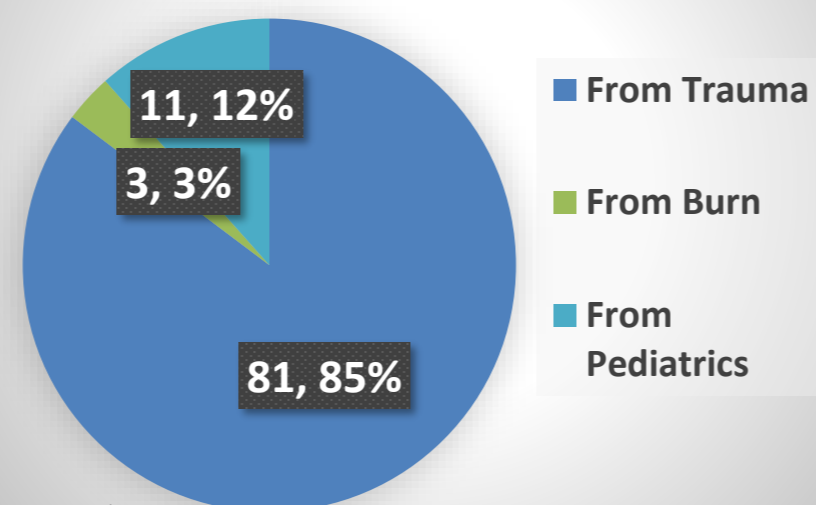


Figure 1.

Positive SS Demographics	Figure 2. Participants
MALE	50, 53%
Female	45, 47%
Hispanic or Latino	36, 38%
CAUCASIAN/WHITE	43, 45%
Black/African American	12, 13%
Asian	0
Unknown Ethnicity	4, 4%
No Insurance	13, 14%
Private Insurance	0
Medicare	15, 16%
MEDICAID	61, 64%
Medicare & Medicaid	6, 6%

Burn Skeletal Survey Results

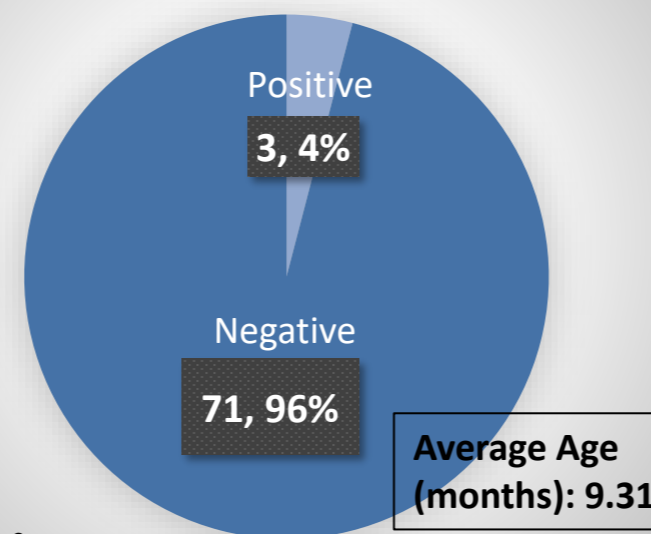


Figure 3.

Trauma Skeletal Survey Results

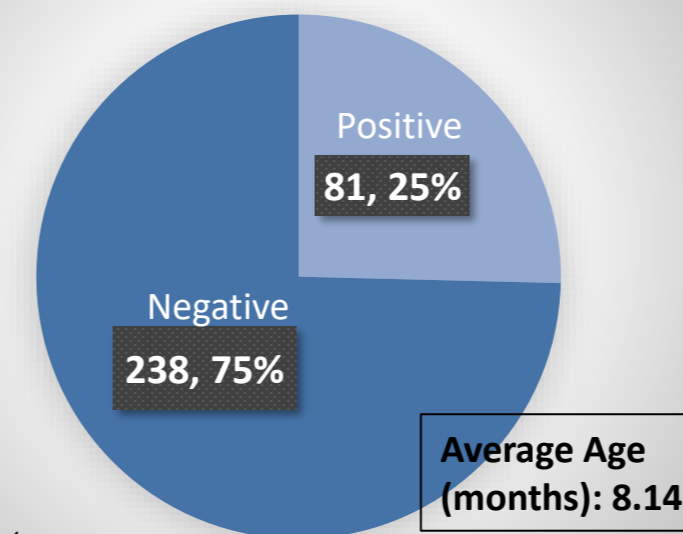


Figure 4.

Figure 5. Cause of Injury in Burn Patients

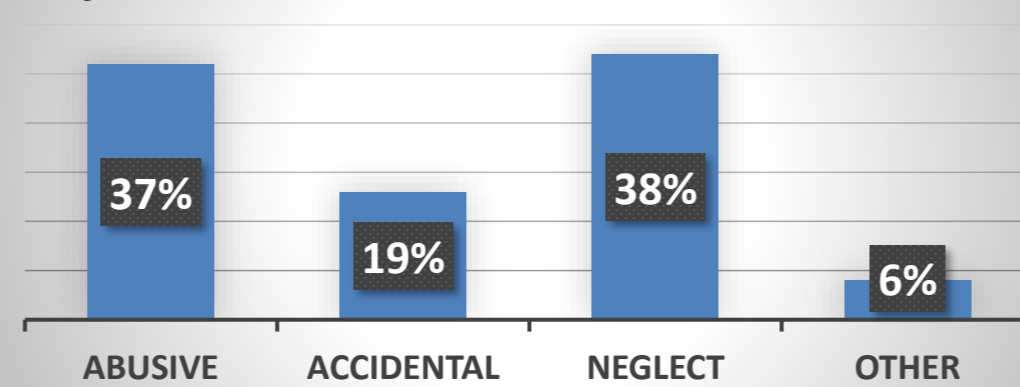


Figure 5.

Abusive Burn Demographics	Figure 6. Participants
Average Age	9.58
White	9, 35%
NON-WHITE	10, 38%
No Insurance	5, 19%
Private Insurance	1, 4%
Medicare	2, 8%
MEDICAID	18, 69%



Scan for References and Acknowledgments

Discussion

In this retrospective study of 635 patients (351 male, 284 female, 297 white, 271 non-white, average age 8.6 months) who have undergone a SS in the last decade, we discovered;

- There were 95 positive and 540 negative surveys (15% positive)
- Of the positive surveys, 85% were admitted from trauma, 12% from pediatrics, and 3% from burns (Figure 1.)
- The prevalence of positive SSs in burn patients was 4%, which supports our hypothesis that 6%-20% is a high number (Figure 3.)
- -The 3 burn patients with positive surveys were all female, had Medicaid or no coverage, and were on average 11 months old
- 88% (97/110) of children with injuries from physical abuse had Medicaid or no insurance (Figures 2. and 6.)
- 37% of all burns were caused from abuse, and 38% from neglect (Fig.5.)
- Overall, burn patients were older (9.31 months vs 8.14 in trauma) but not more likely to be non-white (28 white/28 non-white for burns, 146 white/143 non-white for trauma)
- Skeletal surveys are necessary in detecting abuse in trauma patients (1/4) but not necessarily burn patients (1/25) (Figures 3. and 4.)

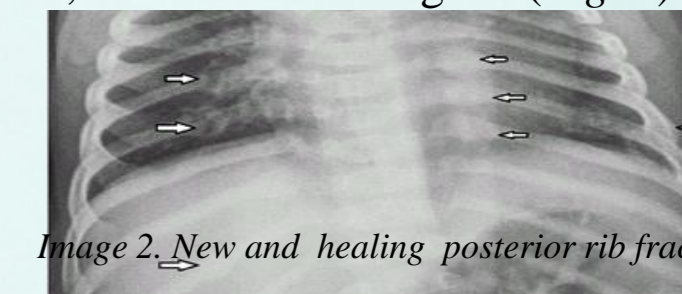


Image 2. New and healing posterior rib fractures²

Future Directions

- Propose a change in policy for screening children with a burn injury as their primary diagnosis
 - If a patient is admitted for a burn injury, their pretest probability of a positive SS is almost negligible
 - Clinical suspicion should be extremely high to warrant subjecting the child to whole body radiation
- Further understand why patients from disadvantaged socio-economic backgrounds are prone to potential neglect and/or abuse
 - Eventually investigate ways to decrease this correlation (Figures 2. and 6.)
- Gather more data from Black/African American children (only 65, or 10% in this study) as well as from older children
- Develop a streamlined system to determine if burns are abusive, negligent, or accidental, and investigate why abusive burns are so prevalent (37% in this study, Figure 5.)
- Investigate ways to ensure follow ups with children found to have sentinel* injuries (66 cases in this study)

Glossary*

- I. Occult³; hard to detect, non-naturally occurring (abusive) fractures
- II. Petechial Bruising³; pattern of bruising highly specific for physical abuse
- III. Positive Skeletal Survey³; containing one or more abusive fractures
- IV. Sentinel Injury³; physical abuse that is not a fracture, such as petechial bruising* or oral injury

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