CORTICES Annual Meeting

2024

Seattle Children's Hospital

Host: Todd Blumberg, MD

September 27th and 28th

Welcome to CORTICES Fall 2024

Ben Shore & Todd Blumberg

Friday CORTICES Agenda

- 8:30 to 11:00 AM: CORTICES Progress Report Block 1
  - Tibia Nail: Skeletal Maturity APP Training – Miller
  - Femoral Neck Fx Update- Baghdadi and Larson
  - NFTI-WIFI Update- Ramalingam
  - Lisfranc Retrospective- Rice-Denning
  - Antibiotic Prophylaxis in Open Fractures- Livingston
  - Thoracolumbar Burst Fx Update- Birch & Shore
- 11:10 AM to 12:00 PM Membership, Website and Research Processes
  - Research Committee Updates- Canizares & Swarup
  - Website Updates & Feedback – Venkatesh
  - Membership Discussion- Laine & Beebe
- 12:00 PM to 12:50 PM Lunch
- 1:00 PM TO 2:00 PM CORTICES Progress Report Block 2
  - Surgeon Preference- Schoenecker
  - NAT Topics for Papers- Shore
- 2:00 PM to 2:20 PM Gloat Fest
  - Differentiating Between Knee Septic Arthritis- Li
  - Management of Syndesmotic Injuries in Children and Adolescents- May
- 2:30 PM to 3:00 PM By-Laws Discussion and Committees
  - Updates to Bylaws- Shore
  - Membership Discussion: Membership Points- Laine
- 3:00 PM Meeting Adjourned

CORTICES Progress Report

Block 1

8:30 AM to 11:00 AM

Tibia Nail: Skeletal Maturity

App Training

Mark Miller
St. Louis Children's Hospital
Virtual Presentation

Antegrade rigid intramedullary nailing (RIMN) of tibial diaphyseal fractures in adolescents with open proximal tibial physis

September 27, 2024
CORTICES Annual Meeting
Seattle, WA

Mark L Miller, MD and Josh Marino BS

- Beta testing is set for sites with all necessary DUA's/SSA's and IRB approvals.

- Current approved list:
- BCH, Lurie, Campbell, and Colorado
  - Coordinators will need to update IRB to include up to June 2024 if they have not already done so
- Will demonstrate the Skeletal Maturity Application and radiographic measurements during today's meeting (PPT and Training guide will be sent to investigators)
- A separate, virtual meeting will be held and recorded for coordinators in the following weeks to cover the data entry guide and physician excel sheet

Primary Aim:
Quantify proximal tibial iatrogenic deformity at skeletal maturity in adolescents with diaphyseal tibial shaft fractures treated with antegrade rigid intramedullary nailing through an open proximal tibial physis

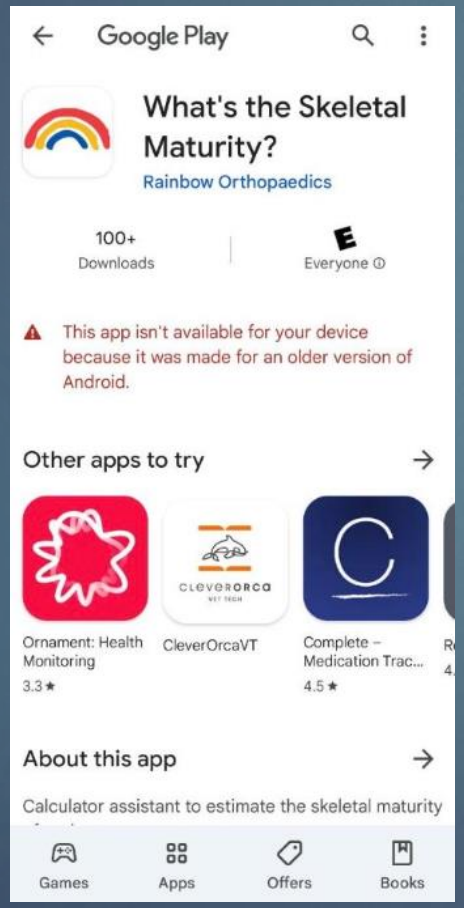
Hypothesis:
Antegrade rigid intramedullary nail fixation through open proximal tibia physis in adolescents nearing skeletal maturity will not cause clinically significant proximal tibial deformity (>5 deg change in MPTA or PPTA)

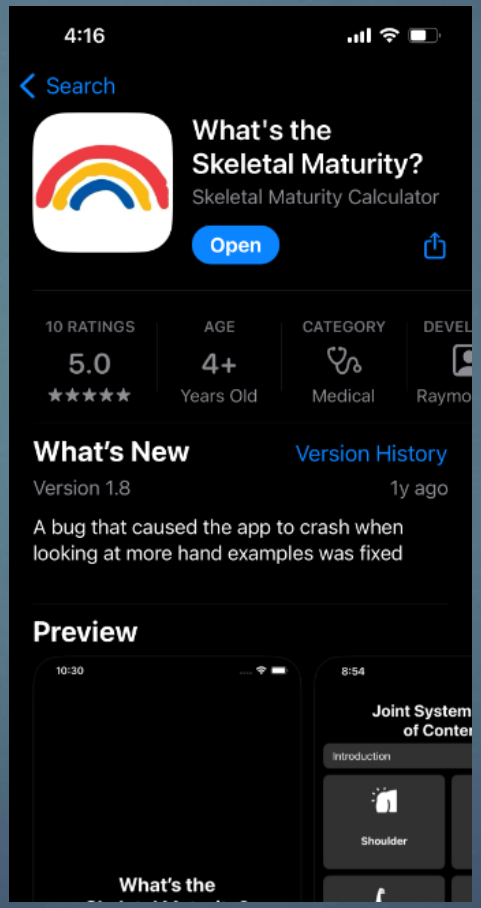
Primary Outcome:
Deformity Parameters at Skeletal maturity: mechanical Medial proximal tibia angle (mMPTA), mechanical posterior proximal tibial angle (mPPTA), Secondary when available (Leg length discrepancy (LLD) Mechanical Axis Deviation (MAD),)

REDCAP is built with BCH as host data site

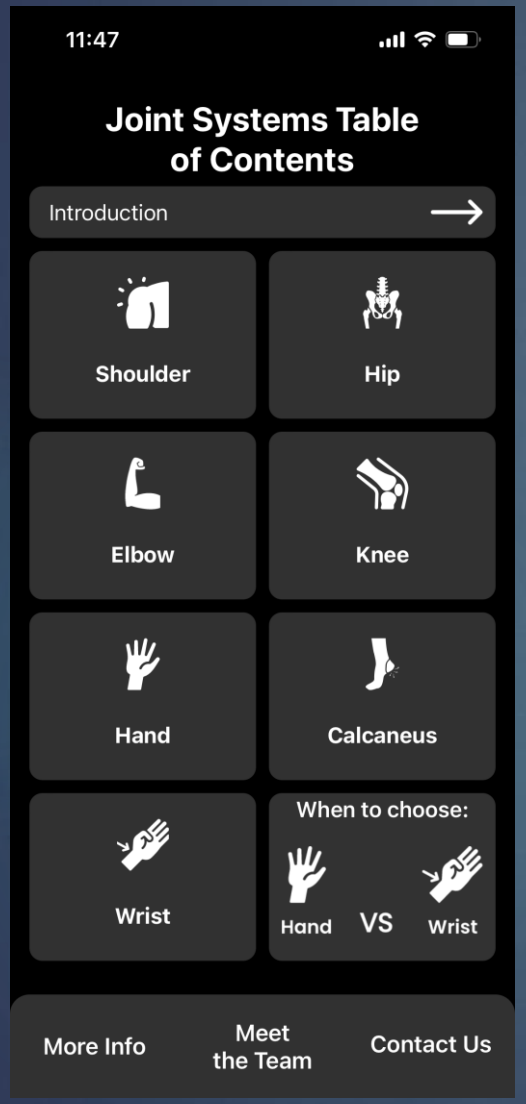
- Inclusion criteria: Age <18, tibial shaft fracture, open physes (TibQ 0 or 1), treated with rigid tibial IMN, Treated at a CORTICES institution between January 2010 and June 2023
-
- Exclusion criteria: skeletally mature TibQ-2, treatment with other than rigid tibial IMN
-

What’s the Skeletal Maturity?



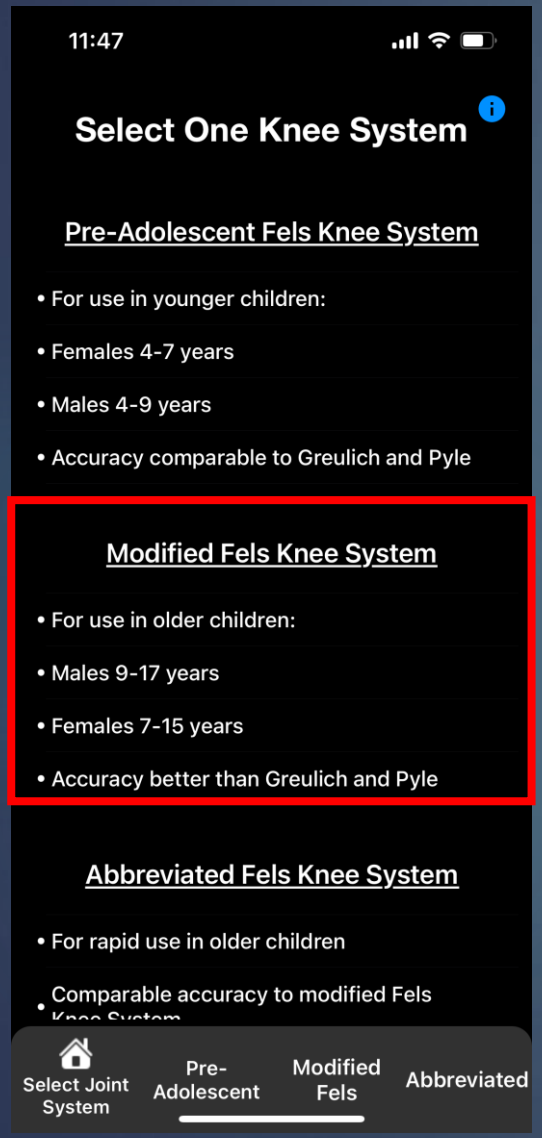


Application Home Page



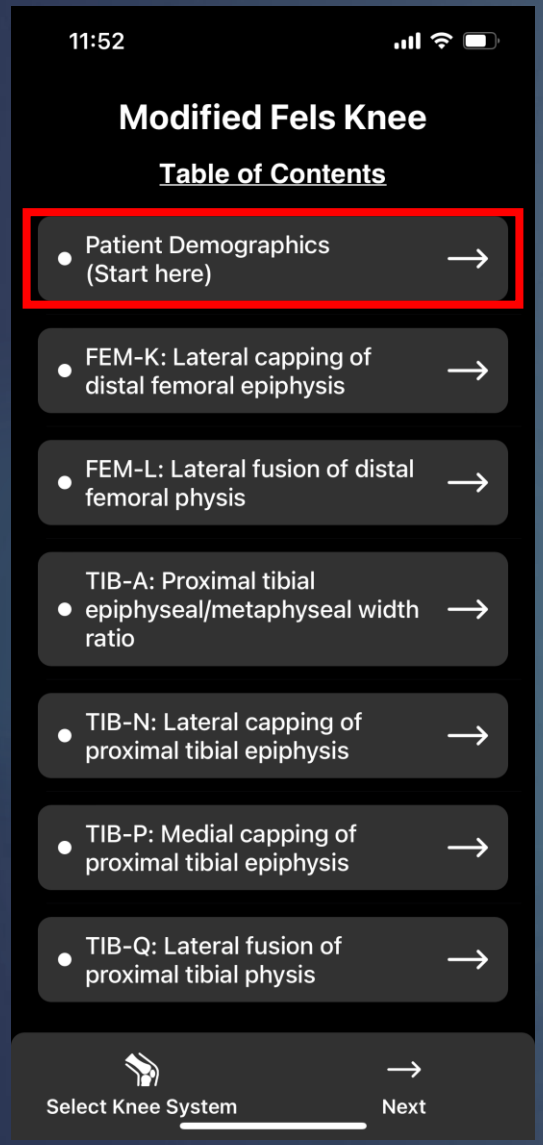
- 1. Choose the ‘Knee’ joint system from the home page

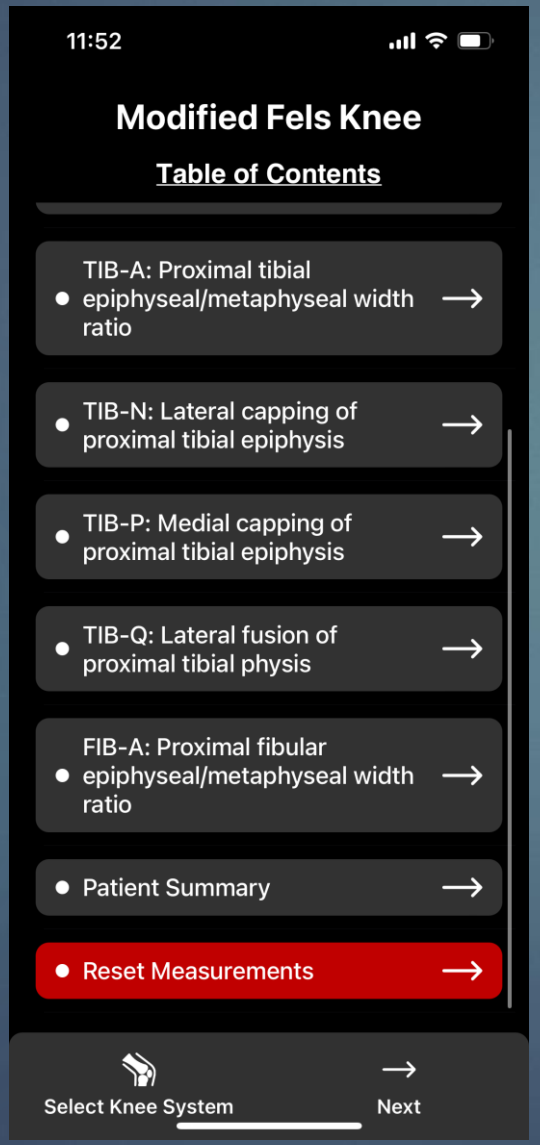
Knee System



- 2. There are three knee systems to choose from make sure to choose the ‘Modified Fels Knee System’

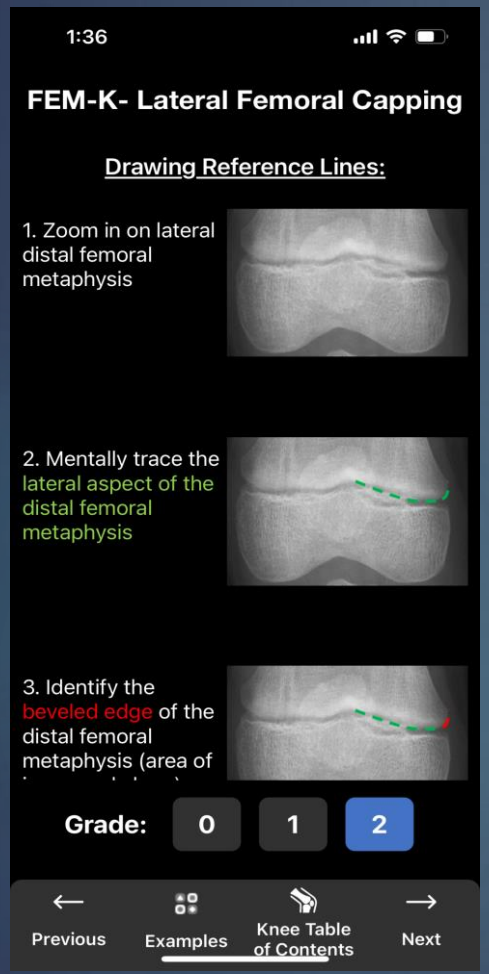
Modified Fels Knee System

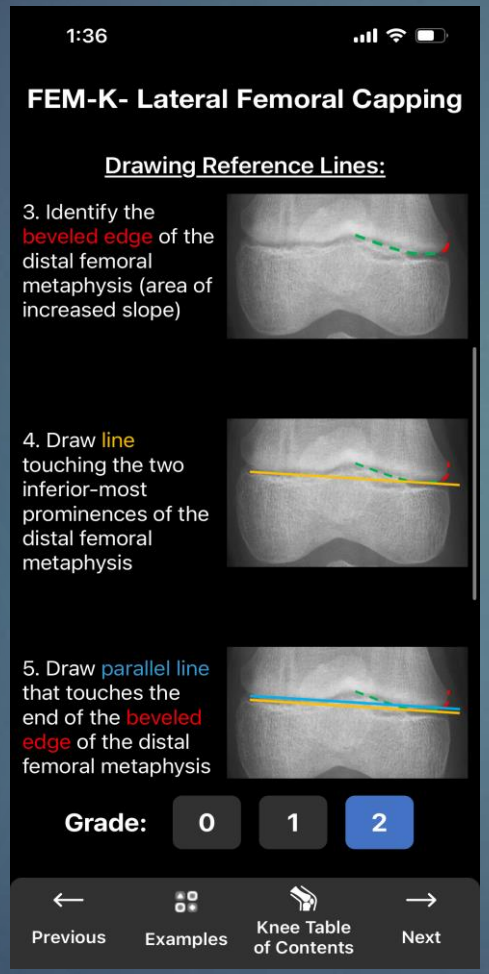


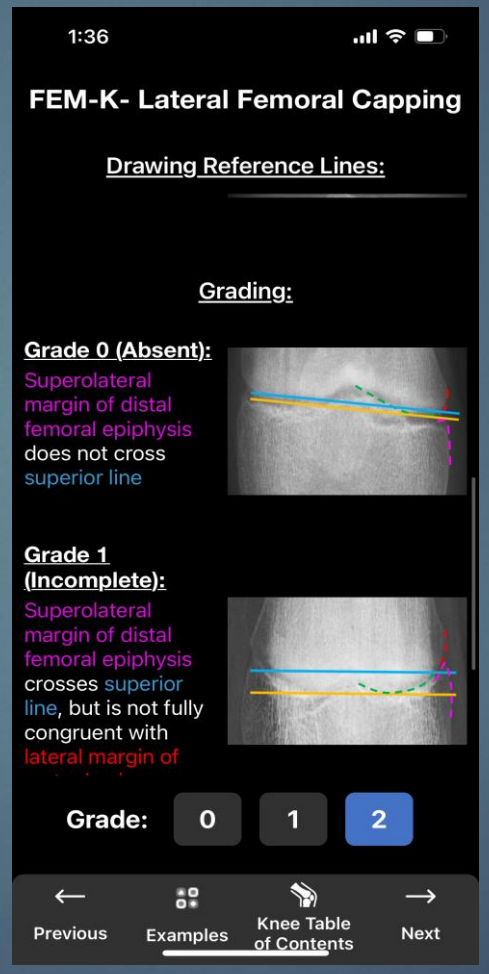


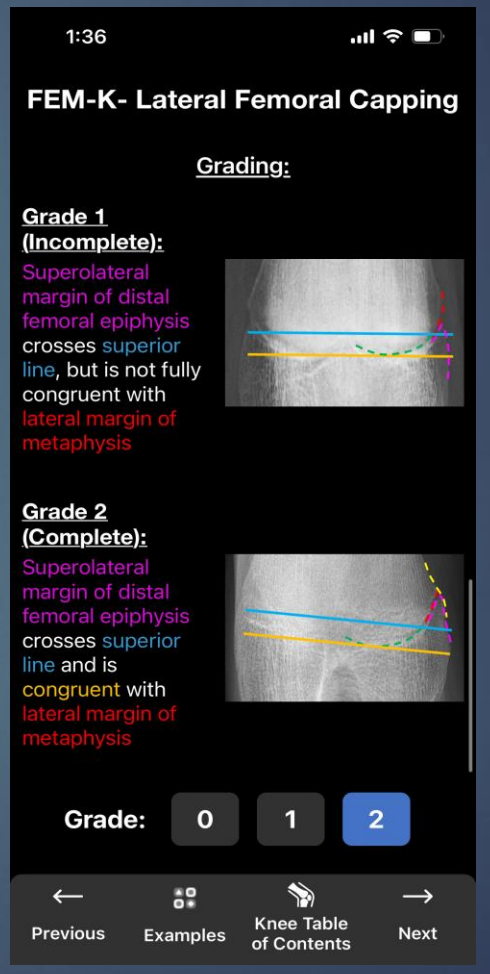
- 3. Start with patient demographics do not try to click on the other table of contents

Fels Knee System: FEM-K- Lateral Femoral Capping



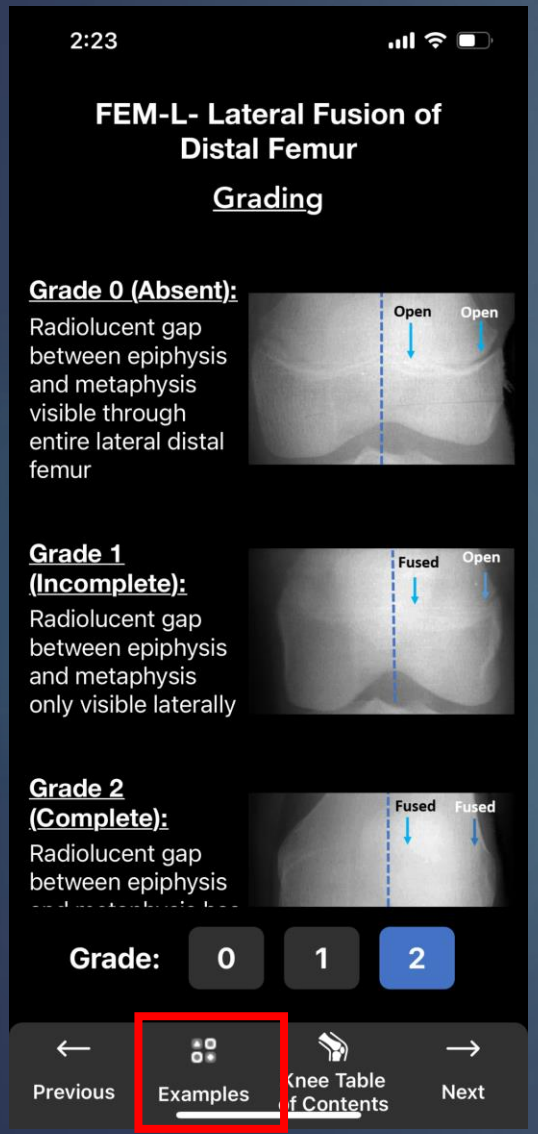






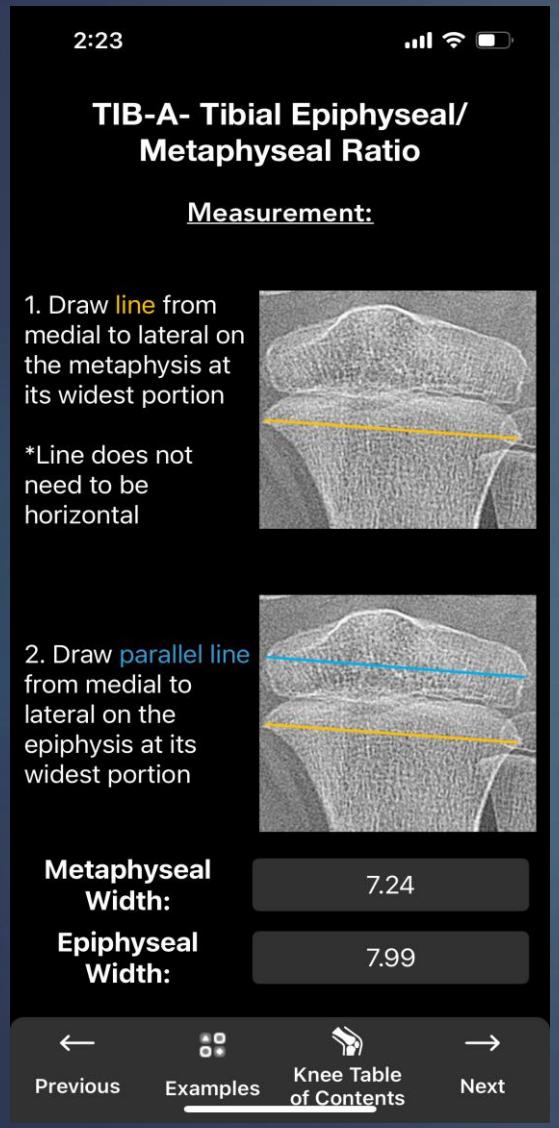
- 4. Follow the on screen instructions for the application and select the Grade that the bone presents as

Fels Knee System: FEM-L- Lateral Fusion of Distal Femur



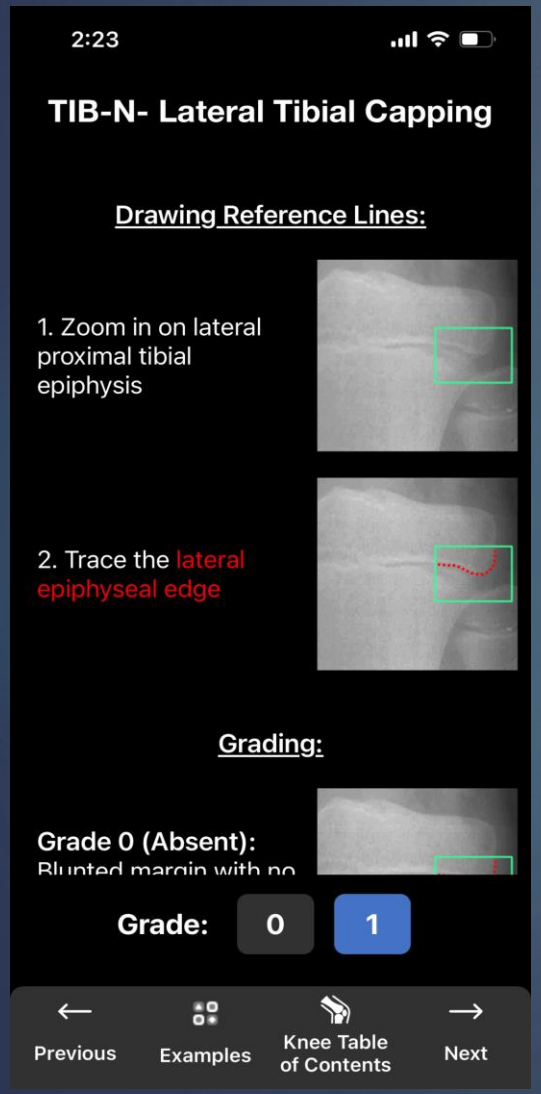
- 5. Next you will grade the lateral fusion of the distal femur.
- Use the "Examples" tab at the bottom if you need help identifying the grade.

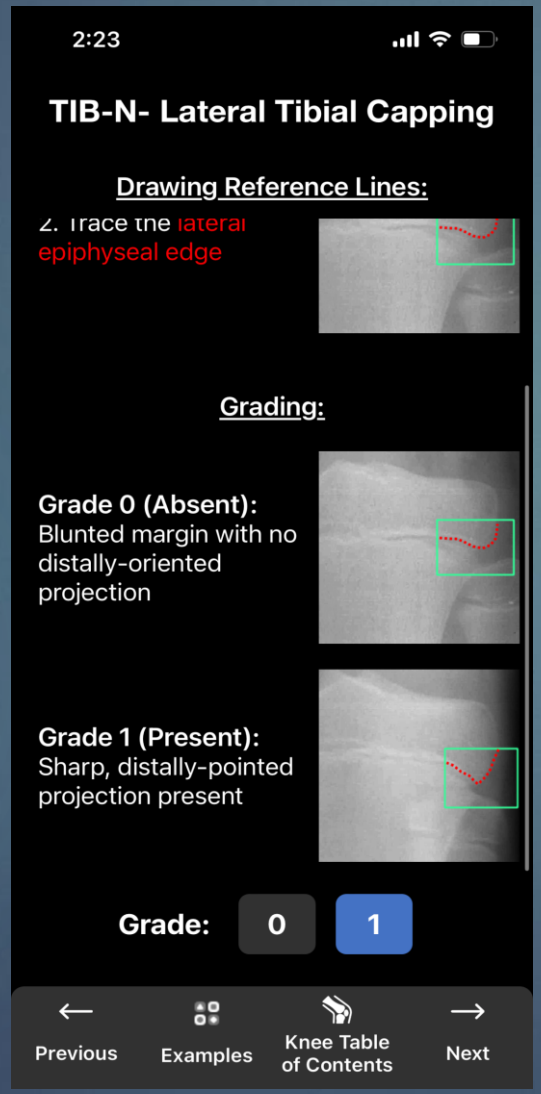
Fels Knee System: TIB-A- Tibial Epiphyseal/Metaphyseal Ratio



- 6. Use the Line Measurement tool to measure the metaphyseal and epiphyseal widths

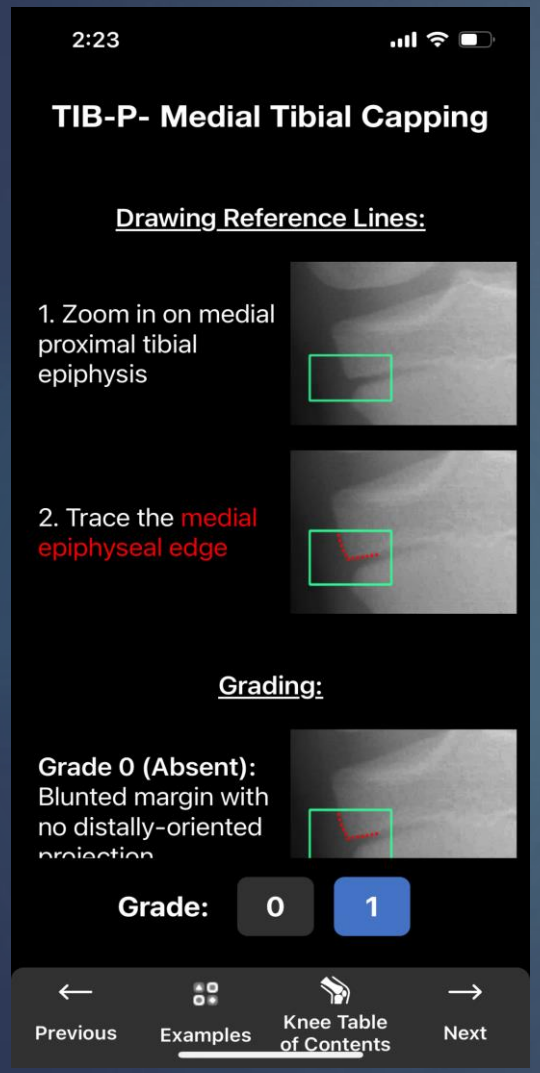
Fels Knee System: TIB-N- Lateral Tibial Capping

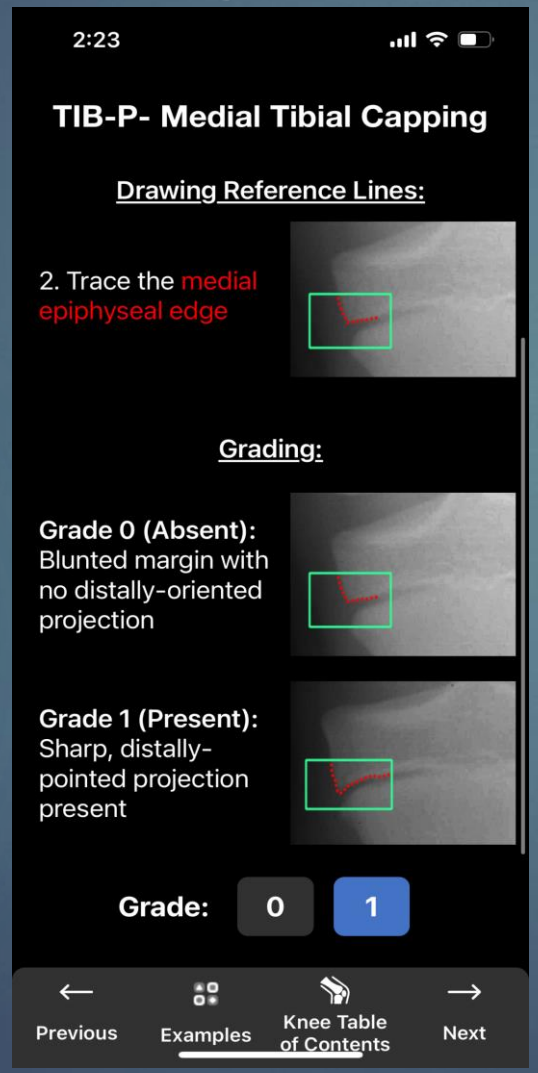




- 7. Determine if the lateral epiphyseal edge is blunted or sharp.

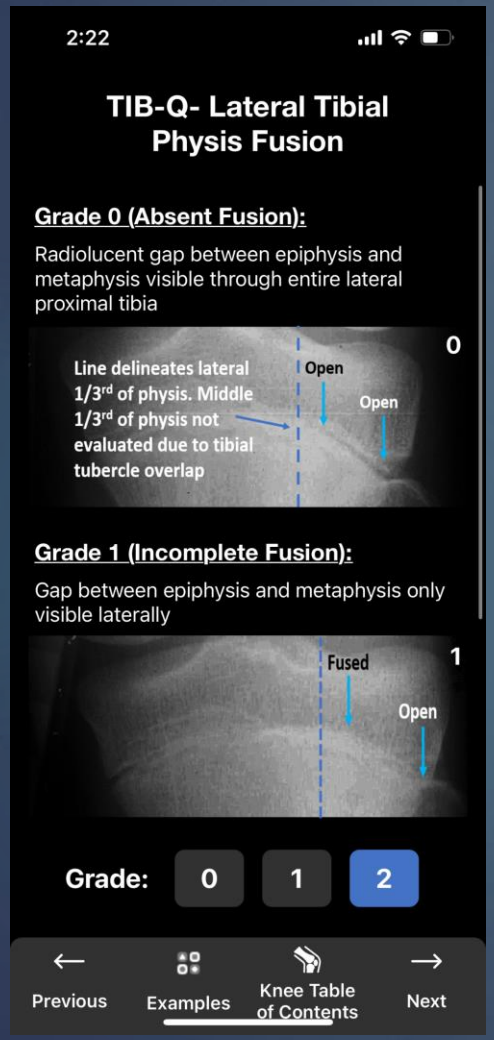
Fels Knee System: TIB-P- Medial Tibial Capping

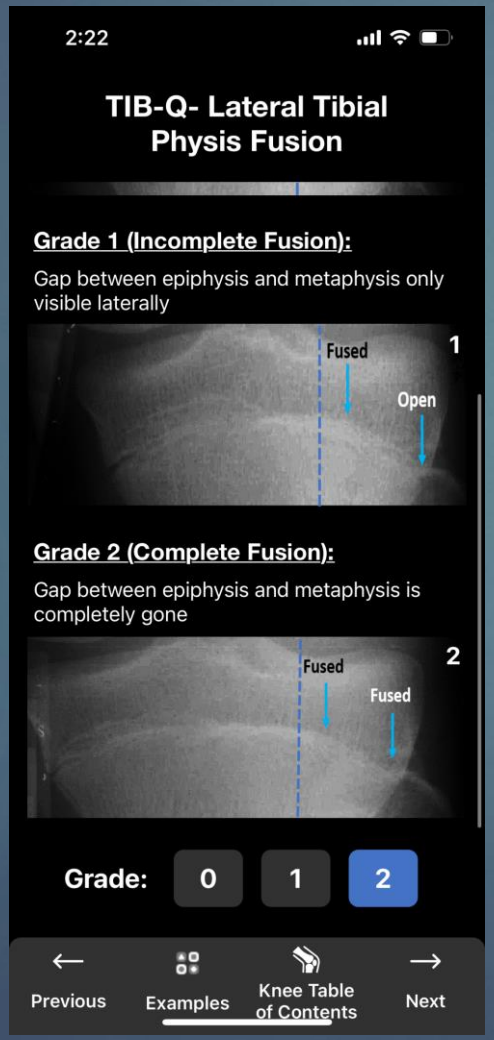




- 8. You will do the same thing for the medial epiphyseal edge as you did with the lateral

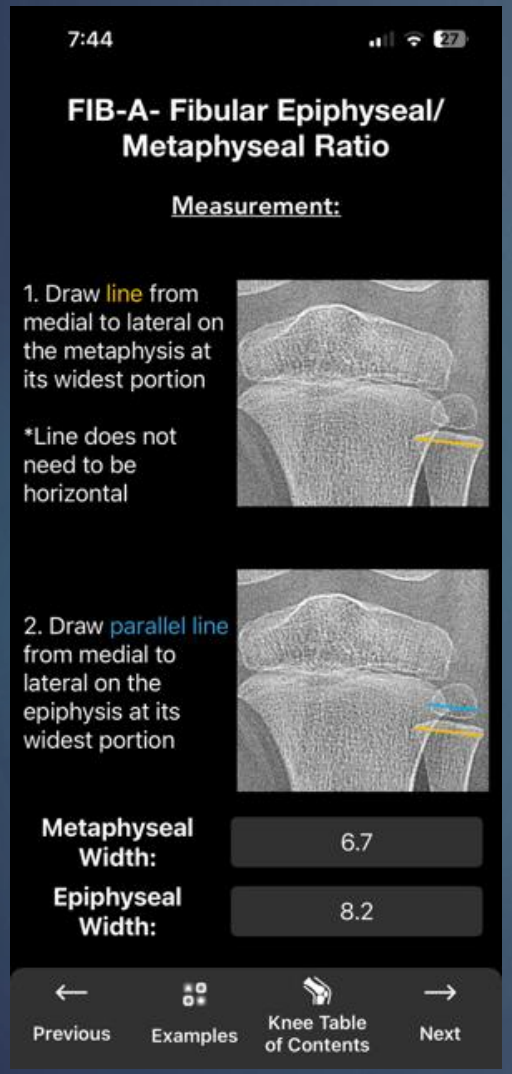
Fels Knee System: TIB-Q- Lateral Tibial Physis Fusion





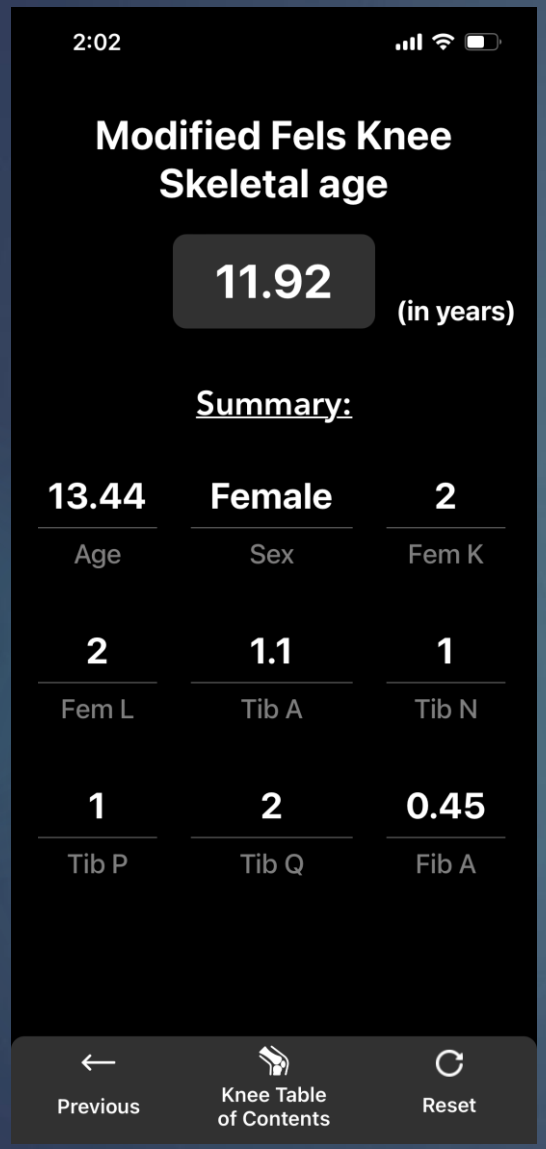
- 9. Zoom in on the physis and determine the level of fusion between the epiphysis and the metaphysis
- This is the measurement you will be inputting into REDcap to determine if the patient will be included in the study,
- Grades 0 and 1 indicate that they are eligible for the study while grade 2 makes them ineligible for the study

FIB-A- Fibular Epiphyseal/Metaphyseal Ratio



- 10. Last but not least, measure the widths of the metaphysis and epiphysis of the fibula at their widest portions.

Fels Knee System: Final Summary



- 11. Once you have entered all required fields, the summary gives you a skeletal age which you will enter into REDCap

Training Materials

- Please complete the training (will be sent out to coordinators)
- Once finished see how your measurements compare to the answer key
- Submit proof that you completed the training (Your answers from the app)
- You will receive approval from BCH to begin the application measurements

Preliminary WashU Data

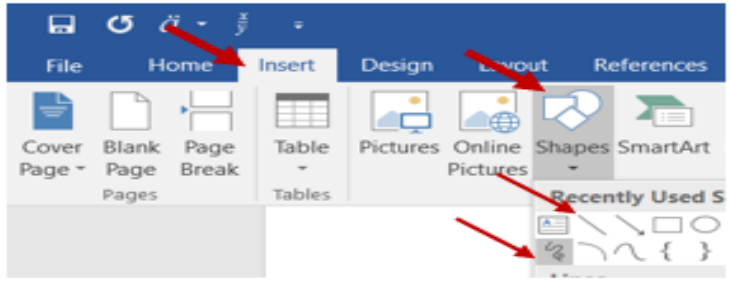
- 93 patients at SLCH 2010-2023 who underwent antegrade reamed IMN, <18 years old
- 21 patients eligible (17 TIbQ=1, 4 TibQ=0)

- 10 patients test data input into RedCap. 4 of 10 patients did not have follow up > 3 months
- No patients with more than 5 deg change in PPTA or MPTA.

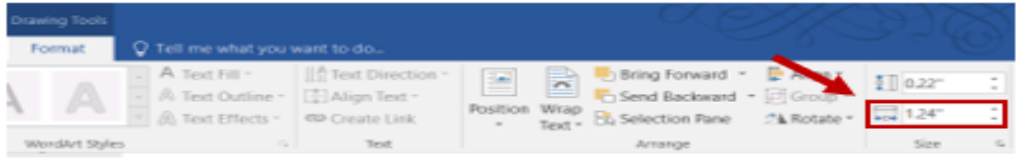
How to Complete the Training using Word

Use the **Skeletal Maturity** app in your phone to input values, but draw lines in this Word document using the **"Insert"** Tab and choosing the submenu **"Shapes"**.

To add straight lines choose the line icon, or to draw free hand shapes chose the scribble icon



To measure line length for the Tib-A and Fib-A ratios, draw the lines as instructed and then **double click** on the line you want to measure. You will see the **"Drawing Tools"** tab immediately highlighted and to the far right you will have the **"Size"** of the lines. **Width** is the measure at the bottom.



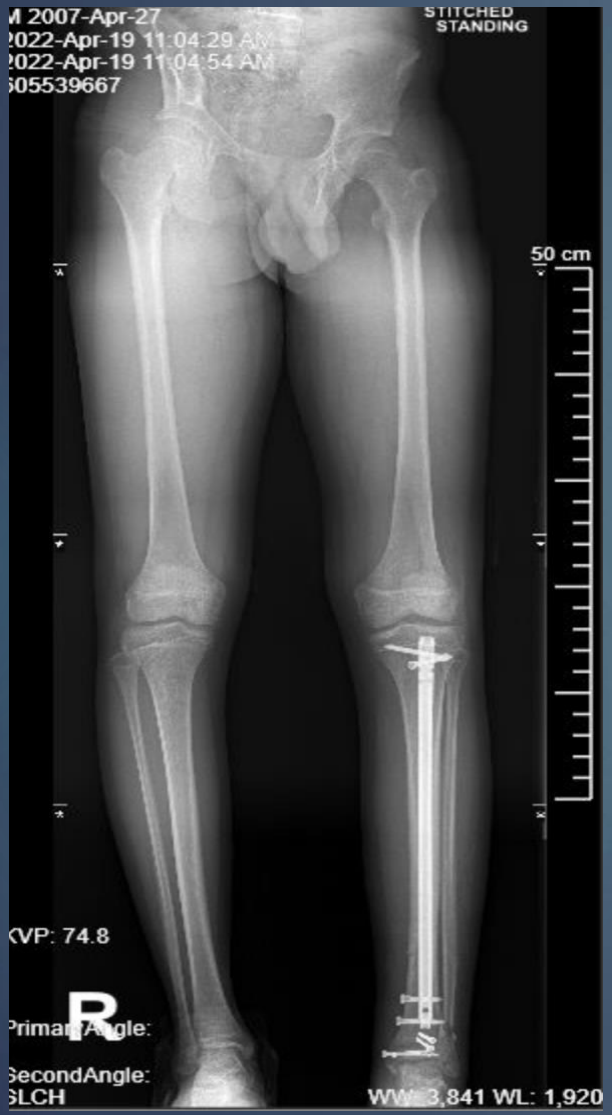
Please follow the instructions in the PPT document and enter the 1) **Skeletal age** you obtain for each case and your **Tib-Q** score as this will serve as our measure for inclusion criteria.

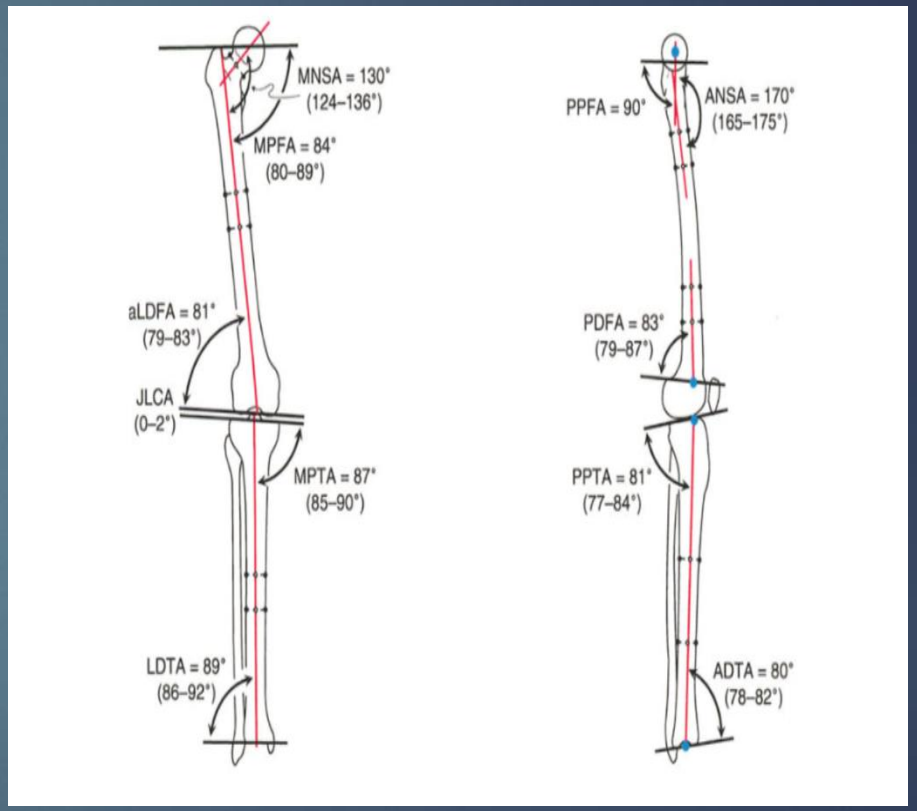
Skeletal Age Case

1. Patient 1:
2. DOB: 09/26/2003
3. Time of Xray: 12/05/2017
4. Age: 14
5. Sex: Male

Radiographic Measurements

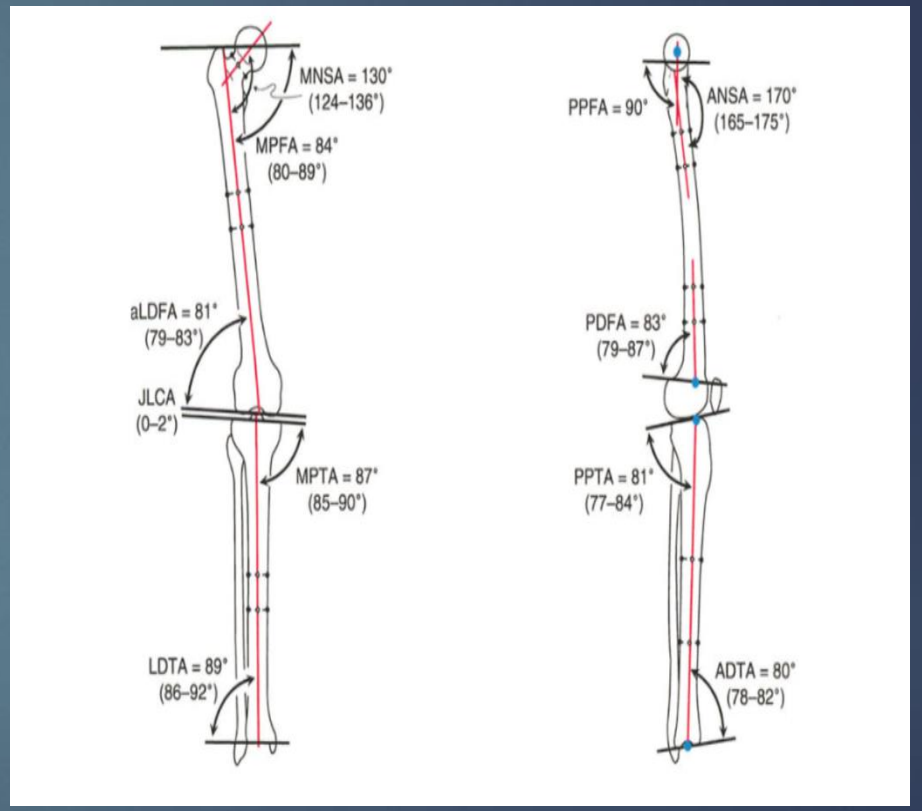
Standing AP of both lower extremities and lateral of tibia at 6 weeks postop





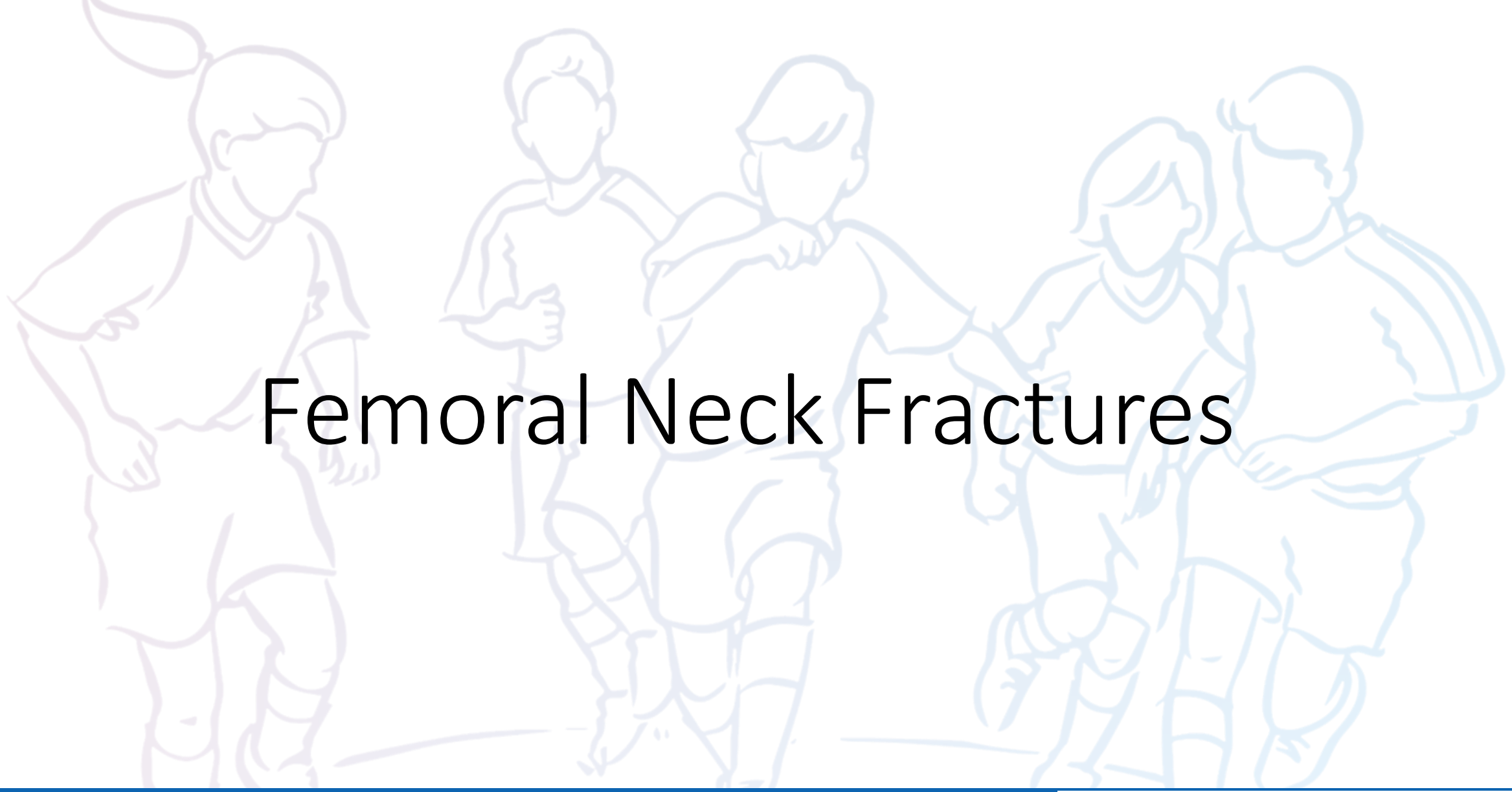
Radiographic Measurements

Standing AP of both lower extremities and lateral of tibia at skeletal maturity (18 months for this case- age 16)



Femoral Neck Fx Update

Soroush Baghdadi & Jill Larson
Lurie Children's Hospital
Virtual Presentation



Femoral Neck Fractures

Where we were

- Study protocol
  - 2 – 25 year-old ambulatory patients with a femoral neck fracture after 2010
  - Injury, patient, and treatment characteristics
  - Imaging data collected
  - Looking for the occurrence and risk factors for adverse outcome
    - AVN
    - Non-union / mal-union
    - Unplanned return to the OR
- REDCap database “concept of an plan”

What we did

- REDCap forms
  - BCH REDCap access
  - Database created

Instrument name	Fields
General	51
Imaging upload	20
Imaging findings	71

What we did

- DUA and IRB process
- Thanks to Meghana and Fernanda!

What we did

- Study protocol finalized
  - Upper age limit changed to 18
  - Dates: between 1/10/2010 and 6/30/2024

Where we are

- Protocol finalized
- REDCap ready and alpha tested at Lurie
- Data entry guide ready

What we did

The inclusion and exclusion criteria for the study are as follows:

Inclusion:

- Presented with femoral neck fracture between **1/10/2010 and 6/30/2024**
- Age 2 to 18 years at date of injury presentation
- Presented at, transferred to, or followed up at a CORTICES-participating institution. Patients who were not initially treated at a participating center are included if injury films are available
- Patient should be ambulatory at baseline
- Minimum imaging requirements: Initial injury films and at least one follow-up. For Patients who underwent surgery, intra-op or early post-op is also required.

Exclusion:

- Physeal fractures, aka Delbet 1

ICD-10 Codes Search Query	
S72.00	Fracture of unspecified part of neck of femur
S72.01	Unspecified intracapsular fracture of femur
S72.03	Midcervical fracture of femur
S72.04	Fracture of base of neck of femur
S72.05	Unspecified fracture of head of femur
S72.09	Other fracture of head and neck of femur
S72.10	Unspecified trochanteric fracture of femur
S72.14	Intertrochanteric fracture of femur
S72.2	Subtrochanteric fracture of the femur
S72.8	Other fracture of the femur
S72.9	Unspecified fractures of the femur

ICD-9 Codes Search Query	
733.14	Pathologic fracture of neck of femur
733.15	Pathologic fracture of other specified part of femur
73396	Stress fracture of femoral neck
82002	Closed fracture of midcervical section of neck of femur
82003	Closed fracture of base of neck of femur
82009	Other closed transcervical fracture of neck of femur
82010	Open fracture of intracapsular section of neck of femur, unspecified
82012	Open fracture of midcervical section of neck of femur
82013	Open fracture of base of neck of femur
82019	Other open transcervical fracture of neck of femur
82020	Closed fracture of trochanteric section of neck of femur
82021	Closed fracture of intertrochanteric section of neck of femur
82022	Closed fracture of subtrochanteric section of neck of femur
82030	Open fracture of trochanteric section of neck of femur, unspecified
82031	Open fracture of intertrochanteric section of neck of femur
82032	Open fracture of subtrochanteric section of neck of femur
8208	Closed fracture of unspecified part of neck of femur

Where we are

- Lurie database was queried
  - 204 records
  - 62 femoral neck fractures
  - Apophyseal fractures and subtrochs were the most common exclusions

Next Steps

- Complete alpha test
- Finalize data entry guide
- Update all IRBs
- Start data collection

Thank You

NFTI-WIFI Variable Update

Wendy Ramalingam
Cincinnati Children's Hospital

Pediatric NFTI-WIFI
(Necrotizing Focal Tissue Infection – With or without Fascial Involvement)

CORTICES Annual Meeting

Seattle, WA

September 27-28, 2024

Wendy Ramalingam MD

Lawson Copley MD

Stephanie Moore PhD

Jonathan Schoenecker MD

Cincinnati Children's

Monroe Carell Jr. Children's Hospital at Vanderbilt

Scottish Rite for Children

UT Southwestern Medical Center

children's health

CORTICES

ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Seattle Children's

HOSPITAL · RESEARCH · FOUNDATION

CORTICES Pediatric NFTI-WIFI Study

- Multicenter Retrospective Study
- Inclusion criteria
  - Age 0-18
  - January 2010 – **June 2024**
  - Diagnosis of necrotizing fasciitis of the extremities, face, neck, trunk, or groin
    - ICD9 and ICD10 codes
- Exclusion criteria
  - None

ICD9/10 Codes

- ICD 9 – 728.86: Necrotizing fasciitis

- ICD 10 - M72.6: Necrotizing fasciitis
  - M72.60 Necrotizing fasciitis Multiple sites
  - M72.61 Necrotizing fasciitis Shoulder region
  - M72.62 Necrotizing fasciitis Upper arm
  - M72.63 Necrotizing fasciitis Forearm
  - M72.64 Necrotizing fasciitis Hand
  - M72.65 Necrotizing fasciitis Pelvic region and thigh
  - M72.66 Necrotizing fasciitis Lower leg
  - M72.67 Necrotizing fasciitis Ankle and foot
  - M72.68 Necrotizing fasciitis Other
  - M72.69 Necrotizing fasciitis Site unspecified

Next steps

- Study Protocol
  - Submit to local IRBs
- Review data dictionary
  - REDCap created
  - Start data collection once IRBs approved
- Need: Site champions for study/Beta testing sites
- Further discussion

Lisfranc Study Update Seattle Meeting 2024

Megan Johnson
Jaime Denning
Keith Baldwin
Tony Riccio

Background

- Lack of literature on pediatric Lisfranc injuries
- Little known about mechanism of injury, fracture patterns, threshold for operative vs. nonoperative management, fixation options, subsequent disability/pain
- Not known if the presence of open physes should direct operative vs. nonoperative management, fixation choice, return to activity

Previous Work

- Single institution – 56 peds patients, no PROs (Boston)
- Single institution – 30 peds patients, PROs
- Prelim work by Jaime Denning (unpublished)
- Systematic Review – just published

Specific Aims

- Primary Aim:
  - **Retrospectively characterize pediatric lisfranc injuries with regard to age, mechanism of injury, radiographic injury patterns, treatment, outcomes and compare to historical cohorts of adult Lisfranc injuries**
    - Hypothesis: mechanism of injury, fracture pattern, treatment modalities and outcomes will differ between peds and adult patients
    - Primary outcome: ability to and timing of return to sport, peri-operative complications, postoperative complications, need for supervised therapy services, radiographic outcome (residual displacement, arthritic changes and deformity)

Specific Aims

- Secondary Aims:
  1. **To compare outcomes between operatively and non-operatively managed patients and determine if a threshold of displacement exists beyond which worse outcomes can be expected with non-operative management.**
     - Hypothesis: Surgical and non-surgically managed Lisfranc injuries will have similar outcomes at lower amounts of displacement. However, worse outcomes and less complications will be identified in the non-operative cohort beyond an as of yet undetermined amount of displacement or for certain fracture patterns

Specific Aims

- Secondary Aims:

  2. To determine if the presence of open physes influences the outcome of pediatric Lisfranc injuries by comparing outcomes between pediatric patients with open physes to those less than 18 with closed physes.

  - Hypothesis: Pediatric patients with Lisfranc injuries and open physes have worse outcomes than those with closed physes

Specific Aims

- Secondary Aims:

  3. Develop a classification system of pediatric Lisfranc injuries based on the patterns of injury observed in this population (ex. Patients with open physes have different injury patterns than those with closed physes).

  - Hypothesis: Pediatric patients with Lisfranc injuries, in particular those with open physes, have different injury patterns than adult patients with Lisfranc injuries.

Design/Methods

- Retrospective
- 0-18, Lisfranc injury based on imaging (XR, CT, MRI), can include other foot fractures
- At least 6 month followup
- Exclusion:
  - Neuromuscular, syndromic, metabolic bone disease
  - Polytrauma
  - Open fractures

Design/Methods

- Nonoperative or operative treatment (any fixation method)
- Primary Outcome:
  - Return to sport (chart review)
  - Radiographic outcome (residual displacement, arthritic change, deformity)
  - Complications (chart review)

Update/To Do

- Protocol/Data Dictionary ✓
  - Will email to everyone who is interested in this study
  - Data Dictionary
- IRB
- REDCap
  - Once done, TSRH/CCHMC/CHOP will pilot ~5 patients each, then open it up
- Survey on practice variation – which would you fix? ✓
  - https://redcap.link/cortices.CasesSurvey
- Pilot with 10-ish patients to look at inter/intra-rater reliability – could be its own study

Stretch and Refreshment Break

Antibiotic Prophylaxis in Open Fractures Survey Updates

Kristin Livingston
Boston Children's Hospital

Boston Children's Hospital
Where the world comes for answers

RACE Against Contamination: IV Antibiotics in Pediatric Open Fractures

RACE (Rapid Antibiotics & Clinical Effectiveness) for Kids

Kristin S Livingston MD, Emi Schwab BA; Shanika De Silva, PhD; Benjamin J Shore, MD MPH FRCSC, Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES)

Department of Orthopaedic Surgery, Boston Children's Hospital, Boston, MA

Thank you all for your participation!

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

ANTIBIOTIC ADMINISTRATION IN PEDIATRIC OPEN FRACTURES

HARVARD MEDICAL SCHOOL TEACHING HOSPITAL

BACKGROUND

> Serious orthopaedic injuries associated with high energy trauma and potential morbidity
> 2-9% of fractures in children are open

GUIDING PRINCIPALS

> Contamination (and infection risk) is higher with higher energy/larger wounds
> Gustilo-Anderson Classification is framework
> Early initiation of antibiotics is more important than early surgery (Skaggs)

ANTIBIOTIC THERAPY

> Adult studies recommend antibiotics within 3 hours of injury
> Best practice for IV antibiotics in pediatric open fractures remains unclear:
  > Timing?
  > Selection of antibiotics?

RESEARCH GAP

Limited studies on pediatric open fractures leaving institutions to interpret what is "best practice" --> variation between institutions

METHODS

PRIMARY AIM

To describe the institutional variation between ACS Level 1 Pediatric Trauma Centers (CORTICES) in treatment of pediatric open fractures

SURVEY POPULATION

Designated open fracture champion at 18 CORTICES centers participated

THANK YOU!

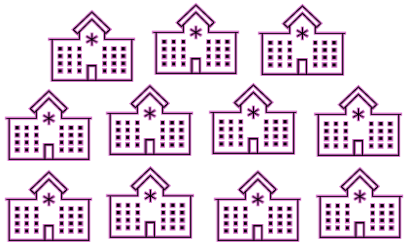
DATA COLLECTED

Who orders antibiotic?
Policy for timing? What is it?
Audited? By whom?
Success rate?
Policy for type of antibiotic by GA?
What are recommended antibiotic for each type?
Who was involved in policy creation?
Are there other protocols surrounding open fracture?

POLICY VARIATIONS FOR TIMING OF IV ANTIBIOTICS

18 CORTICES Institutions

(About 1/3 of all ACS Level 1 Pediatric Trauma Centers nationwide)

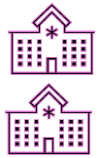


Hospital approved policy
(11/18)

Yes, but unsure of approval
(1/18)

No policy
(5/18)

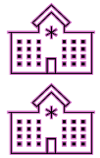
Unsure
(1/18)



ASAP
(not audited)
(2/12)

<3 hours from presentation or OSH

(61-80% success)
(1/12)



<1 hour from injury
(2/12)

<1 hour from ED
(7/12)

>80% success

61-80% success

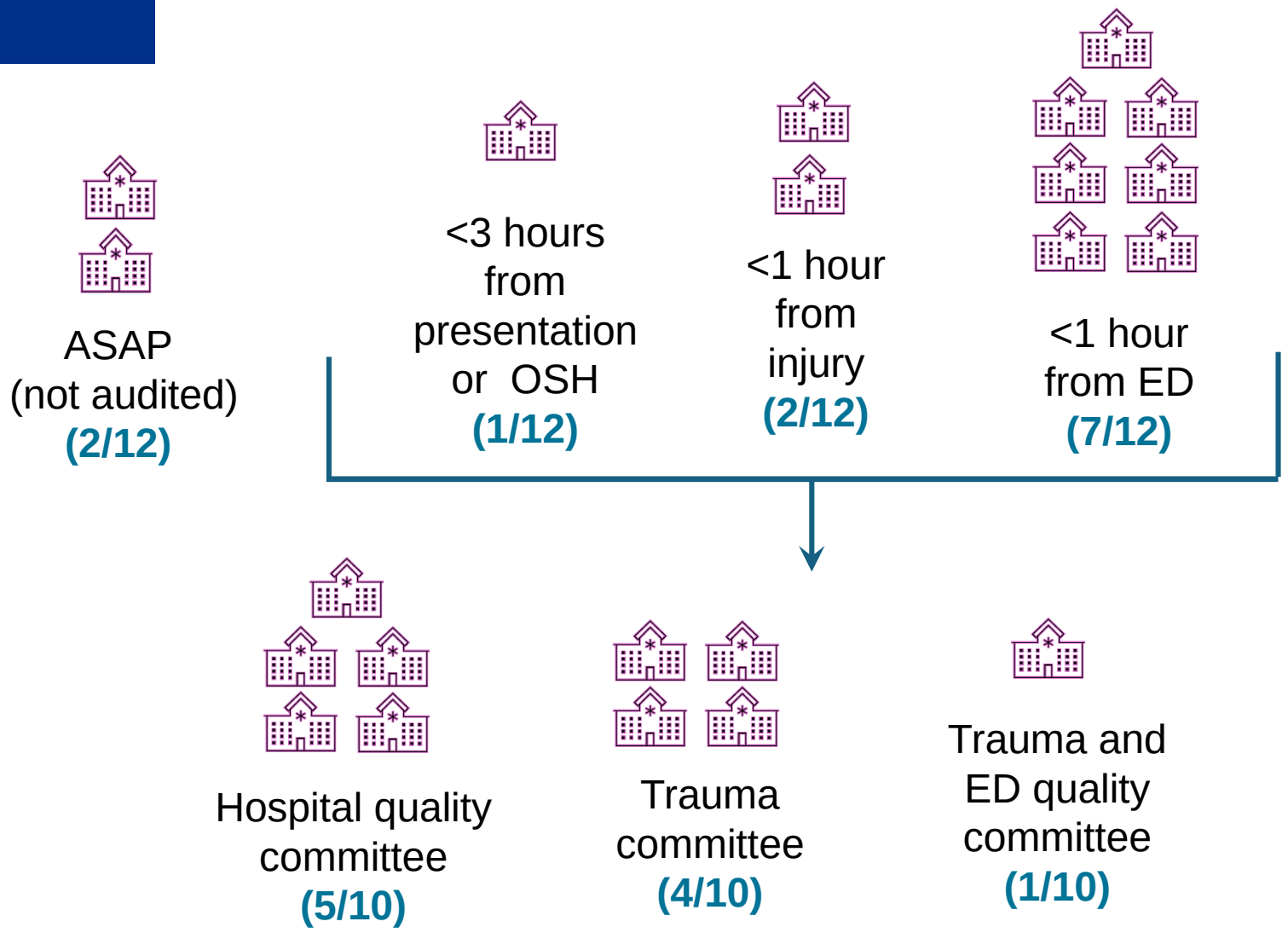
41-60% success

21-40% success

Auditing by hospital quality committee

IS TIMING OF IV ANTIBIOTICS AUDITED?

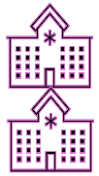
12 Institutions with Timing Policies



POLICY VARIATIONS FOR SELECTION OF IV ANTIBIOTICS

18 CORTICES Institutions

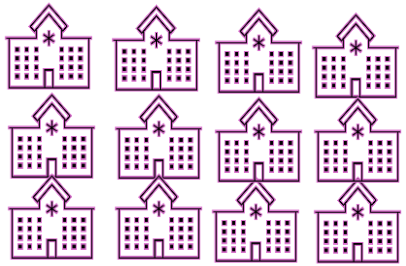
Hospital approved policy
(12/18)



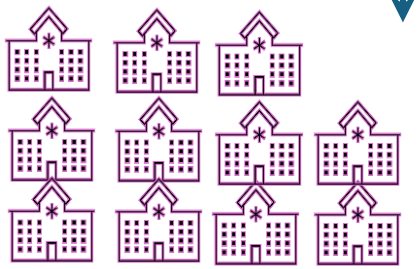
Unsure of policy approval level
(2/18)

Department approved policy
(1/18)

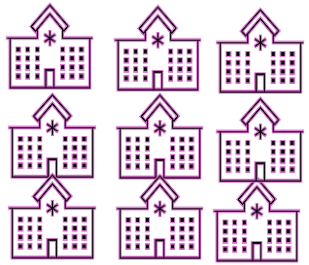
No policy
(3/18)



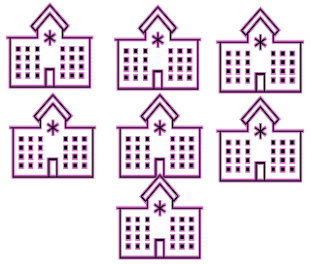
Infectious disease
(12/15)



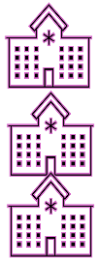
Orthopaedic Surgery
(11/15)



Emergency Dept
(9/15)



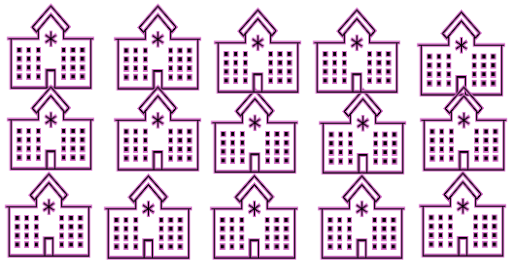
Pharmacy
(7/15)



Gen Surg/Trauma
(3/15)

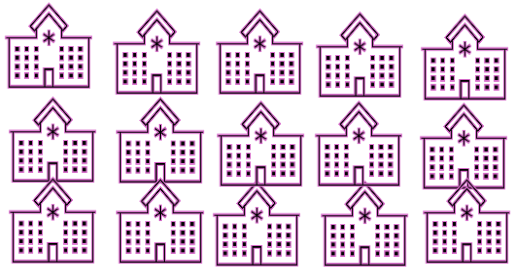
Peds
(2/15)

POLICY VARIATIONS FOR SELECTION OF IV ANTIBIOTICS

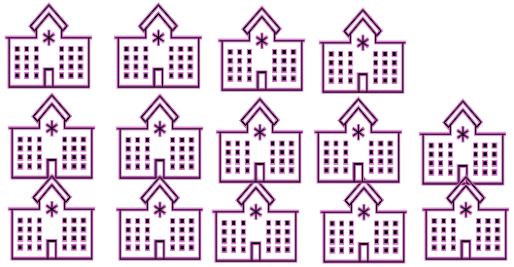


15 Cortices institutions with policy for GA-based antibiotic type

GRADE 1



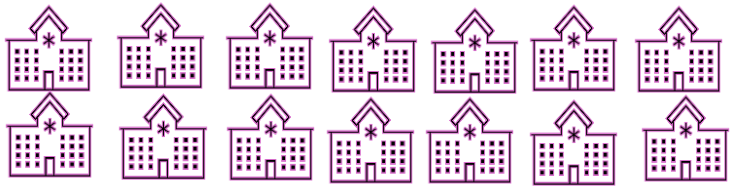
Cefazolin **(15/15)**



Clindamycin **(14/15)**

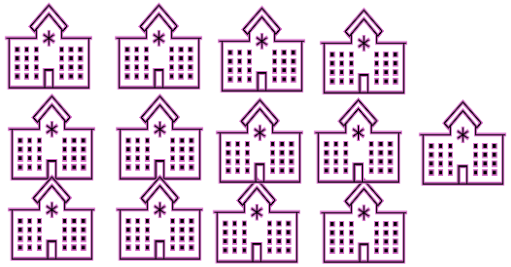
Vancomycin **(1/15)**

GRADE 2



Cefazolin **(14/15)**

Zosyn **(1/15)**



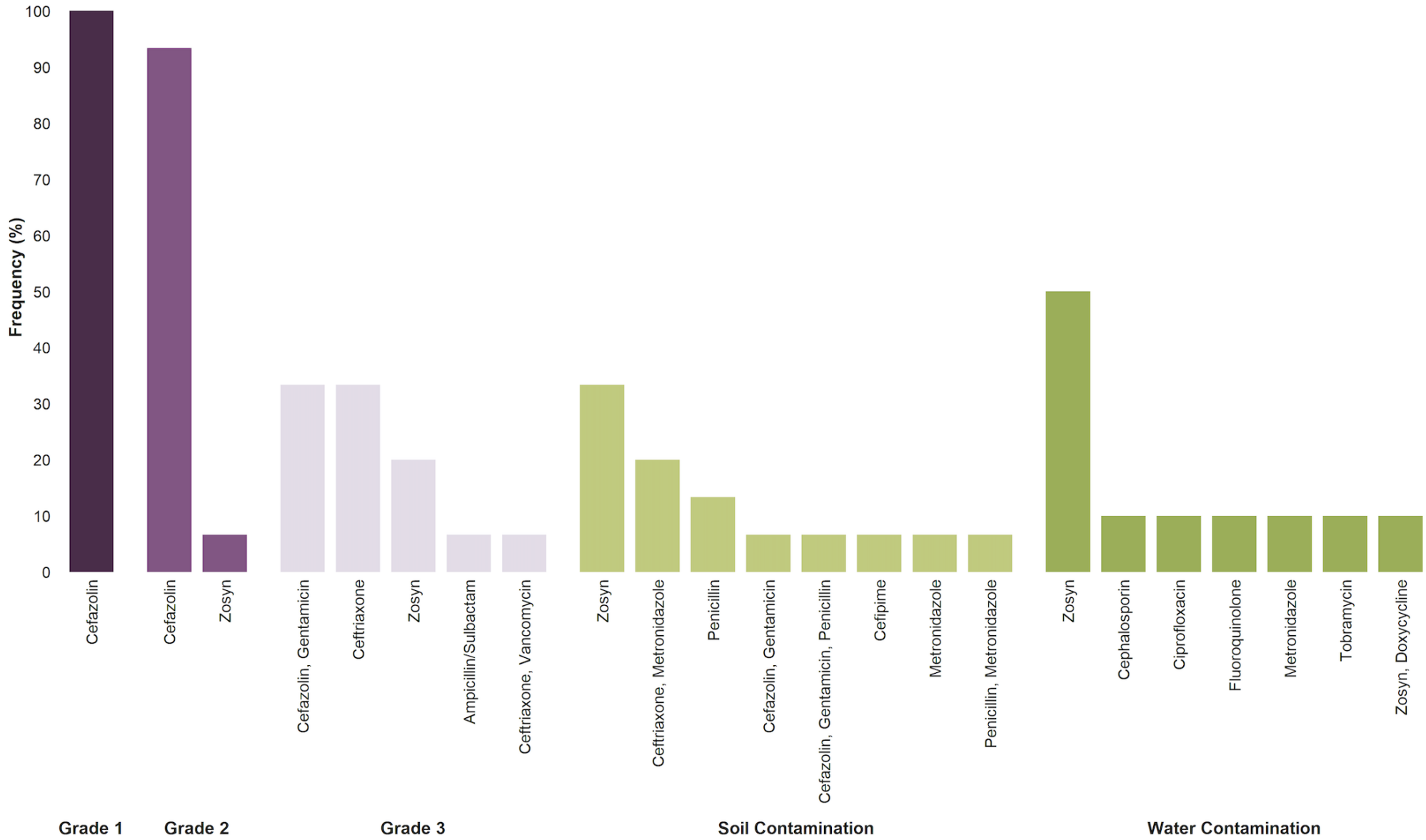
Clindamycin **(13/15)**

Vancomycin **(1/15)**

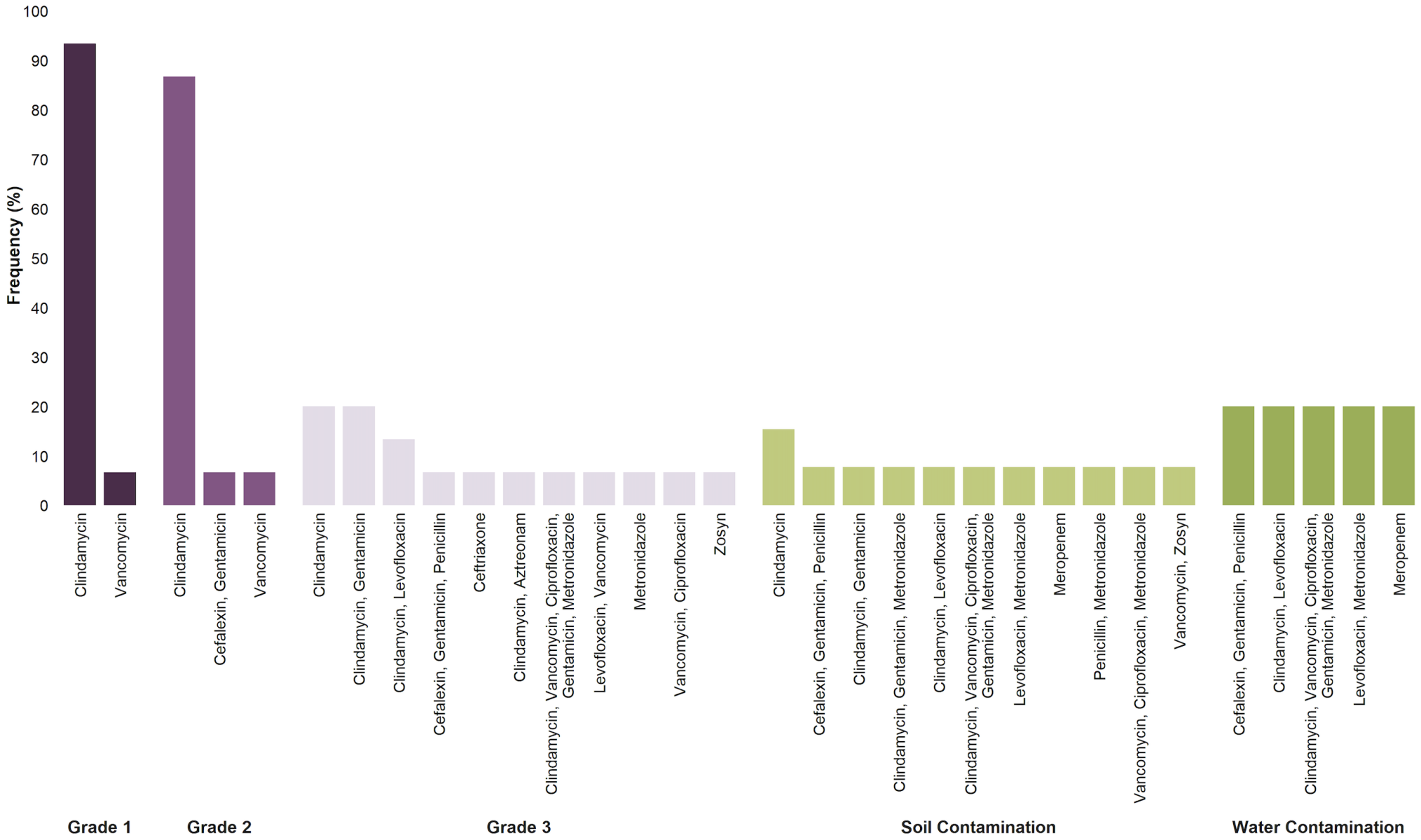
Cefazolin/Gent **(1/15)**

GRADE 3

GA TYPE 1,2, 3, SOIL, WATER ANTIBIOTICS



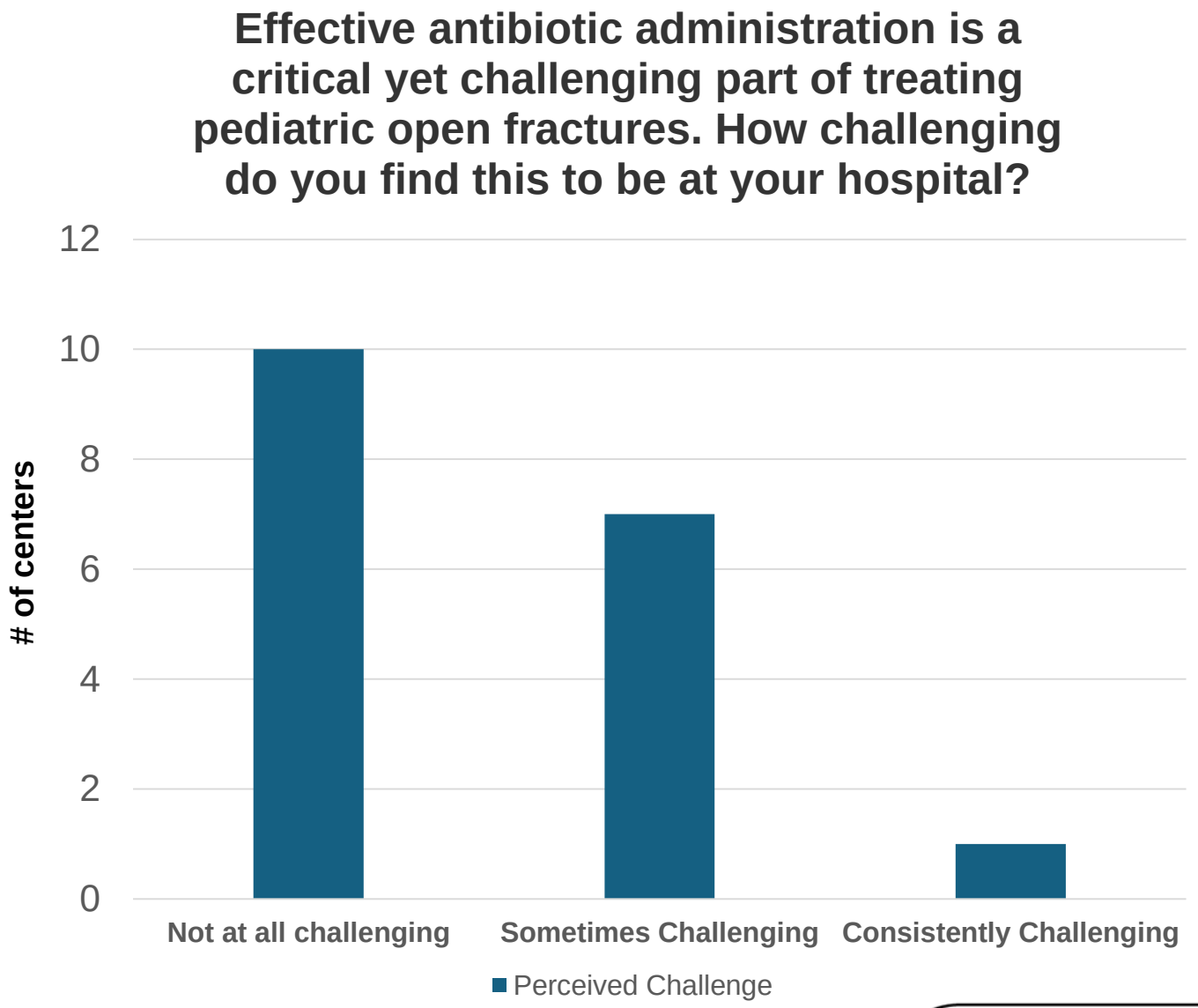
GA TYPE 1,2, 3, SOIL, WATER ANTIBIOTICS (ALLERGY ALTERNATIVE)



Who orders antibiotics for open fractures?

9 of 18: ED exclusively

9 of 18: ED or Ortho



DISCUSSION

KEY FINDINGS

- Most ACS Level 1 Pediatric Trauma Centers surveyed have official policies regarding timing and type of antibiotics for open fractures.
- Timing policies vary but the most frequent policy was <1 hour from time of ED arrival and success is possible!
- Multiple departments are involved in making policies and auditing success of IV antibiotic administration
- While selection of antibiotics for GA type 1 and 2 fractures are highly consistent, the selection of antibiotics for GA type 3 fractures +/- soil/water contamination have no consensus among centers

CONCLUSIONS

> There is significant variability in policies for administration of IV antibiotics for pediatric open fractures at ACS Level 1 Pediatric Trauma Centers.

> It is concerning that the greatest variability lies in treatment of the most severe injuries.

> Further studies should focus on establishing best practices for treatment of the most severe injuries.

NEXT STEPS: Retrospective Study

- Retrospective study open fractures in children at CORTICES institutions
- Focus on timing of antibiotics and rate of infection
- Focus on which antibiotics have lowest infection rates for GA type 3 fractures

THANK YOU

Thoracolumbar Burst Fx

Survey Updates

Craig Birch, Daniel Hedequist, Benjamin Shore

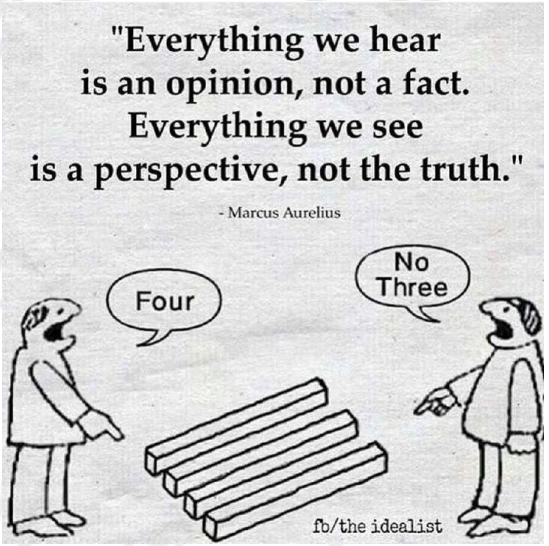
Boston Children's Hospital

Thoracolumbar Fractures CORTICES Survey

Craig Birch, Daniel Hedequist, Benjamin Shore (BCH)

PURPOSE

The purpose of this study was examine the patterns of on-call practices, call distribution, and case management approaches for spinal trauma cases across institutions participating in the CORTICES study group.



AIM

Primary aim
To characterize the on-call practices & case management approaches for spinal trauma across CORTICES institutions

Hypothesis: There is heterogeneity in the types of healthcare professionals and variability in the management strategies employed for spinal trauma cases.

METHODS

The survey was distributed to surgeons managing non-operative calls or treating thoracolumbar fractures at CORTICES study sites.

If the surgical team wasn't part of CORTICES, a delegate from the institution who performs surgeries completed the survey.

RESULTS

Demographics: 19 respondents from 18 CORTICES institutions, mean age 44 years (range: 34-63), majority male (89%) and White (67%)

Professional experience: Median practice duration of 8 years (range: 1-27). Training: 37% completed residency in the South, 37% completed fellowship in the Northeast.

Current practice: 26% in both the South and West regions.

Department affiliation: 84% orthopedics, 16% neurosurgery

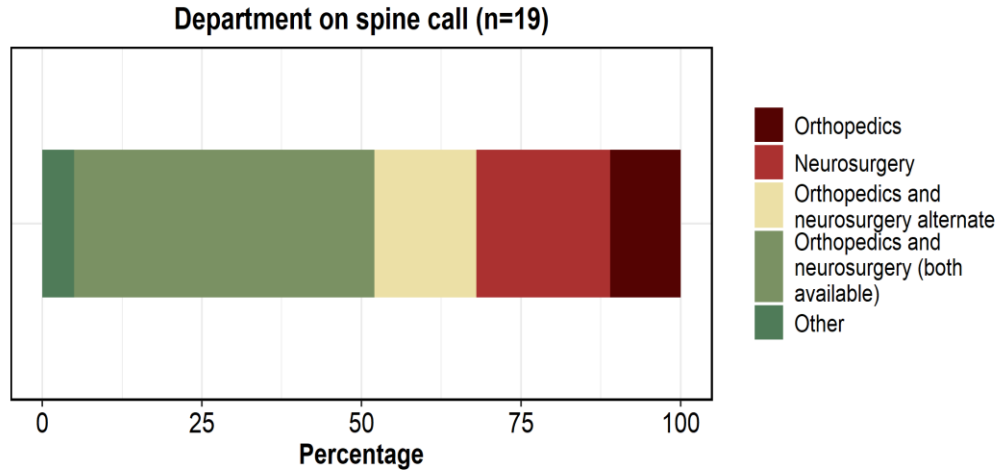
RESULTS

Spine Call Management Patterns

Most common setup: 47% (n=9) involve both orthopedics and neurosurgery teams.

Other arrangements:

- Neurosurgery alone: 21% (n=4)
- Alternating between orthopedics and neurosurgery: 16% (n=3)
- Orthopedics alone: 11% (n=2)



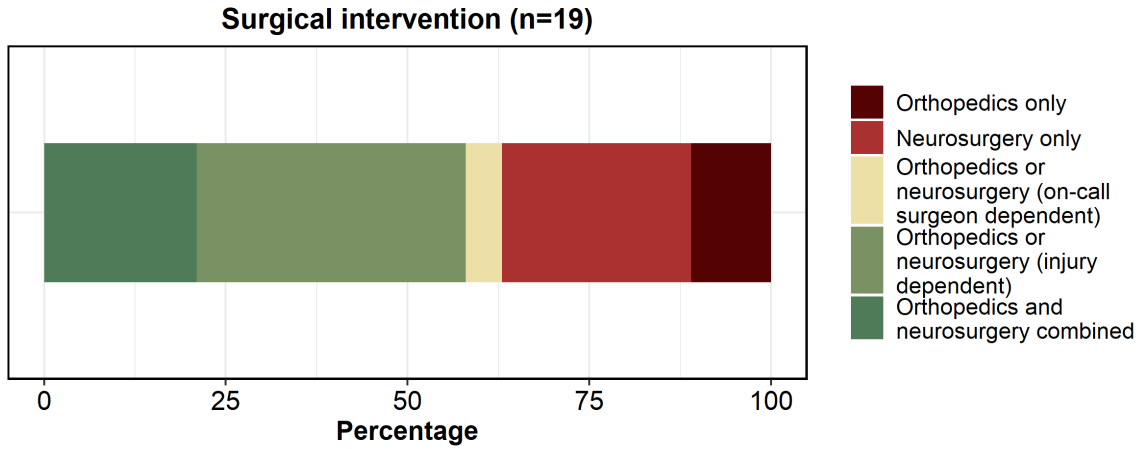
RESULTS

Operative Management Patterns

Most common setup: 37% (n=7) orth
or neurosurgery depending on schedul
and injury

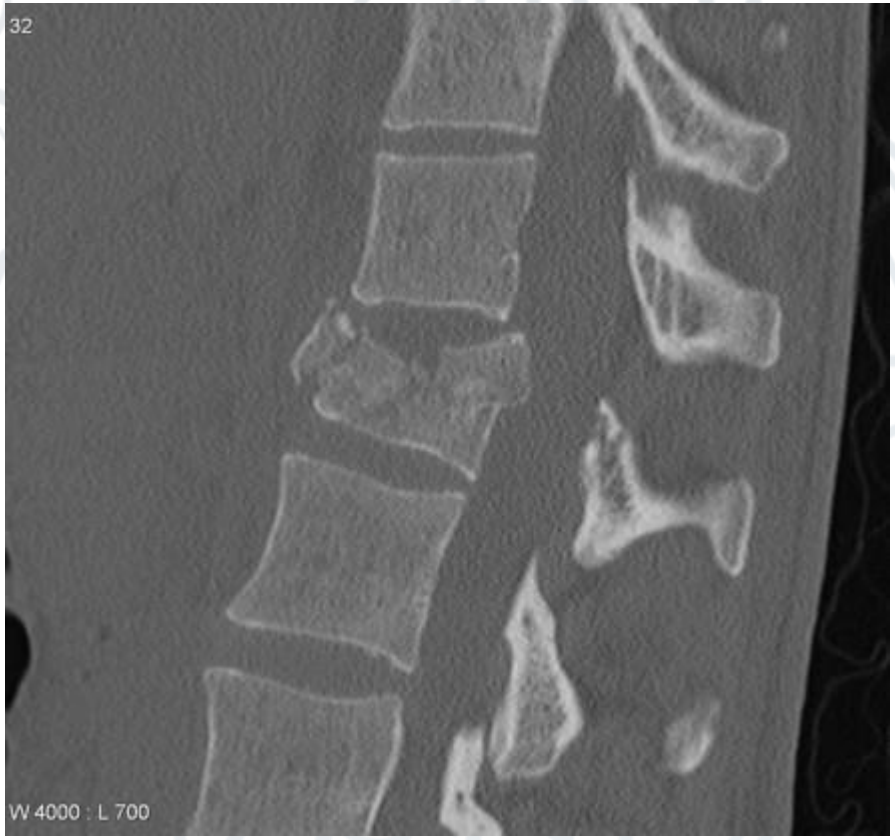
Other arrangements:

- Neurosurgery alone: 26% (n=5)
- Combination ortho and neurosurgery: 21% (n=4)
- Other arrangement: 16% (n=3)



RESULTS

Neurological status was the primary factor in determining admission to neurosurgery or orthopedics.



RESULTS

First Case: L1 injury with neurologic deficits

- There was consensus to treat with posterior spinal decompression and fusion (81%, 13/16).
- The most common upper instrumented level chosen was **T11** (56%, 9/16), and the most common lower instrumented level was **L3** (75%, 12/16).

RESULTS

First Case: L1 injury with neurologic deficits

However, wide variability in levels selected:

UIV

- T10 – 6% (n=1)
- T11 – 56% (n=10)
- T12 – 33% (n=6)

LIV

- L2 – 22% (n=4)
- L3 – 72% (n=13)
- Other – 6% (n=1)

RESULTS

Second Case: Neurologically intact L1 injury.

Half (8/16) of respondents taking operative spine call preferred non-operative treatment.

Among those opting for surgical management, posterior spinal fusion was the most popular (50%, 4/8), followed by posterior spinal instrumentation without fusion at (25%, 2/8).

T12 was the most commonly chosen (50%, 4/8) upper instrumented level, while **L3** was preferred for the lower instrumented level (63%, 5/8).

CONCLUSIONS

For a thoracolumbar injury with neurologic deficits, a consensus of treatment with posterior spinal decompression and fusion was reached.

Surgeons varied in which upper and lower instrumentation levels they would utilize. When the injury did not include neurologic deficits, surgeons were equally split on surgical and non-surgical management.

Key Takeaways

- Call arrangements vary widely by location
- Surgical management is performed by a wide variety of providers and arrangements vary by location
- Consistent treatment of unstable fracture with neurodeficit with decompression and fusion
- Wide variety of non-op v op for intact burst fractures
- Level selection did not follow classic teaching of 2-up, 2-down pattern and varied widely

NEXT STEPS

This survey demonstrated that there is significant variability in call patterns and management of spine trauma

Next step to catalog the variability of surgically managed spine trauma patients (essentially answer the questions of what have we been doing so far and how has it worked)

NEXT STEPS

How?

Start collecting the operative spine trauma cases from each institution to assess for the operative characteristics

NEXT STEPS

- Demographics (assess who gets injured and how)
- Fracture type (AO TL classification of fractures based on injury films)
- Operative intervention (posterior v A/P; with decompression without)
- Level selection (UIV and LIV)
- Assess when the 2-up, 2-down rule is broken (by injury type, patient type)
- Complication data to see when fixation failure or reoperation occurs

- Ideally this allows us to provide information about when it is safe to break the 2-up, 2-down rule and not result in fixation failure or poor outcomes

Membership, Website & Research Processes

11:10 AM to 12:00 PM

Research Committee Updates

Fernanda Canizares & Ishaan Swarup
CORTICES Research Committee

Research Committee Structure

- **New members:**
  - Stephanie Moore-Lotridge
  - Fernanda Canizares
  - Ishaan Swarup

- **Longstanding Members:**
  - Keith Baldwin
  - Walter Truong

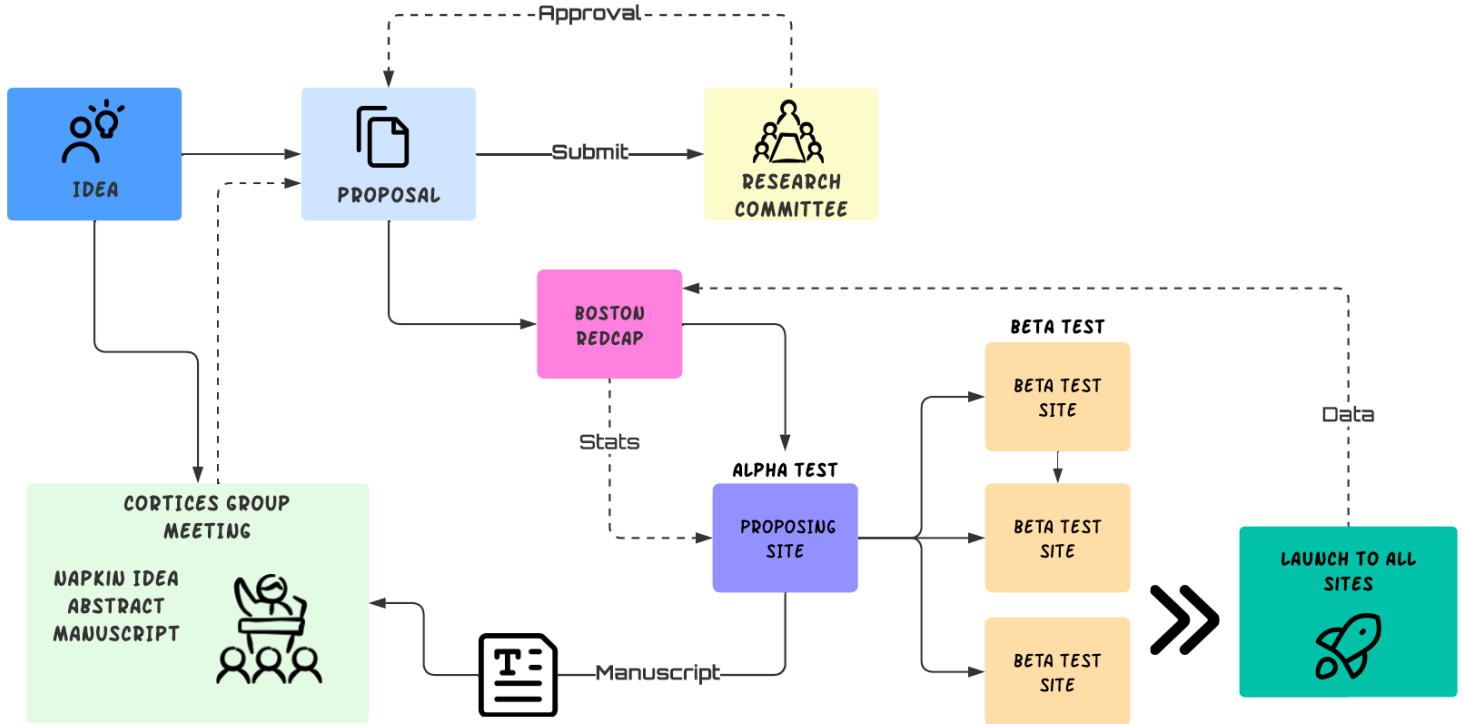
Research Proposal Types

- Prospective: Requires new IRB
- Retrospective: Under current IRB. Chart review, secondary data, EMR.
- Expedited:
  - Surveys about practice variation
  - Use of existing databases (i.e Floating elbow, NAT)
  - Systematic reviews

Research Process

Retrospective studies

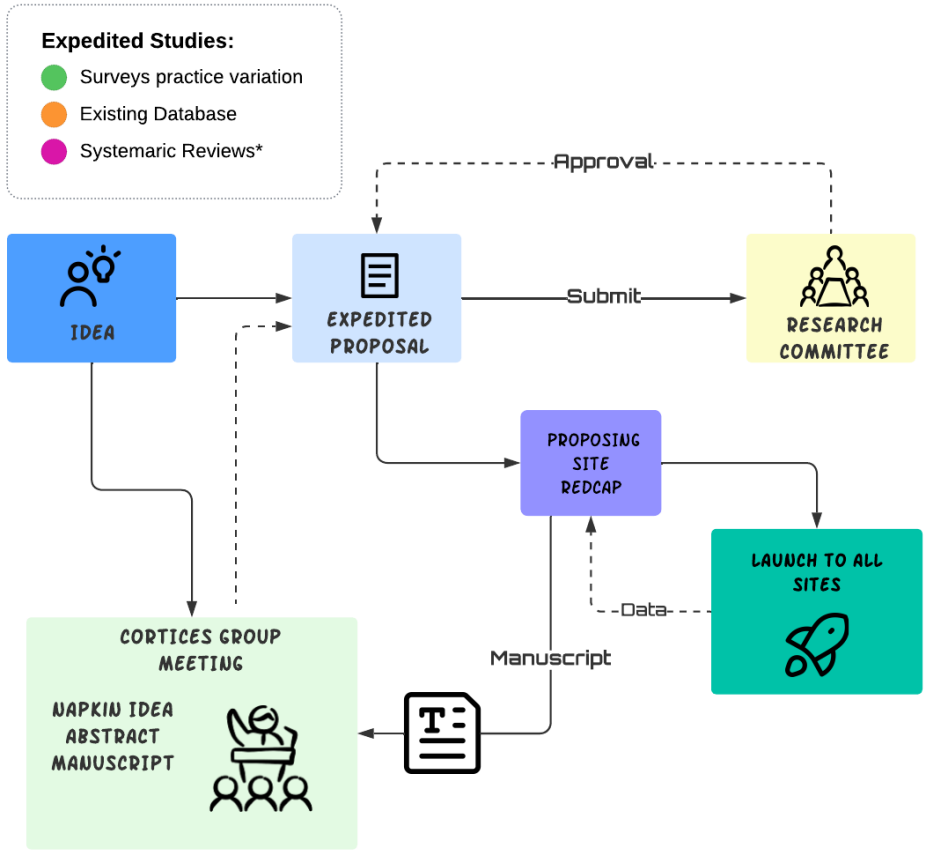
1. Idea presented at CORTICES meeting to gather feedback
2. Create a research Proposal and submit to the research committee (RC).
3. RC reviews, scores, and provides feedback.
4. Proposing team: variable list to Boston.
5. Boston creates REDCap
6. Proposing site tests own data (α-test)
7. Three Sites test database (β-test)
8. Study is launched to all sites.



Research Process

Expedited studies:

1. Idea presented at CORTICES meeting to gather feedback
2. Create an Expedited Research Proposal and submit to the research committee (RC).
3. RC reviews, scores, and provides feedback.
4. Proposing site creates REDCap for surveys, or requests existing data from Boston REDCap.
5. Proposing site sends survey to interested sites.
6. Proposing site conducts systematic review, RC doesn't need to approve, but will provide guidance if needed.

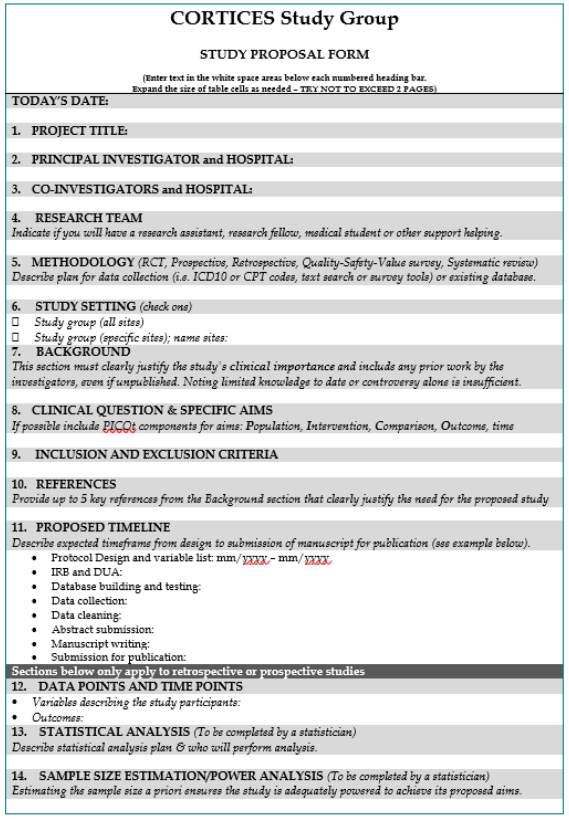


Research Proposal Forms

Steps:

1. Title, PI, up to 2 Co-PIs, hospitals, research team.
2. Methods: Survey, ICD/CPT codes
3. ***Background* Justify why your question is clinically important.**
4. Aims/research questions
5. Inclusion/Exclusion
6. Five Key References
7. Timeline
8. Data points: variables
9. Statistical analysis *Stats*
10. Power analysis/sample

Retrospective



CORTICES Study Group

STUDY PROPOSAL FORM

(Enter text in the white space areas below each numbered heading bar.
Expand the size of table cells as needed – TRY NOT TO EXCEED 2 PAGES)

TODAY'S DATE:

1. PROJECT TITLE:

2. PRINCIPAL INVESTIGATOR and HOSPITAL:

3. CO-INVESTIGATORS and HOSPITAL:

4. RESEARCH TEAM
Indicate if you will have a research assistant, research fellow, medical student or other support helping.

5. METHODOLOGY *(RCT, Prospective, Retrospective, Quality-Safety-Value survey, Systematic review)*
Describe plan for data collection (i.e. ICD10 or CPT codes, text search or survey tools) or existing database.

6. STUDY SETTING *(check one)*
☐ *Study group (all sites)*
☐ *Study group (specific sites); name sites:*

7. BACKGROUND
This section must clearly justify the study's clinical importance and include any prior work by the investigators, even if unpublished. Noting limited knowledge to date or controversy alone is insufficient.

8. CLINICAL QUESTION & SPECIFIC AIMS
If possible include PICOt components for aims: Population, Intervention, Comparison, Outcome, time

9. INCLUSION AND EXCLUSION CRITERIA

10. REFERENCES
Provide up to 5 key references from the Background section that clearly justify the need for the proposed study

11. PROPOSED TIMELINE
Describe expected timeframe from design to submission of manuscript for publication (see example below).
- Protocol Design and variable list: mm/yyyy – mm/yyyy
- IRB and DUA:
- Database building and testing:
- Data collection:
- Data cleaning:
- Abstract submission:
- Manuscript writing:
- Submission for publication:

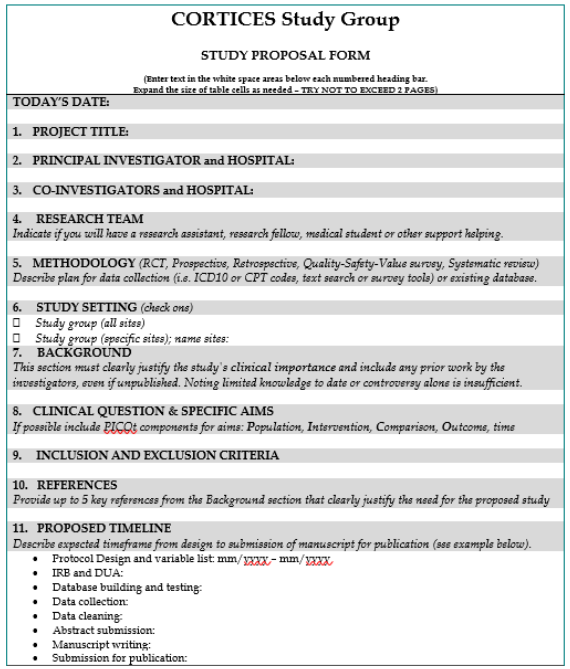
Sections below only apply to retrospective or prospective studies

12. DATA POINTS AND TIME POINTS
- *Variables describing the study participants:*
- *Outcomes:*

13. STATISTICAL ANALYSIS *(To be completed by a statistician)*
Describe statistical analysis plan & who will perform analysis.

14. SAMPLE SIZE ESTIMATION/POWER ANALYSIS *(To be completed by a statistician)*
Estimating the sample size a priori ensures the study is adequately powered to achieve its proposed aims.

Expedited



CORTICES Study Group

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5. METHODOLOGY *(RCT, Prospective, Retrospective, Quality-Safety-Value survey, Systematic review)*
Describe plan for data collection (i.e. ICD10 or CPT codes, text search or survey tools) or existing database.

6. STUDY SETTING *(check one)*
☐ *Study group (all sites)*
☐ *Study group (specific sites); name sites:*

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- Protocol Design and variable list: mm/yyyy – mm/yyyy
- IRB and DUA:
- Database building and testing:
- Data collection:
- Data cleaning:
- Abstract submission:
- Manuscript writing:
- Submission for publication:

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Seattle Children's
HOSPITAL · RESEARCH · FOUNDATION

Scoring system

- **Standardized Evaluation:** each one is assessed based on the same criteria → fairness.
- **Quality Control:** to maintain internal and external credibility
- **High Standards:** Allows the research committee not only to provide feedback about science, but also feasibility.

- **Factor 1 : Importance of the Research**
  - Significance, Innovation
  - Scored 1 - 9
- **Factor 2 : Rigor and Feasibility**
  - Approach (*also includes Inclusion and Clinical Trial (CT) Study Timeline*)
  - Scored 1 - 9
- **Factor 3 : Expertise and Resources**
  - Investigators, Environment
  - Evaluated as appropriate or gaps identified; gaps require explanation
  - Considered in overall impact; no individual score

Scoring for Retro-Prospective

STUDY PROPOSAL SCORING	High----Medium---Low								
	1	2	3	4	5	6	7	8	9
Factor 1: Importance of the Research									
Significance: Assess the importance of the proposed retrospective research question in addressing a knowledge gap in the management of emergent pediatric orthopedic conditions (trauma and infection).									
Innovation: Evaluate the use of innovative concepts, methods, or approaches in the proposed retrospective research to enhance patient care and outcomes. Also, consider if the proposal could answer multiple research questions.									
Factor 2: Rigor and Feasibility									
Rigor: Evaluate the rigor of the research design, appropriate controls (when applicable), sample size justification, analysis plans, and relevance of proposed outcome variables.									
Feasibility: Evaluate if the study can be completed with available resources within the specified timeline. Ensure the data collection plan aligns with objectives, ICD/CPT codes adequately identify orthopedic pathologies, and data quality is consistent across centers.									
Factor 3: Expertise and Resources									
Investigator(s): Evaluate the expertise and experience of researchers in pediatric orthopedic surgery and their ability to conduct rigorous retrospective research within CORTICES. *If support is needed and you have a mentor in mind please indicate: _____	☐ Appropriate			☐ Needs support*					
Environment: Assess the availability of resources (i.e. research assistant) at proposing site to support the successful execution of the proposed retrospective research.	☐ Appropriate			☐ Needs support					

1. Assess the importance of the research

2. Methodological Rigor and Feasibility

3. Expertise and Resources

Scoring for Expedited Studies

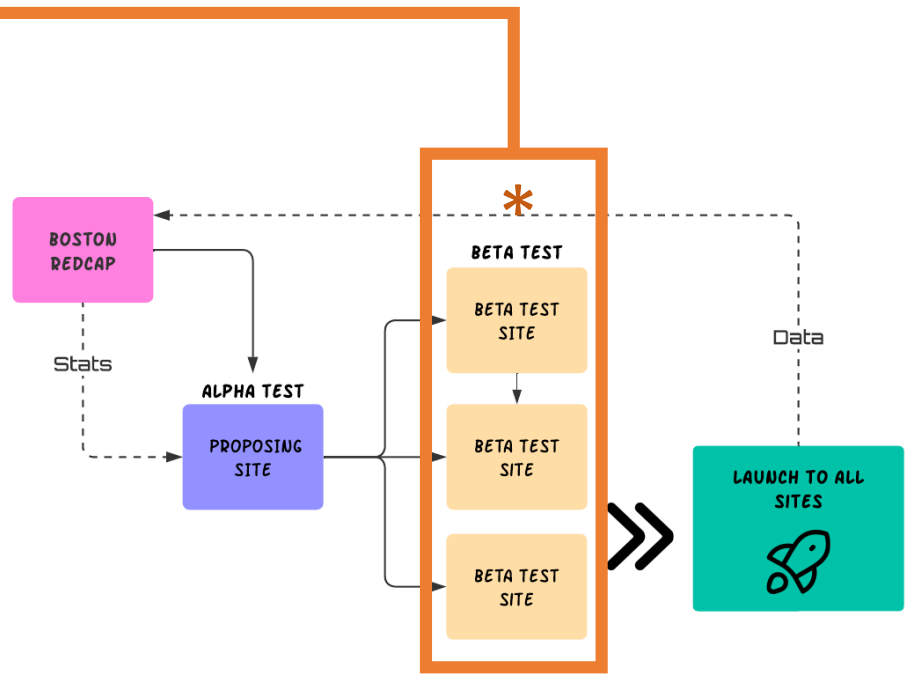
STUDY PROPOSAL SCORING	High----Medium---Low								
	1	2	3	4	5	6	7	8	9
Factor 1: Importance of the Research									
Significance: Assess the importance of the study aims and evaluate whether the survey format is appropriate for addressing the research question.									
Factor 2: Rigor and Feasibility									
Feasibility: Evaluate whether the study can be efficiently completed within the specified timeline, leveraging existing data or survey responses.									
Factor 3: Expertise and Resources									
Investigator(s): Evaluate whether the investigator has the necessary experience in survey design and execution to successfully complete the project. *If support is needed and you have a mentor in mind please indicate: _____	☐ Appropriate				☐ Needs support*				

1. Assess the importance of the research
2. Methodological Rigor and Feasibility
3. Expertise and Resources

Beta Site Testing-Group

We want to create a group for sites that need only minimal IRB papewok and no SSA →**Beta Test Group:**

Site	No SSA	Only IRB date
Boston Children's Hospital	x	x
Children's Hospital of Philadelphia	x	x
Le Bonheur Children's Hospital	x	x
Texas Children's Hospital	x	x
CMC Dallas/TSRH	x	x
University of Michigan	x	x
Washington University in St. Louis	x	x



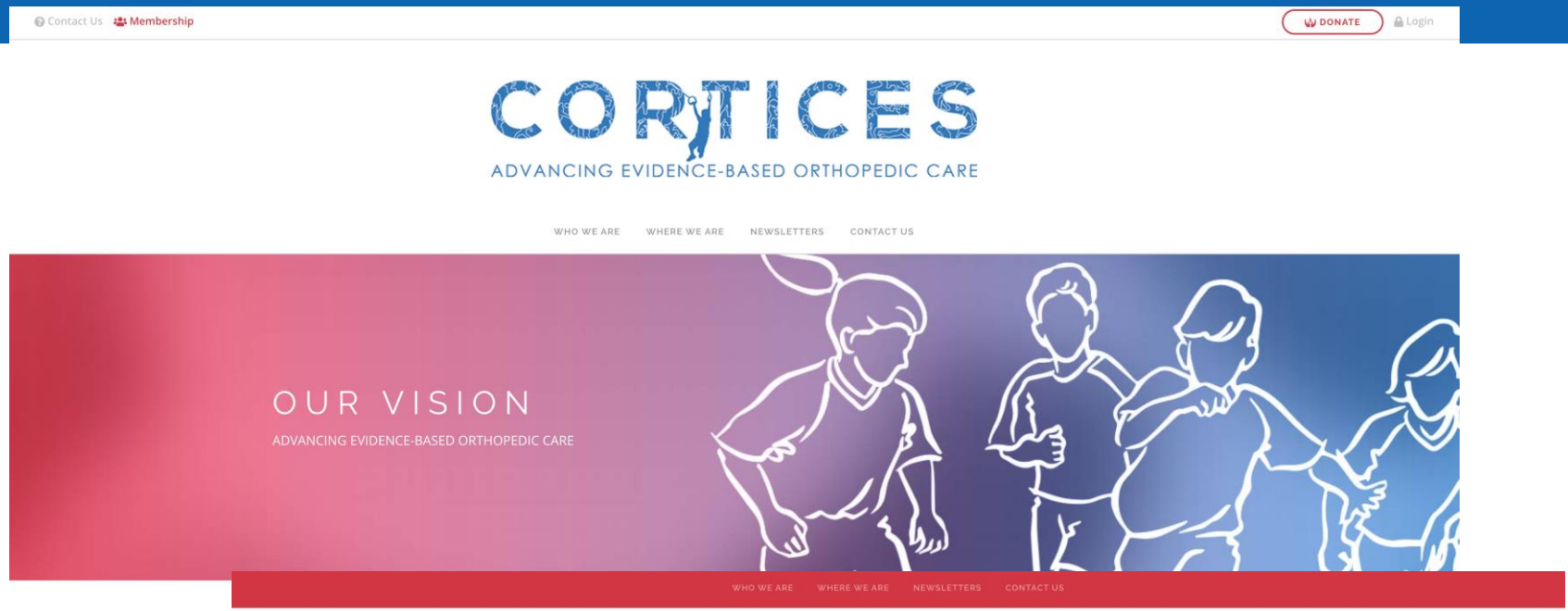
Surveys for Practice Variation

- Current IRB is retrospective and doesn't allow patient or subject contact.
- However, surveys that are collected within your institutional Quality Improvement Framework:
  - De-identified
  - Surveys whose primary purpose is to gauge opinions and perceptions, satisfaction, clinical practice guidelines, projects to improve clinical care → **No IRB review (~at BCH).**
- Your IRB has to know that you will use QI surveys as source of data.

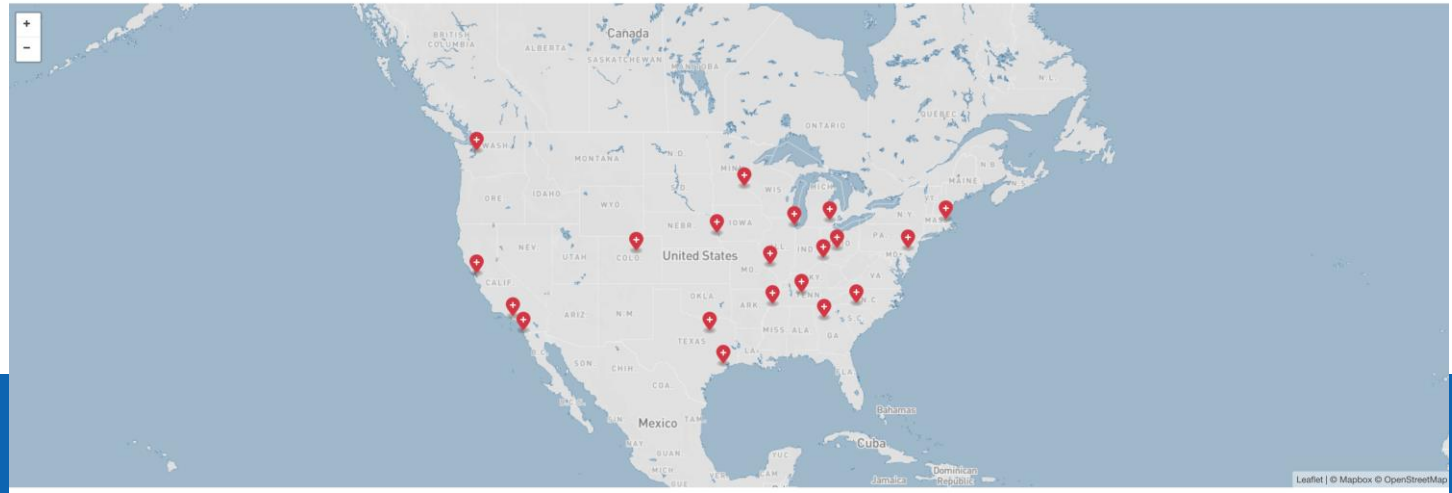
CORTICES Website Updates

Meghana Venkatesh
Boston Children's Hospital

Before...

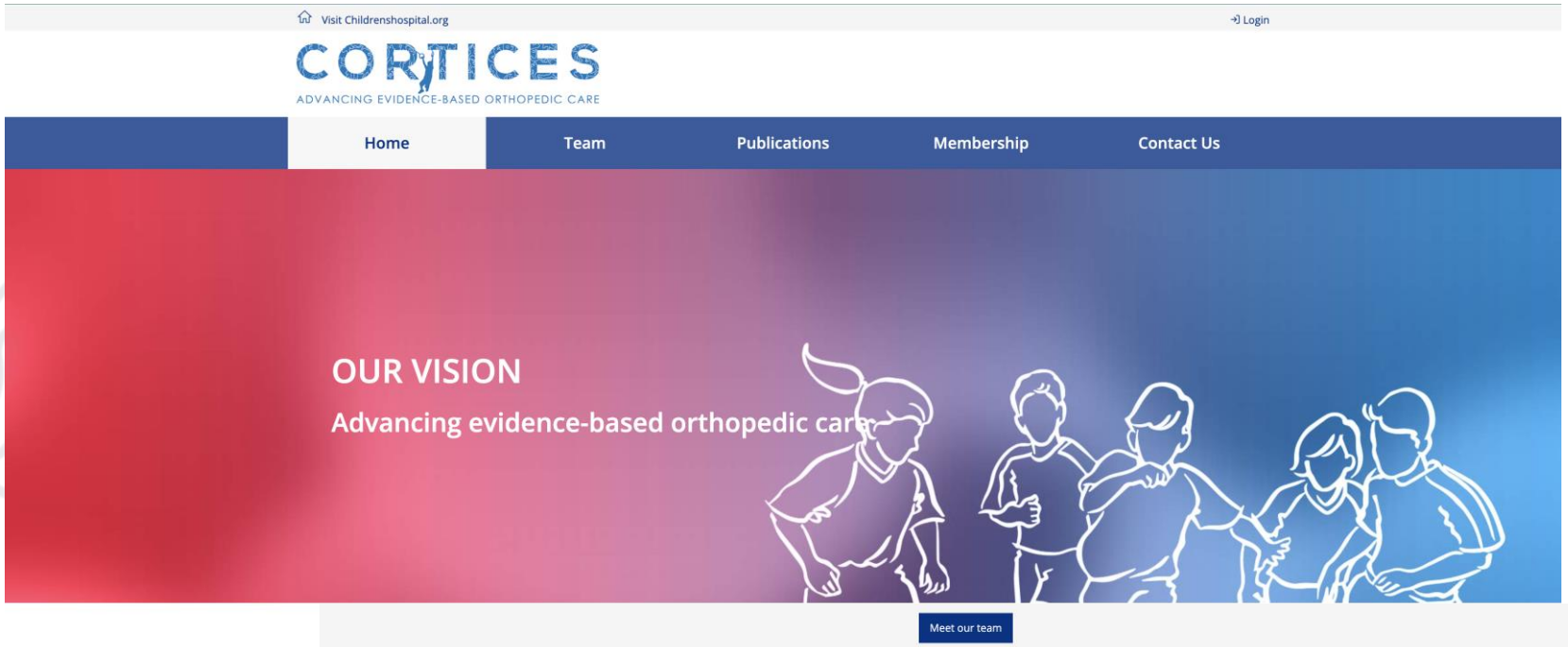


OUR LOCATIONS



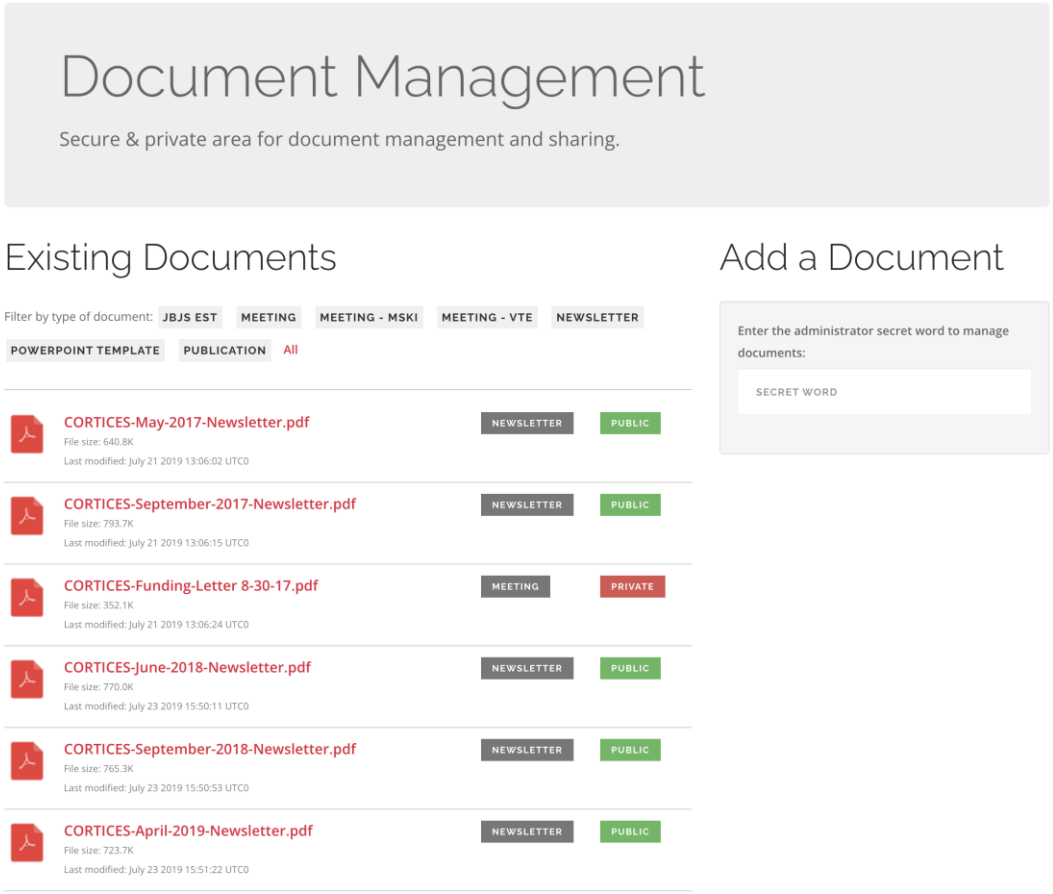
CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

After



CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Before...


Document Management
Secure & private area for document management and sharing.
Existing Documents
Filter by type of document: JBJS EST MEETING MEETING - MSKI MEETING - VTE NEWSLETTER POWERPOINT TEMPLATE PUBLICATION All
CORTICES-May-2017-Newsletter.pdf
File size: 640.8K
Last modified: July 21 2019 13:06:02 UTC0
NEWSLETTER PUBLIC
CORTICES-September-2017-Newsletter.pdf
File size: 793.7K
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NEWSLETTER PUBLIC
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NEWSLETTER PUBLIC
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File size: 765.3K
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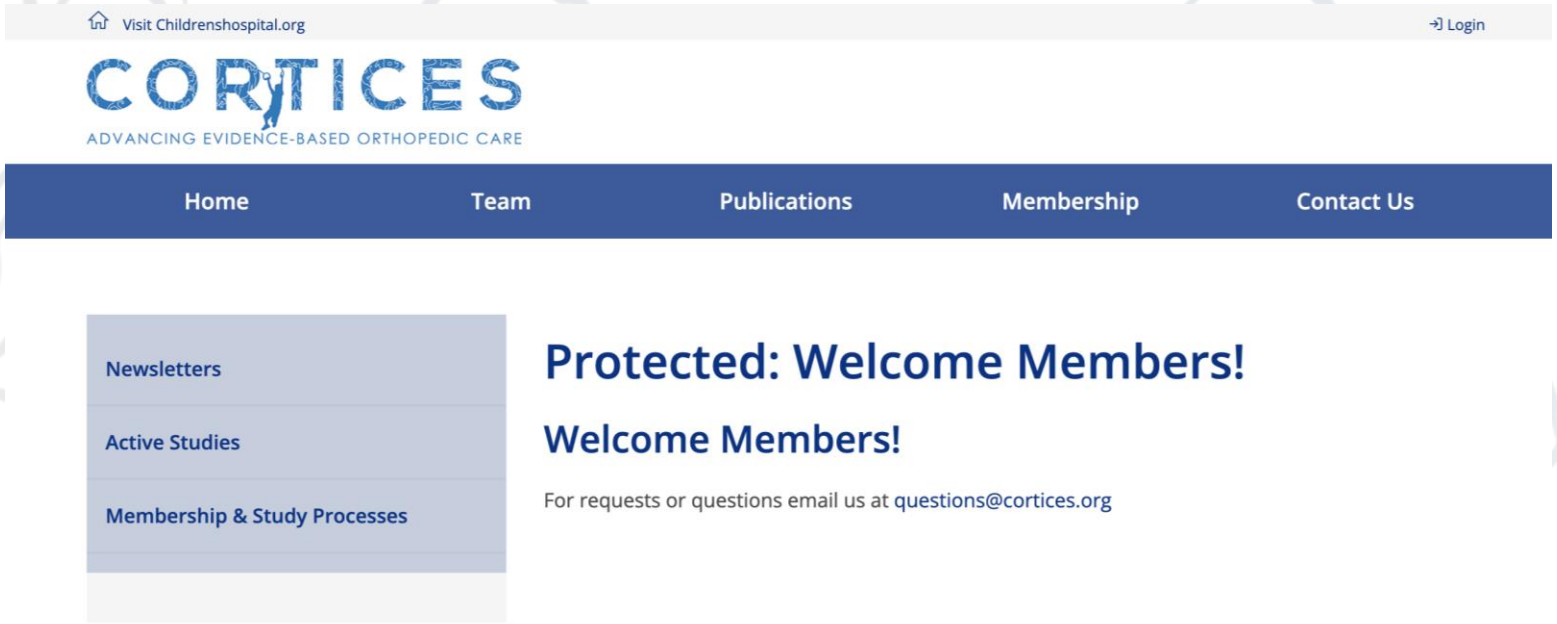
NEWSLETTER PUBLIC
CORTICES-April-2019-Newsletter.pdf
File size: 723.7K
Last modified: July 23 2019 15:51:22 UTC0
NEWSLETTER PUBLIC
Add a Document
Enter the administrator secret word to manage documents:
SECRET WORD

After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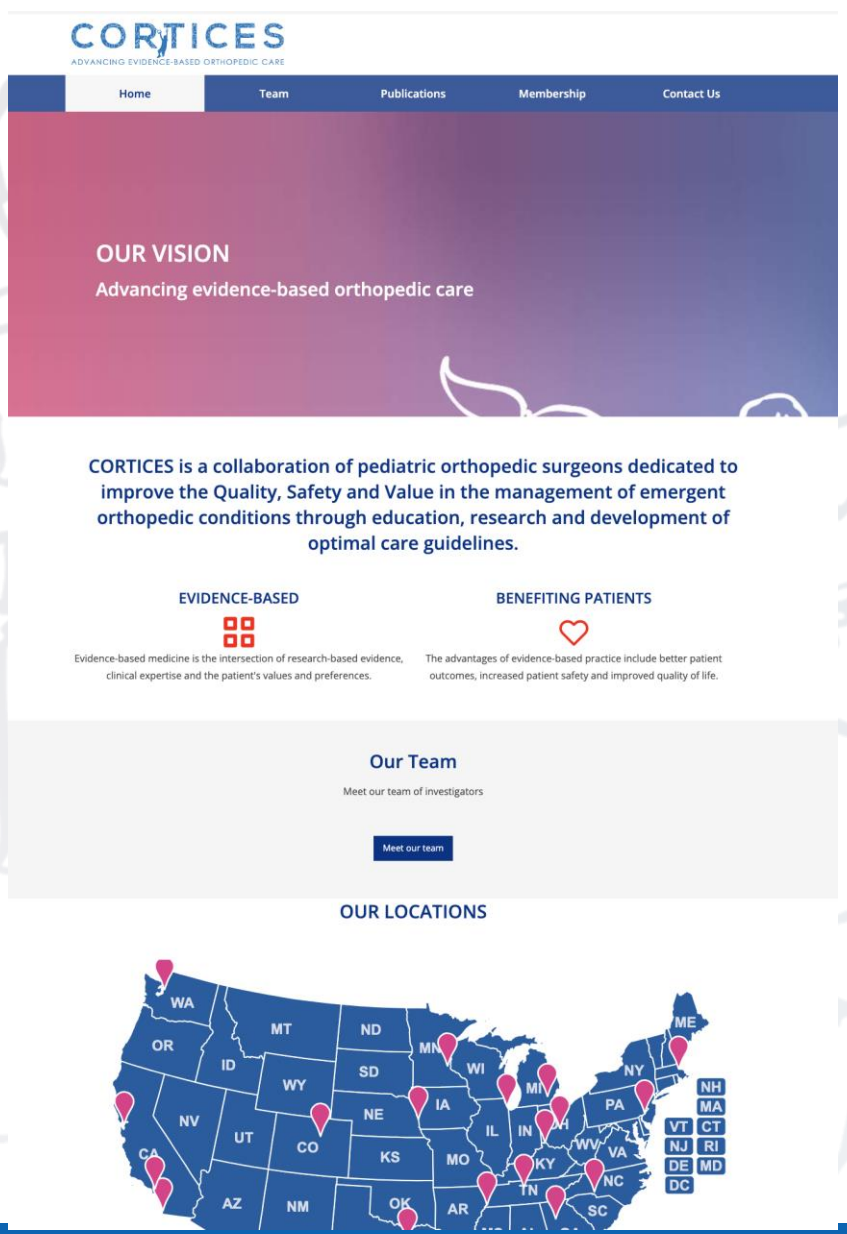
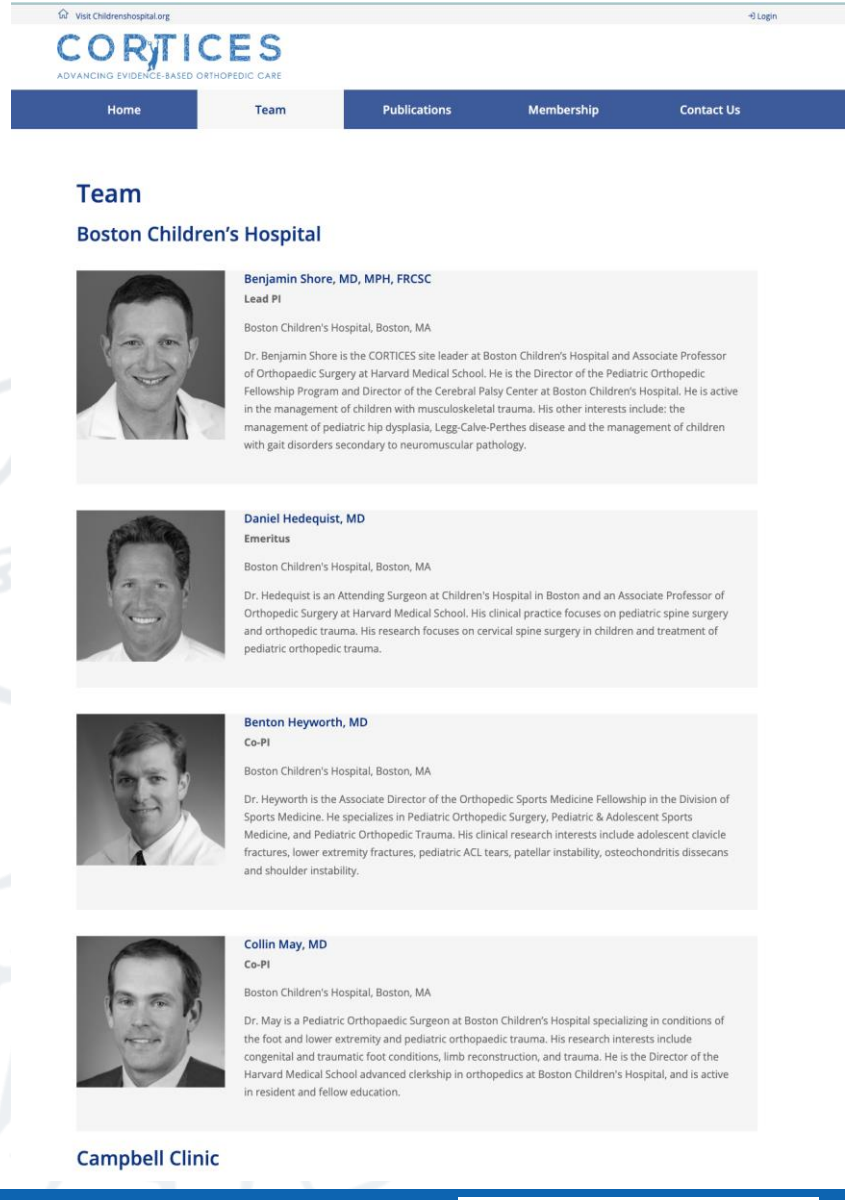
Membership & Study Processes
Protected: Welcome Members!
Welcome Members!
For requests or questions email us at questions@cortices.org

Public Page: Home & Team





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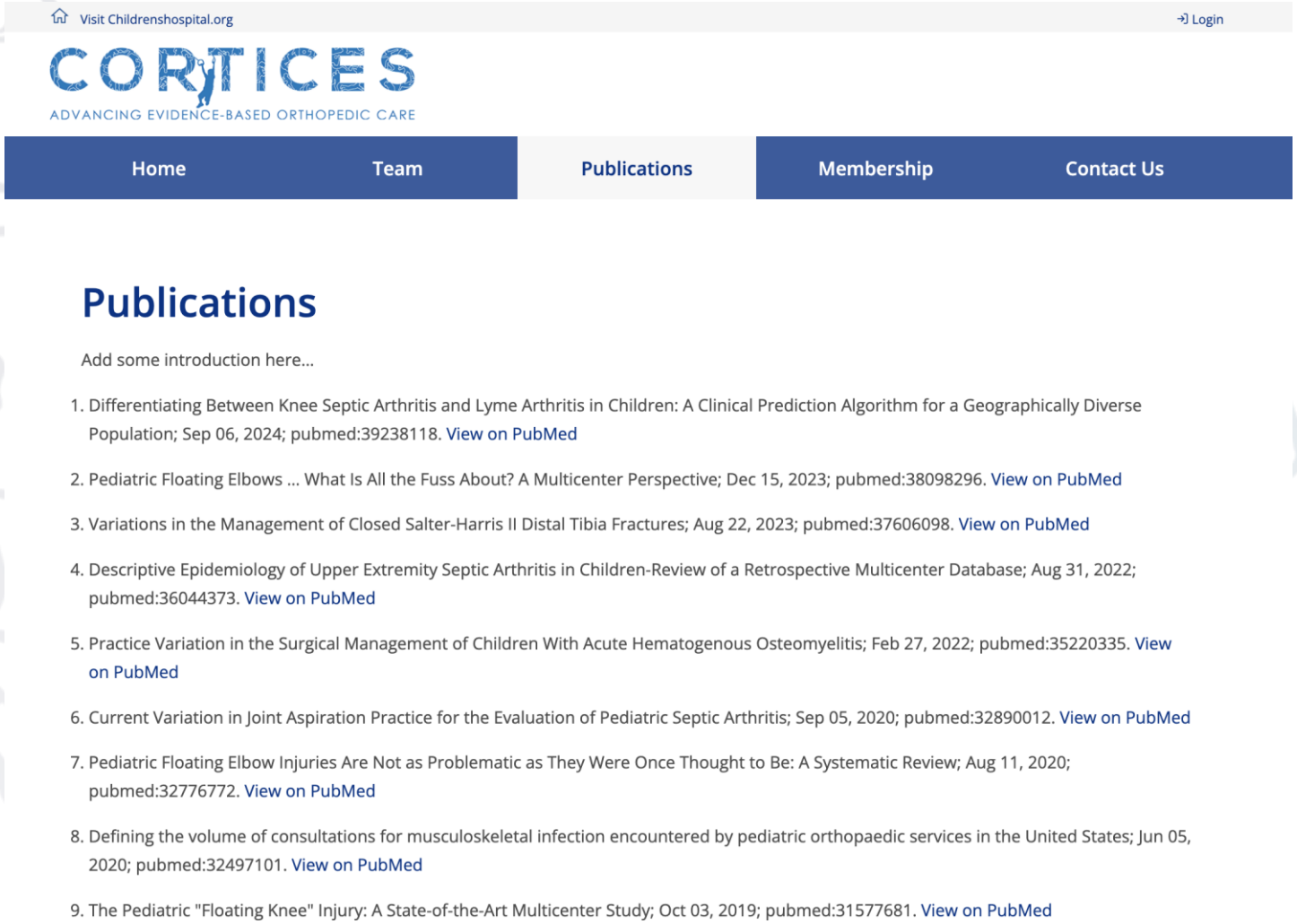
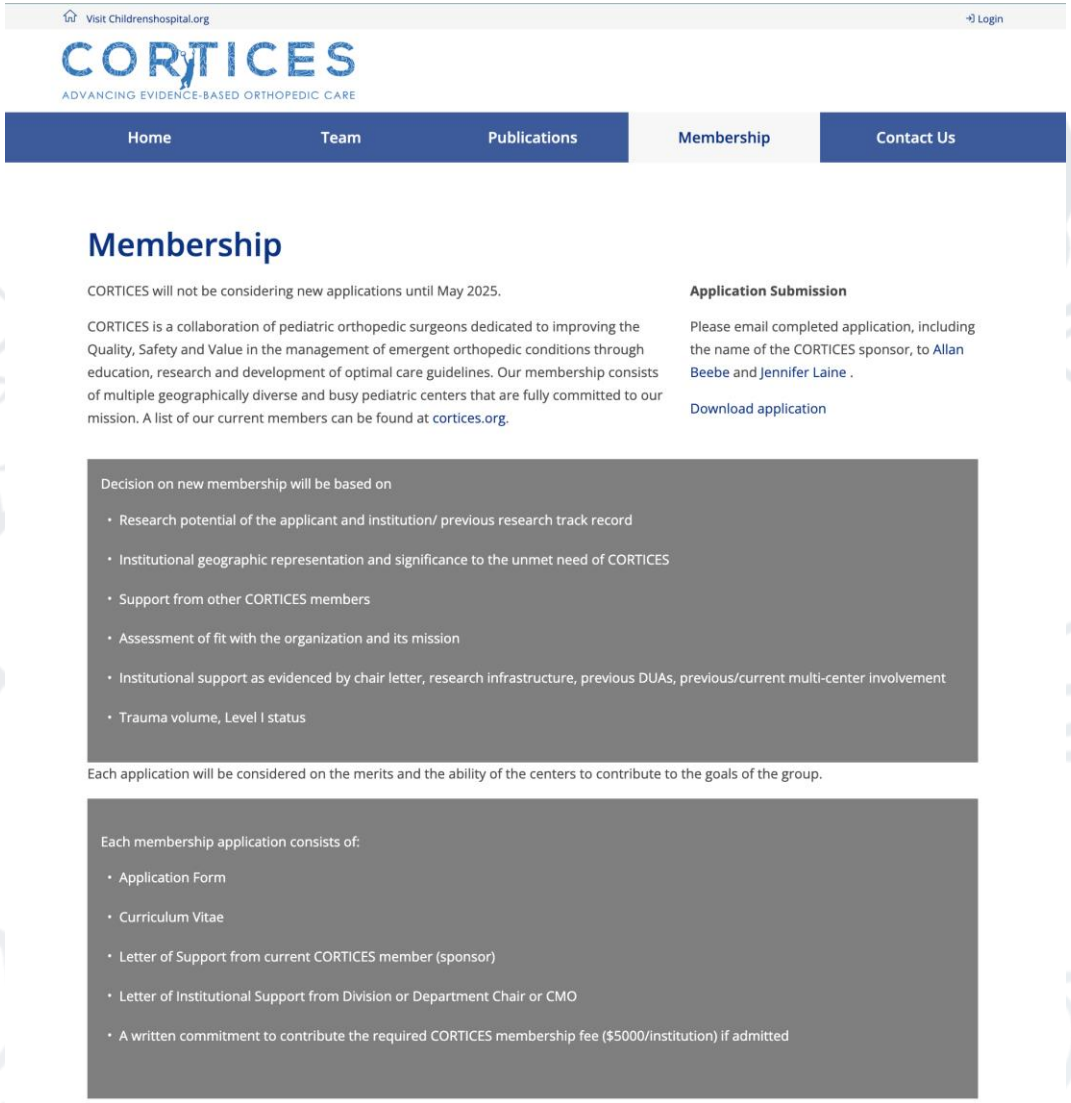
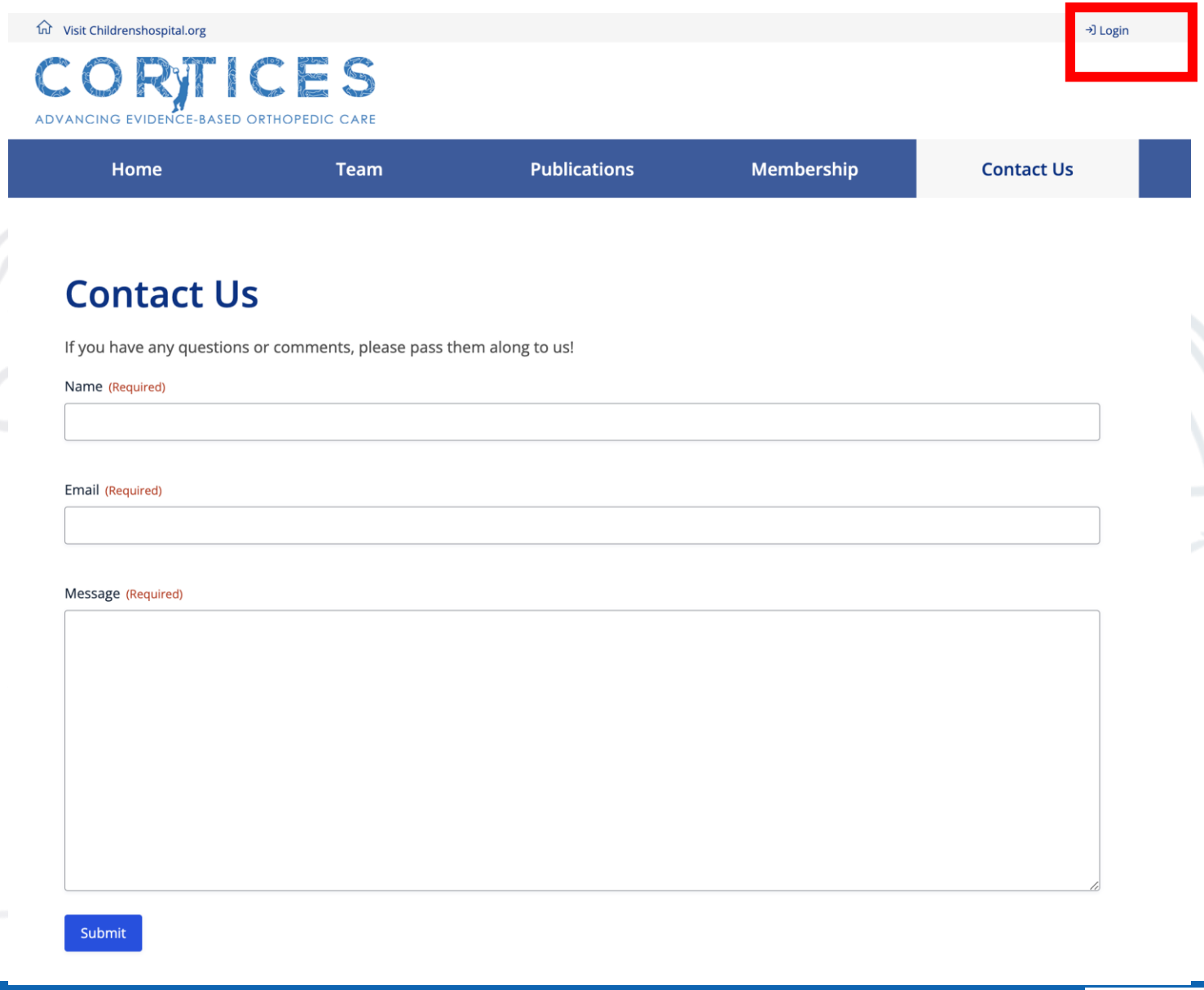
Public Page: Publications



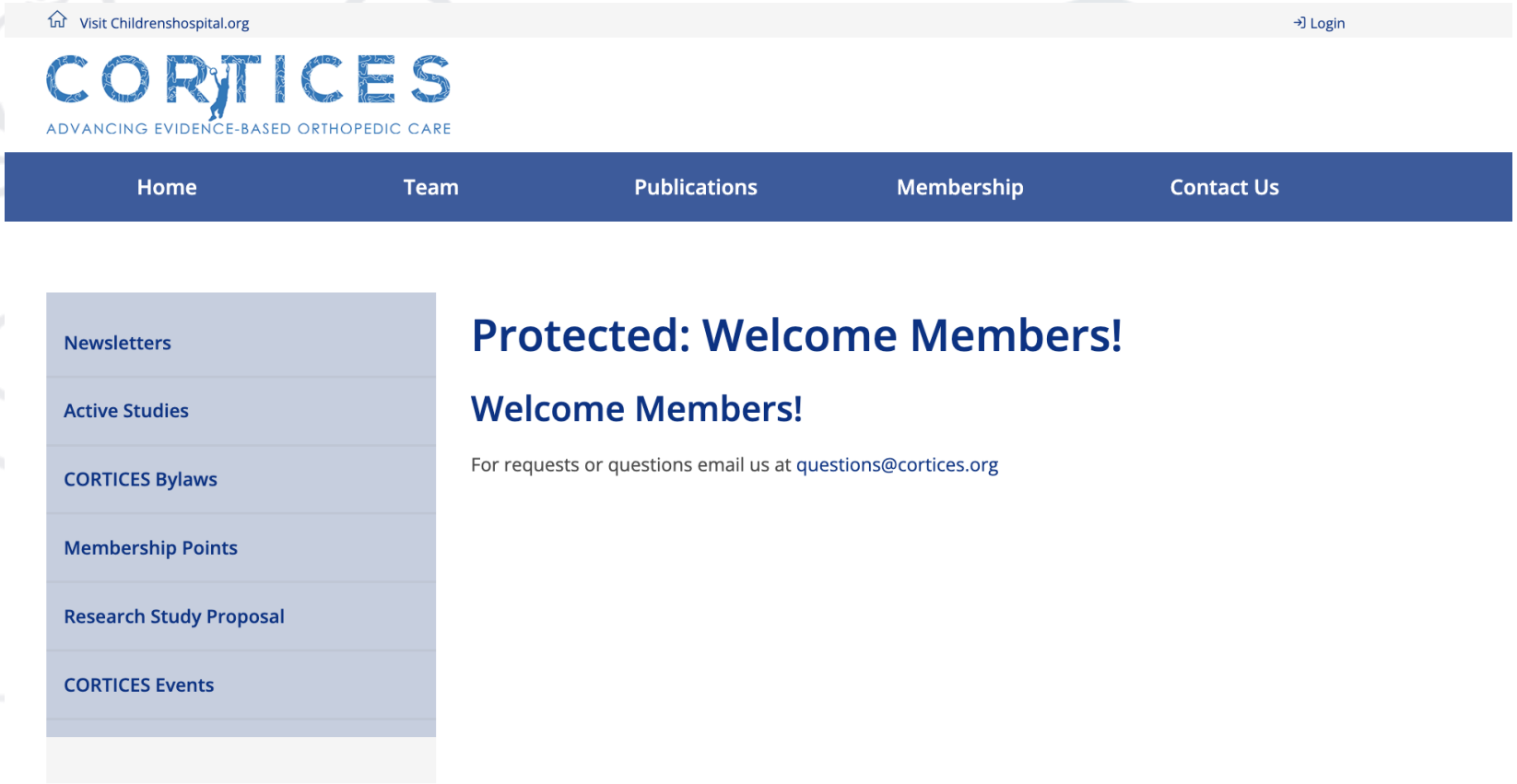
Public Page: Membership & "Contact Us"



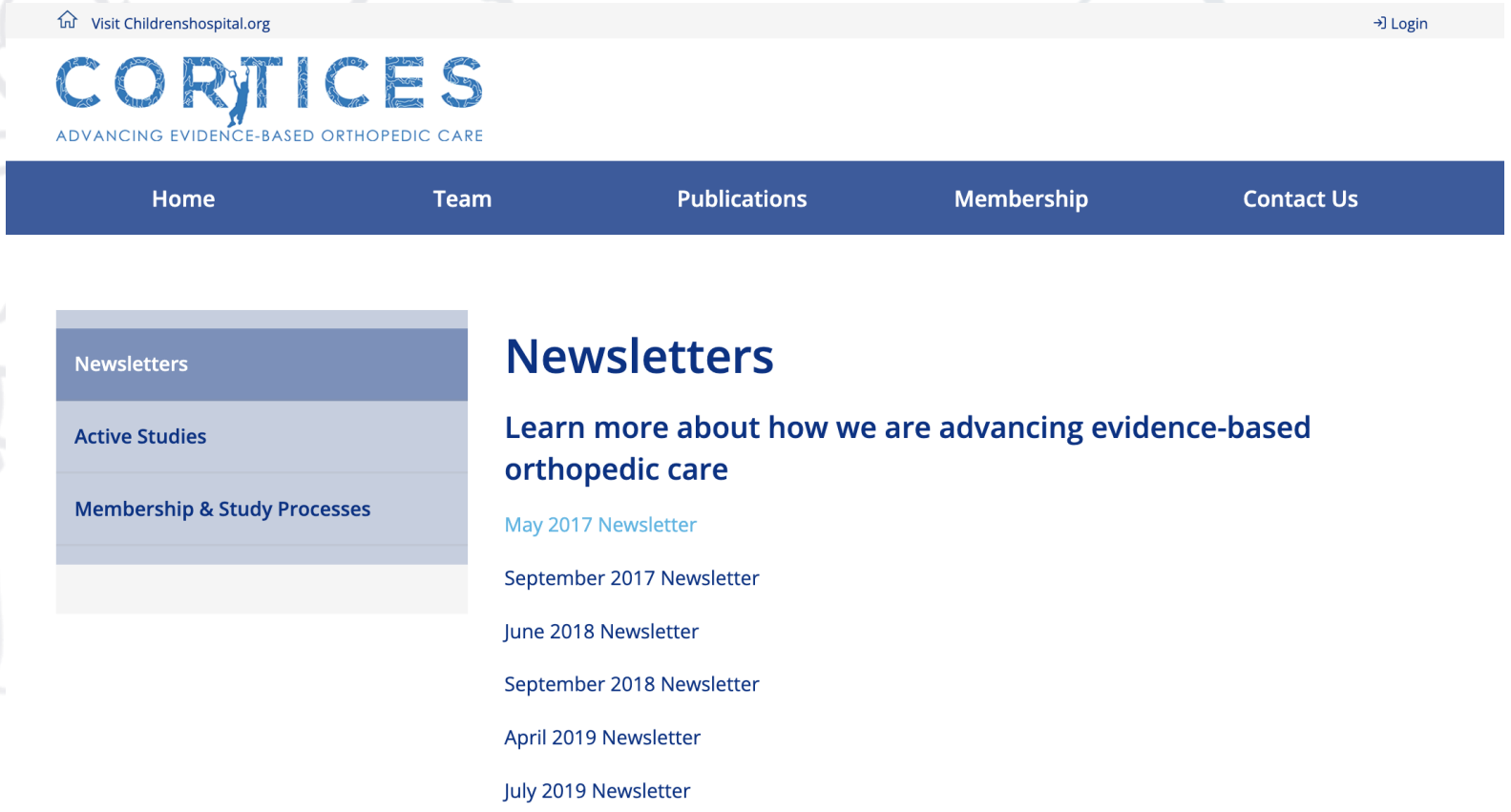
Public Page: Membership & "Contact Us"



Internal Page



Internal Page: Newsletters



Internal Page: Active Studies

- Each Study will have Data Entry Guide, Variable List, Study Launch specifics and more

Internal Page: To be Added & Next Steps

- To be Added:
  - Welcome Members tab
  - Membership Points tab
    - Adding a Redcap link to collect points
  - Research Study Proposal Tab
    - Webform to be added, will allow study proposals to be submitted to Research Executive Committee for Review

Questions & Suggestions

CORTICES Membership Update

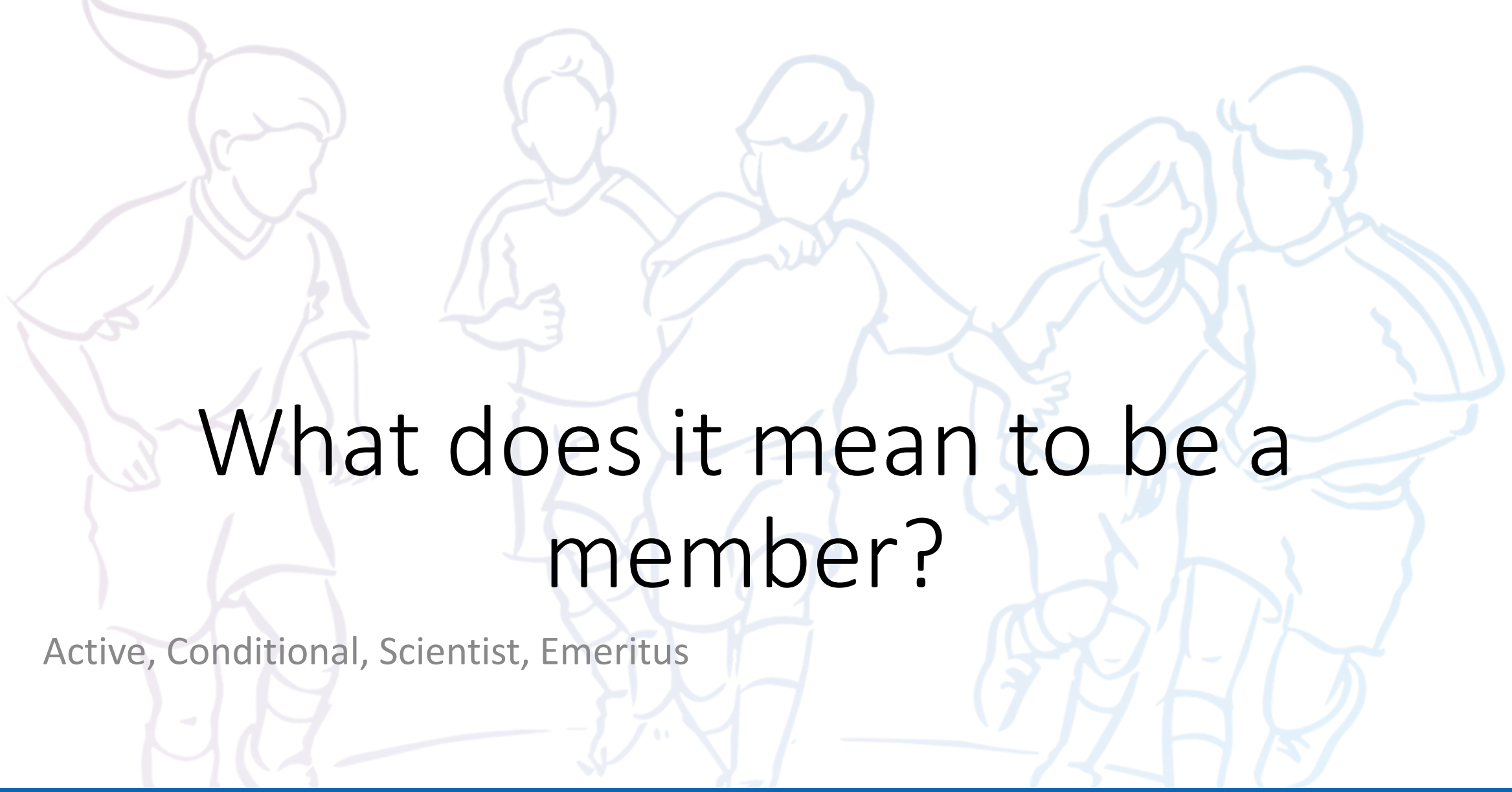
Allan Beebe, MD and Jennifer Laine, MD
CORTICES Membership Committee

Membership Topics

- Membership Timeline
- Points should represent current state
- Proposed Points Process
- New Application Cycle?

Membership Timeline

- 2020: Application Cycle (5 applied, 2 accepted)
  - **only application cycle for new institutions in history of CORTICES**
- 2022: Filled out dyad/scientific representation (11)
- 2023: Admitted new members (4) and 1 transfer from existing institutions



What does it mean to be a member?

Active, Conditional, Scientist, Emeritus

CORTICES

Membership Status

Active:

Conditional:

- Admitted at time of inception
- Or, met criteria for Active Membership
- May: serve on Board, all committees, has full voting

Membership Status

Active:

Conditional:

- Newly admitted members
- Previous active (did not maintain active)
- 2 year max

Criteria for Active Membership

Two Categories:

- **Institutional Requirements**
- **Individual Membership Points System**

Criteria for Active Membership

Two Categories:

- **Institutional Requirements**
- **Individual Membership Points System**

- **Membership Dues Current**
- **DUA Active and Signed**
  - **At least 1 ongoing study**
- **Active IRB**
  - **At least 1 active study**

Criteria for Active Membership

Two Categories:

- **Institutional Requirements**
- **Individual Membership Points System**

- **3 points over the last year**
- **Points assessed on annual basis**
- **Notified of points status prior to (next) annual meeting**

Updated Process

- In addition to BCH tracking, REDCap survey before each annual and POSNA meeting
- Self-reporting will help maintain record of points
- Will receive report card of individual points
  - (prelim report card available today)

Points System – Updated to Reflect Current State

4 Categories:

1) Attendance

2) Data/Responsiveness

3) Participation

4) Productivity/Visibility/Funding

Updates to Points: Attendance

- **1 Point:** Attendance @ current Fall Meeting - BCH + redcap tracked
  - 0.5 points if attend virtually for significant portion
- **0.5 Point:** Attendance @ previous year Fall Meeting - BCH + redcap tracked
  - 0.25 points if attended virtually for significant portion
- **1 Point:** Attendance @ recent POSNA meeting - BCH + redcap tracked
- **0.5 Point:** Attendance @ previous year POSNA - BCH + redcap tracked

Updates to Points: Data/Responsiveness

- **2 Points**: Complete data requests/queries in a timely fashion (ie. no additional reminders, responds to emails in a timely fashion) over the last 12 months for active studies BCH tracked
-

Updates to Points: Participation

- **1 Point:** BOD participation - BCH + redcap tracked
- **2 Points:** For hosting CORTICES meetings- BCH tracked
- **0.25 points**: for each survey completed – BCH and redcap tracked

Updates to Points: Productivity/Visibility/Funding

- **2 points:** Write first draft of manuscript from CORTICES study – redcap tracked
- **1 Point:** Podium presentation for CORTICES study – redcap tracked
- **1 Point:** Poster presentation for CORTICES study (1 point) – redcap tracked
- **2 Points**: Lead or Co-Lead (max 3 PIs) development of new approved retrospective or prospective independent study for CORTICES group (e.g Floating Knee, VTE) (2 points) -- (this does not include developing a survey study, systematic review or question of existing database as this should be captured in the podium/poster/MS points and other point delegations)- BCH tracked

Updates to Points: Productivity/Visibility/Funding, Cont'd.

- **1 Point:** Develop and send new approved survey for CORTICES group
- **1 Point:** Launching study through CORTICES within 1 year of study approval from CORTICES Group- BCH tracked
- **1 Point:** PI (or Co-PI) submits external Grant Submission to support CORTICES study – BCH tracked
- **1 Point:** PI (or Co-PI) is awarded an external Grant to support CORTICES study - BCH tracked

→ If approve, will need to change bylaws

April 2023 to August 2024																				
Site	Role	Individual	NAT Data request Pull & Cleaning (UP TO 2.0*)	CORTICES Meeting Host 2023-2024 (2.0)	Manuscript first draft (2.0)	Lead or Co-Lead new approved study (2.0)	Develop and Send new approved Survey (1.0)	Launch new Study within 1 year of group approval (1.0)	BOD Participation (1.0)	Attendance @ 2024 May POSNA meeting (1.0 in person) (0.5 virtual)	Attendance @ 2023 Philly Annual Meeting (0.5 in person) (0.25 virtual)	Attendance @ 2023 May POSNA (0.5 in person) (0.25 virtual)	Participated in approved Survey (0.25 each)	Podium Presentation for CORTICES 2024 study (1.0)	Poster presentation for CORTICES 2024 (1.0)	PI/CO-PI Submits grant request for CORTICES (1.0)	PI/CO-PI is awarded and external grant for CORTICES (1.0)	Other Podium or Poste presentation (1.0)	Total Points	Average for Institution
Boston Children's Hospital	PI	Benjamin Shore	2.0		2.0				1.0	1.0	0.5	0.5							7.0	4.6
	Emeritus	Daniel Hedequist	2.0				1.0												3.0	
	Co-PI	Benton Heyworth	2.0								0.5	0.5							3.0	
	Co-PI	Collin May	2.0		2.0					1.0	0.5	0.5							6.0	
	Co-PI	Kristin Livingston	2.0				1.0			1.0									4.0	
Children's Healthcare of Atlanta	PI	Josh Murphy	2.0																2.0	2.8
	Co-PI	Dell McLaughlin	2.0							1.0		0.5							3.5	
Children's Hospital Los Angeles	PI	Rachel Goldstein	1.0							1.0		0.5							2.5	2.0
	Co-PI	Jonas Owen	1.0									0.5							1.5	
Children's Hospital of Philadelphia	PI	Keith Baldwin	2.0	2.0		2.0			1.0			0.5							7.5	7.5
	Co-PI	Alexandre Arkader	2.0	2.0		2.0				1.0		0.5							7.5	
Cincinnati Children's Hospital	PI	Jaime Rice Denning	1.0						1.0	1.0	0.5	0.5							4.0	4.5
	Co-PI	Wendy Ramalingam	1.0			2.0				1.0	0.5	0.5							5.0	
Colorado Children's Hospital	PI	Julia Sanders	2.0							0.5	0.25	0.5							3.3	3.1
	Co-PI	Sayan De	2.0								0.5	0.5							3.0	
Children's Minnesota Hospital	PI	Jennifer Laine	2.0						1.0	1.0		0.5.							4.0	4.3
	PI	Walter Truong	2.0						1.0	1.0	0.25	0.25							4.5	
	Co-PI	Emmalyn Sigrist	2.0							1.0									3.0	
Le Bonheur Children's Hospital	PI	David Spence	1.0						1.0	1.0	0.5	0.5							4.0	3.0
	PI	Benjamin Sheffer	1.0								0.5	0.5							2.0	
Levine Children's Hospital	PI	Brian Brighton	N/A																0.0	0.0
Lurie Children's Hospital	PI	Jill Larson	2.0			2.0				0.5	0.5	0.5							5.5	5.5
Nationwide Children's Hospital	PI	Allan Beebe	2.0							1.0	0.25	0.5							3.8	3.9
	Co-PI	Allen Kadado	2.0							1.0	0.5	0.5							4.0	
Rady Children's Hospital	PI	Salil Upasani	1.0						1.0	1.0	0.25	0.5							3.8	2.6
	PI	Katie Rickert	1.0									0.5							1.5	
Seattle Children's Hospital	PI	Antoinette Lindberg	0.0																0.0	0.5
	PI	Todd Blumberg	0.0							0.5		0.5							1.0	
Texas Children's Hospital	PI	Scott Rosenfeld	2.0		2.0					1.0	0.5	0.5		1.0					7.0	5.0
	PI	Jessica McGrath	2.0							1.0									3.0	
Texas Scottish Rite Hospital for Children CMC Dallas	PI	Lawson Copley	2.0			2.0				1.0	0.5	0.5							6.0	4.6
	PI	Megan Johnson	2.0						1.0	1.0	0.5	0.5							5.0	
	PI	Brandon Ramo	2.0									0.5							2.5	
	PI	Tony Riccio	2.0						1.0	1.0	0.5	0.5							5.0	
University of Michigan	PI	Ying Li	2.0		2.0				1.0	1.0	0.5	0.5			1.0				8.0	6.1
	Co-PI	Matt Stepanovich	2.0		2.0							0.25							4.3	
Vanderbilt	PI	Jon Schoenecker	1.0							1.0	0.5	0.5				1.0			4.0	4.0
	PhD	Stephanie Moore-Lotridge	1.0						1.0	1.0	0.5	0.5				1.0			5.0	
	Co-PI	Nathaniel Lempert	1.0								0.5	0.5				1.0			3.0	
Washington University in St. Louis	PI	Mark Miller	1.0			2.0				1.0	0.5	0.5							5.0	3.3
	Co-PI	Zachary Meyer	1.0									0.5							1.5	
UCSF Benioff Children's Hospital	PI	Ishaan Swarup	1.0						1.0	0.5	0.25	0.5							3.3	2.6
	Co-PI	Jaclyn Hill	1.0								0.5	0.5							2.0	

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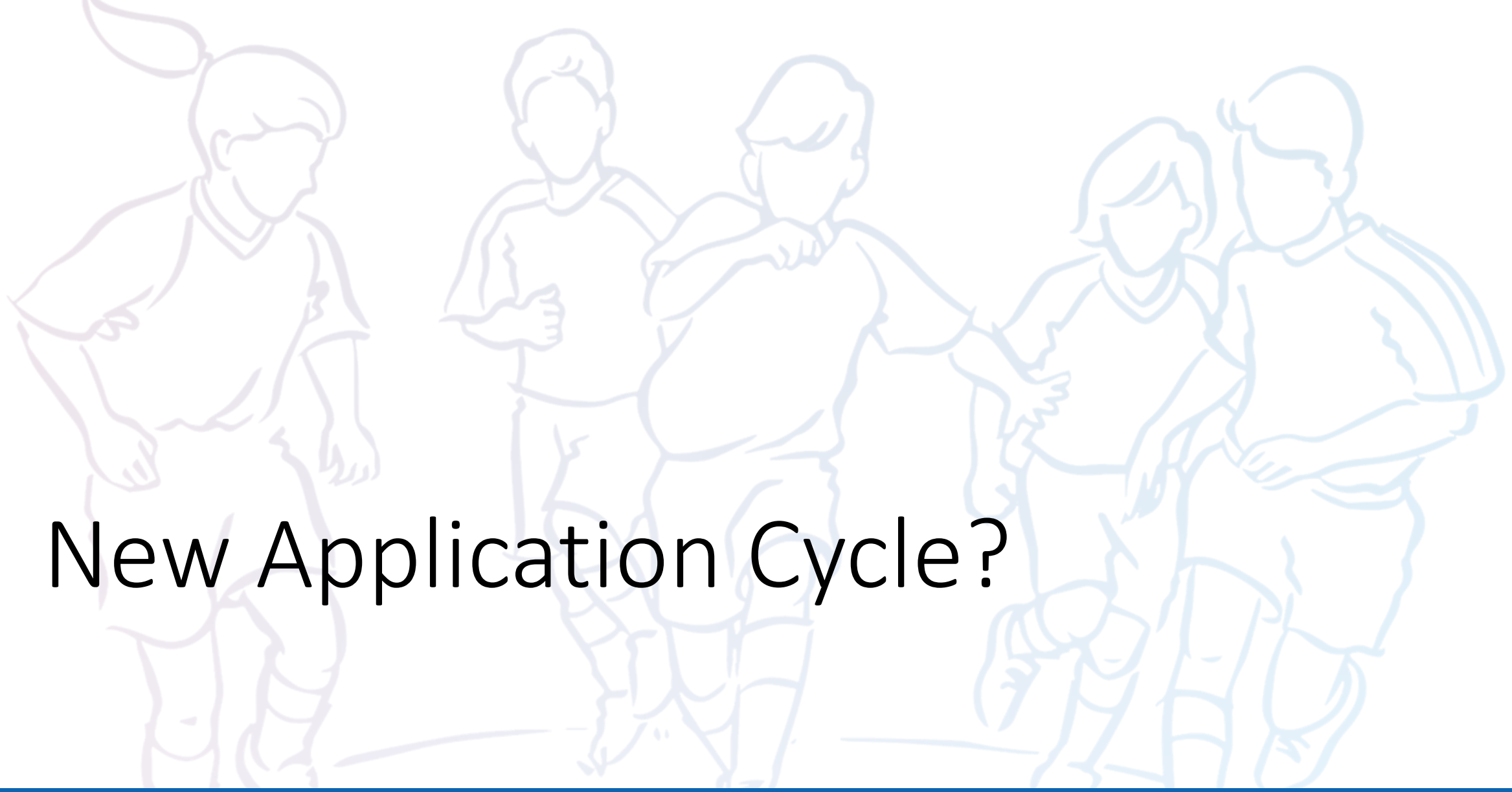

New Application Cycle?

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Questions?

Lunch & Pictures

CORTICES Progress Report

Block 2

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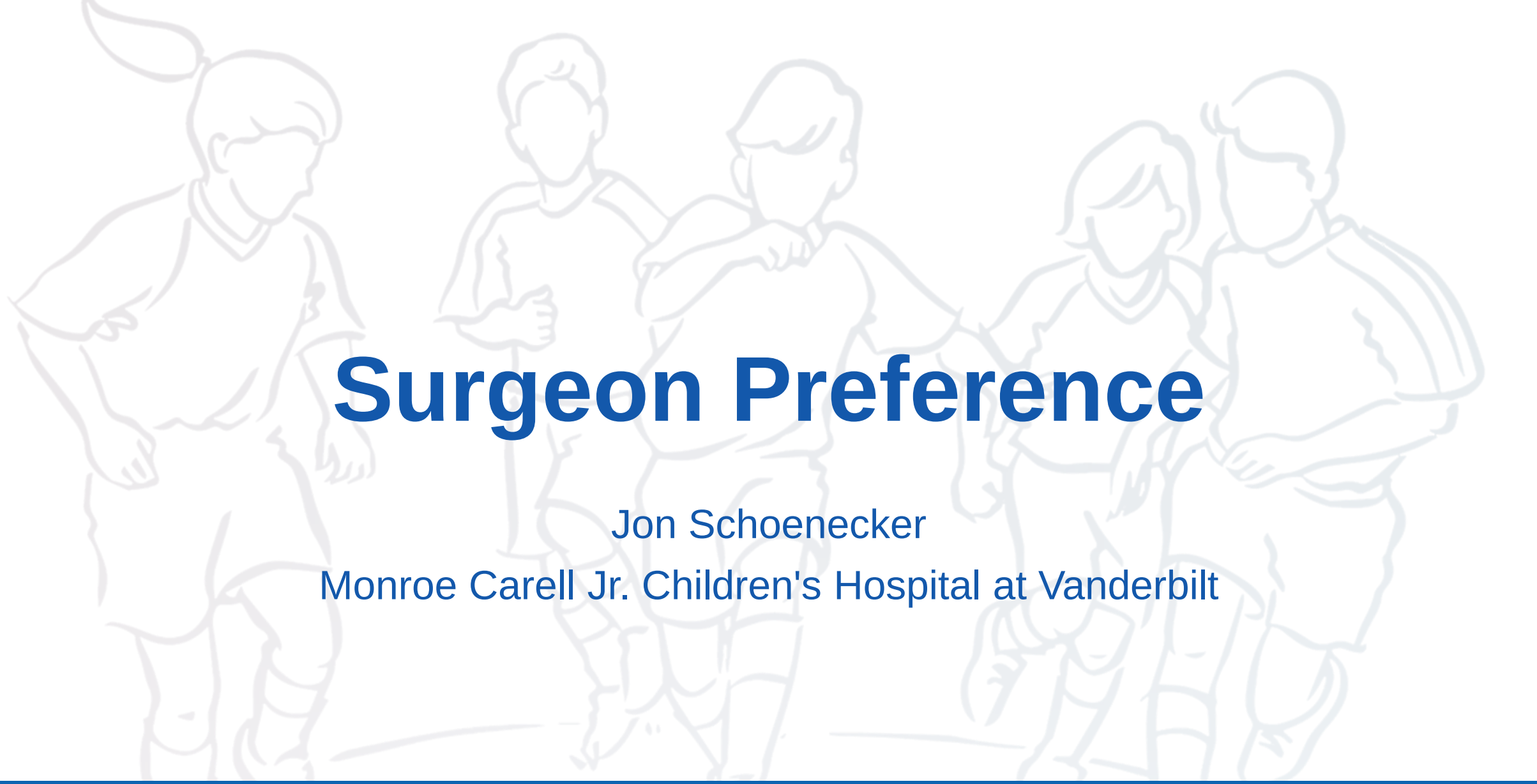


Surgeon Preference

Jon Schoenecker

Monroe Carell Jr. Children's Hospital at Vanderbilt

NAT Paper Topics

Ben Shore & Rosenfeld
Boston Children's Hospital

- Greetings from SICOT in Belgrade, Serbia!

- Sorry to miss CORTICES!

CORTICES NAT AIMS /Paper Ideas

1. Describe variations in Institutional NAT Protocols (Manya) **Paper 1**
2. Report compliance with AAOS screening recommendations
3. Report rate/epidemiology of NAT <3 with diaphyseal femur fx **Paper 2**
4. Report factors that influence provider decision to screen
5. Report factors that predict NAT as cause of injury **Paper 3**
6. Develop risk factor-based screening tool for NAT in this population **Paper 4**

1. Describe variations in Institutional NAT Protocols

- Please send in edits
- What do do next with this variations data?
  - Should we make CORTICES recommendations?

Comparing Non-Accidental Trauma Protocols Across the US, a CORTICES multi-center study

Manya Bali, Scott Rosenfeld, Patricia Miller, Benjamin Shore, CORTICES

ABSTRACT

Background: Non-accidental trauma (NAT) in children is associated with several warning signs. Since fractures are the second-most common injury caused by NAT, pediatric orthopedic surgeons are positioned to help identify and treat at-risk children. However, no standardized tools for identifying NAT exist, resulting in national practice variation. The purpose of this study was to compare NAT protocols from Children's Hospitals across the U.S. to understand how institutions vary in screening and treatment.

Methods: We used treatment and identification recommendations for suspected child abuse from the American Academy of Pediatrics (AAP) as our gold standard. 16 protocols were obtained from CORTICES study group representatives and analyzed across the following categories: Medical History, General Physical Exam, Skin Findings, Abdominal/Head Trauma, Orthopedic Findings, Orthopedic Workup, and General Workflow. Each category contained 2-6 AAP generated recommendations that were searched for within protocols. Additional variables including age for protocol activation, admission service, and social work availability were collected.

Results: General workflow recommendations for consultations and treatment were comprehensive across study sites. Each hospital employed a specialized Child Abuse Team on call 24/7 with additional in-person clinic hours. Variations arose in what service at-risk patients were admitted to (Trauma, Pediatrics, General Surgery) and whether protocols were age-based (25%), injury-based (18.75%), or a combination of both (56.25%). Multiple organ system

What we presented at EPOSNA

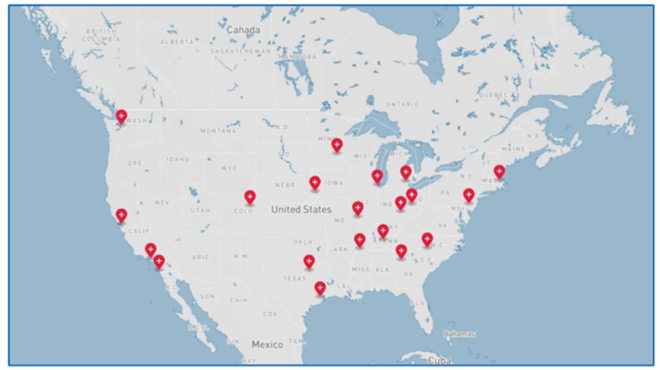
Purpose

Utilize CORTICES multicenter database to report:

1. Compliance with screening
2. Factors that influence who gets screened
3. Overall rate of NAT
4. Risk Factors for NAT (including socio-economic)

Results

- 15 sites
- 1263 patients
- Median age = 23 months
- 71% male
- 65% white
- 44% private insurance
- Mean ADI = 46 (1-100)



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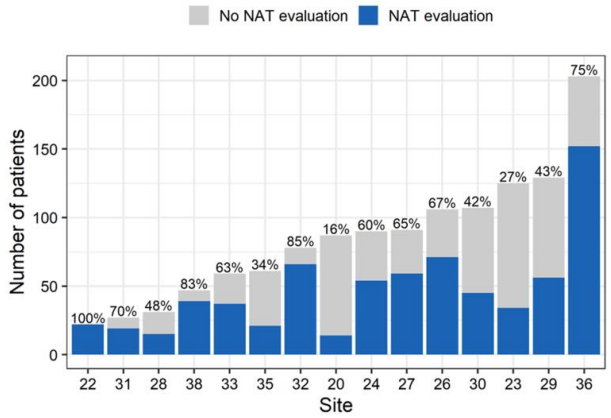
What we presented at EPOSNA

Results

Screening Compliance: **56%**

- Range by institution: 16%-100%



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EPOSNA

Results – Factors for NAT *Screening*

- Age (per 6 months) (OR=0.65; p<0.001)
- Unknown Mechanism of Injury (OR=1.84; p=0.009)
- Government Insurance (OR=1.38; p=0.002)
- ADI > 50 (OR=1.41; p=0.04)
- African American Race (OR=1.41; p=0.04)

Model C statistic, 0.89 (95% CI = 0.86-0.92)

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EPOSNA

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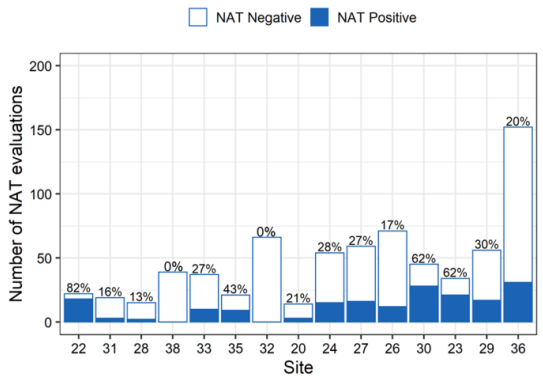
What we presented at EPOSNA

Results – Positive NAT

Rate of NAT in patients screened = **26%**
(185/704; 95% CI=23.1-29.7)



Results – Factors for *Positive NAT*

In patients screened for NAT

- Age (per 6 months) (OR=0.60; p<0.001)
- Unknown Mechanism of Injury (OR=3.86; p<0.001)
- ADI > 50 (OR=1.81; p=0.01)

Model C statistic, 0.86 (95% CI = 0.83-0.89)

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What we presented at EPOSNA

Results – Compounding Risk

Effect of Additional Risk Factors on Risk of NAT			
Age	Baseline Risk of NAT	+ Unknown Mechanism of Injury	+ ADI > 50
0 months	26.2%	57.8%	75.6%
6 months	17.6%	45.3%	65.2%
12 months	11.4%	33.3%	53.1%
18 months	7.2%	23.1%	40.6%
24 months	4.5%	15.4%	29.2%
30 months	2.8%	9.9%	19.9%
36 months	1.7%	6.2%	13.0%

Conclusions

- Largest study, first multicenter, multiregional study
  - NAT = 26% of those screened
- Nationwide compliance with AAOS CPG remains low (56%)
- Biases in screening and diagnosis need more investigation
- Age remains the most important risk factor
- Socioeconomic disadvantage is a risk factor for NAT
- Risk factors do compound
  - Presence of multiple risk factors should prompt official NAT evaluation

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EPOSNA

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EPOSNA

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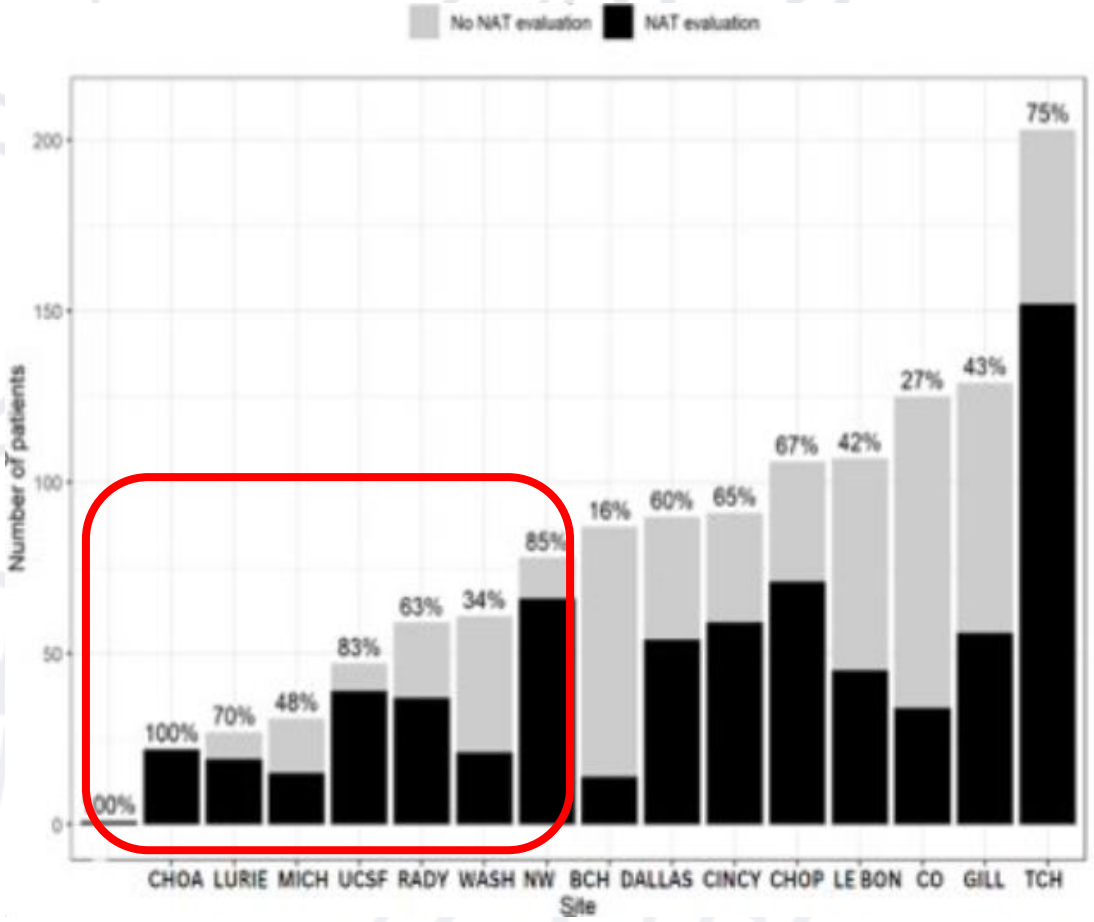
What we have been doing since…

Identified Outliers - Low number of total fractures

Outlier sites re-evaluated their data

- Confirmed number of fractures
- Added ICD codes



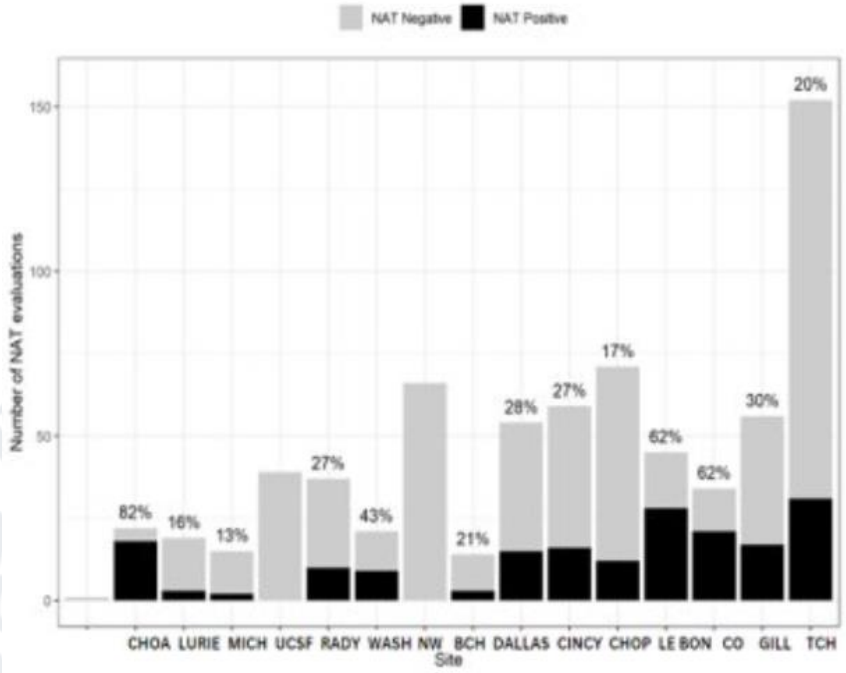
What we have been doing since…

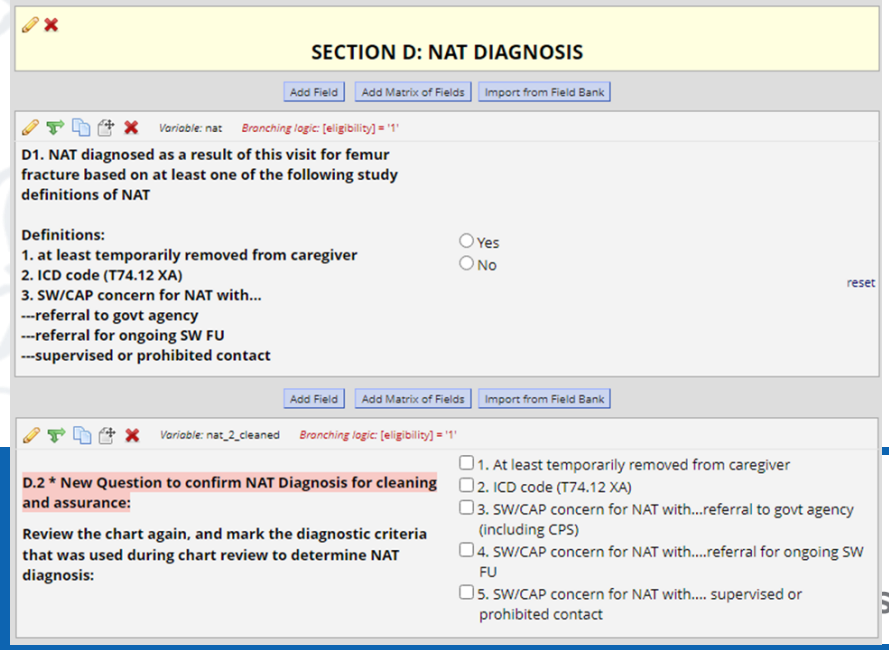
Identified Outliers - % Positive NAT

- Mean = 28%
- Outliers = 0%, 82%, 62%

Every site re-evaluated their data

- Confirmed/changed definition of positive NAT





What we have been doing since…

- All sites re-evaluated their data
- As of 9/17…

BCH- data entry complete
CHLA- not complete
LURIE- data entry complete
CHOA- data entry complete
TSRH- data entry complete
CHOP - data entry complete
NATIONWIDE- data entry complete
WASHU- data entry complete
GILLETTE- data entry complete
RCHSD- data entry complete
LE BONHEUR/CAMPBELL- not complete
UCSF- data entry complete
CINCINATTI- not complete
UMICH- data entry complete
TCH- data entry complete
COLORADO- data entry complete
VANDY- data entry complete

Where we are now (as of 9/2024)

CORTICES NAT Report 9.19.2024:

Table 1. Cohort summary

	(N=1263). POSNA 5.2024		(N=1804) 9.2024	
Characteristic	Freq.	(%)	Freq.	(%)
Age (*months*) *(median, IQR)*	23	(14-29)	23	(12-29)
Sex (*% male*)	900	(71%)	1252	(70%)
Race				
White	825	(65%)	1071	(60%)
Asian	29	(2%)	50	(3%)
Black or African American	238	(19%)	341	(19%)
Hispanic or Latino	42	(3%)	98	(5%)
Native American or Alaska Native	13	(1%)	15	(1%)
Hawaiian of Pacific Islander	2	(0%)	3	(0%)
Other/unknown	114	(9%)	213	(12%)
Ethnicity (*% Hispanic; n=1791)**	217	(18%)	333	(19%)
NAT Evaluation	704	(56%)	1075	(60%)
NAT positive (out of those screened)	*185*	*(26%)*	*353*	*(33%)*
NAT positive (out of total femur fractures)		*15%*		*20%*

*IQR Interquartile range

- 1804 patients enrolled
- 60% screened
- 20% of all presenting femur fractures in kids < 3yo were diagnosed with NAT
- 33% of those screened

NAT screen and result

- NAT screening by race
  - 55% white kids screened
  - 73% black kids screened
  - 69% Hispanic kids screened
  - 67% Native Americans
  - 61% other/unknown
- Positive NAT by race
  - White: 15% (of total), 28% (of screened)
  - Black: 35% (of total), 48% (of screened)
  - Hispanic: 15% (of total), 22% (of screened)

Table 2. Race in all patients compared to those that were screened for NAT

	(N=1804)		(N=1075)		(N=353)	
	All patients		NAT evaluation		NAT Dx	
Characteristic	Freq.	(%)	Freq.	(%)	Freq	(%)
Race						
White	1071	(60%)	588	(55%)	166	(47%)
Asian	50	(3%)	29	(3%)	5	(1%)
Black or African American	341	(19%)	249	(23%)	120	(34%)
Hispanic or Latino	98	(5%)	68	(6%)	15	(4%)
Native American or Alaska Native	15	(1%)	10	(1%)	3	(1%)
Hawaiian of Pacific Islander	3	(0%)	2	(0%)	0	(0%)
Other/unknown	213	(12%)	129	(12%)	44	(12%)
Hispanic Ethnicity						
Hispanic or Latino	334	(18%)	227	(21%)	65	(18%)
Neighborhood Atlas ADI Score (0-100)						
ADI*(median, IQR)*	43	(21-71)	48	(23-75)	57	(32-82)

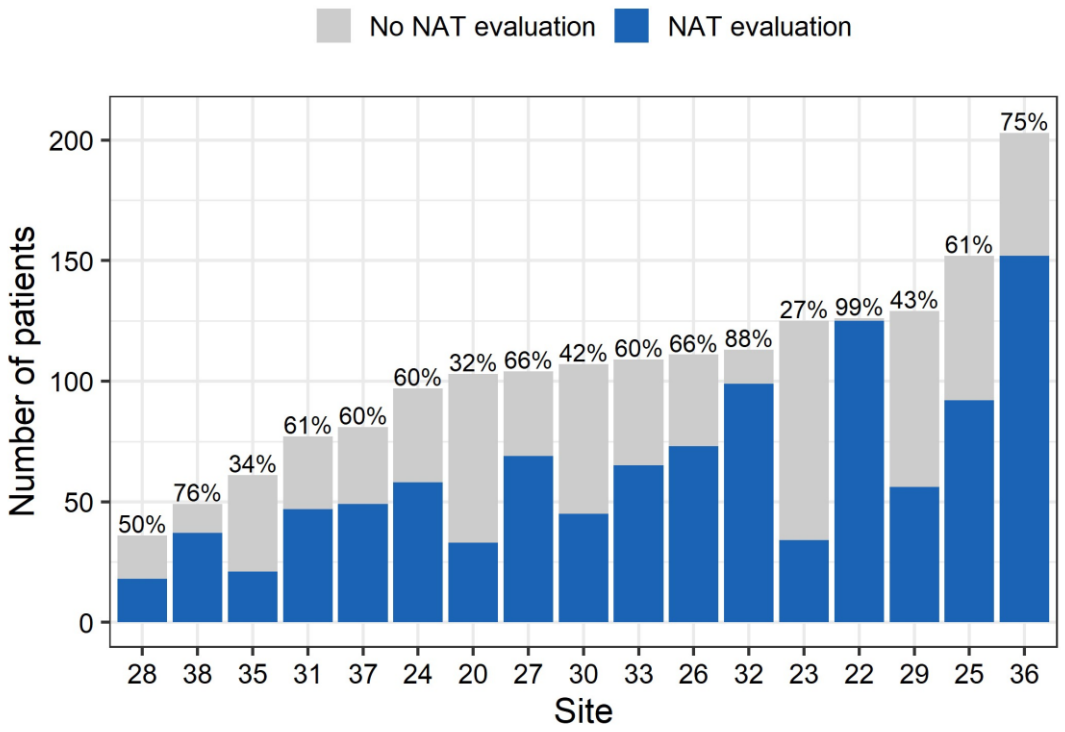
*IQR Interquartile range

Table 3. US population Census 2020

Race	(%)
White alone (not Hispanic or Latino)	57.8%
Asian alone	5.9%
Black or African American alone	12.1%
Native American or Alaskan Native alone	1.1%
Hawaiian or Pacific Islander alone	0.2%
Two or more races	4.1
Ethnicity	**(%)**
Hispanic or Latino (of any race)	19.5%

Screening by site

Current



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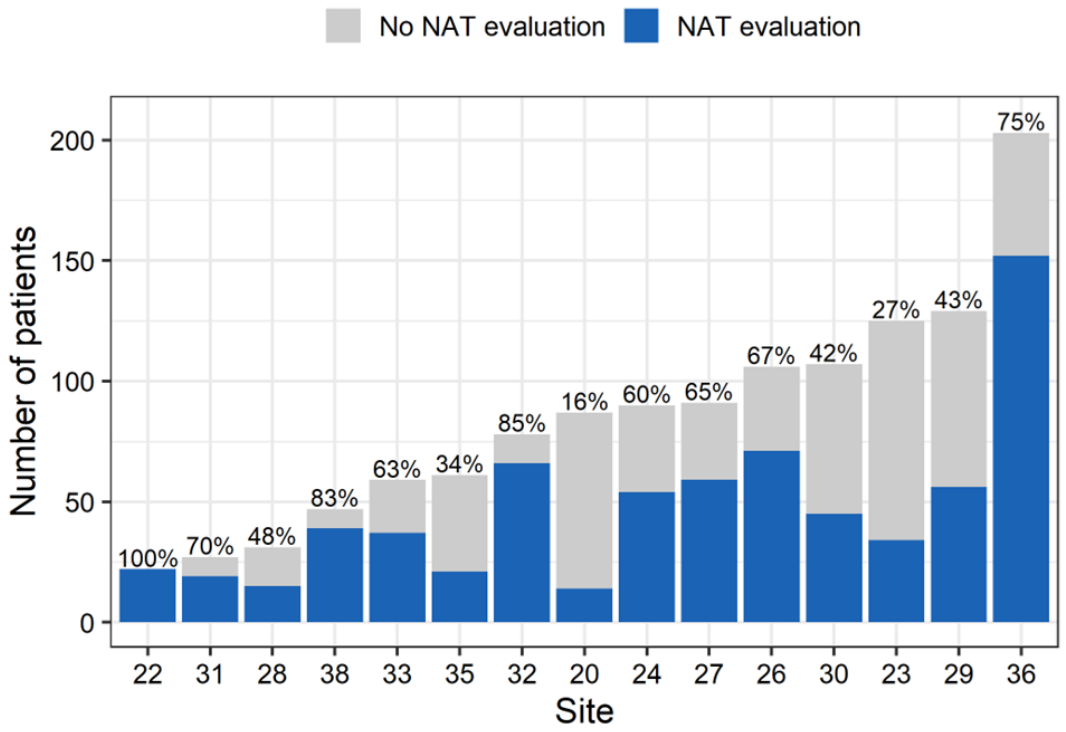
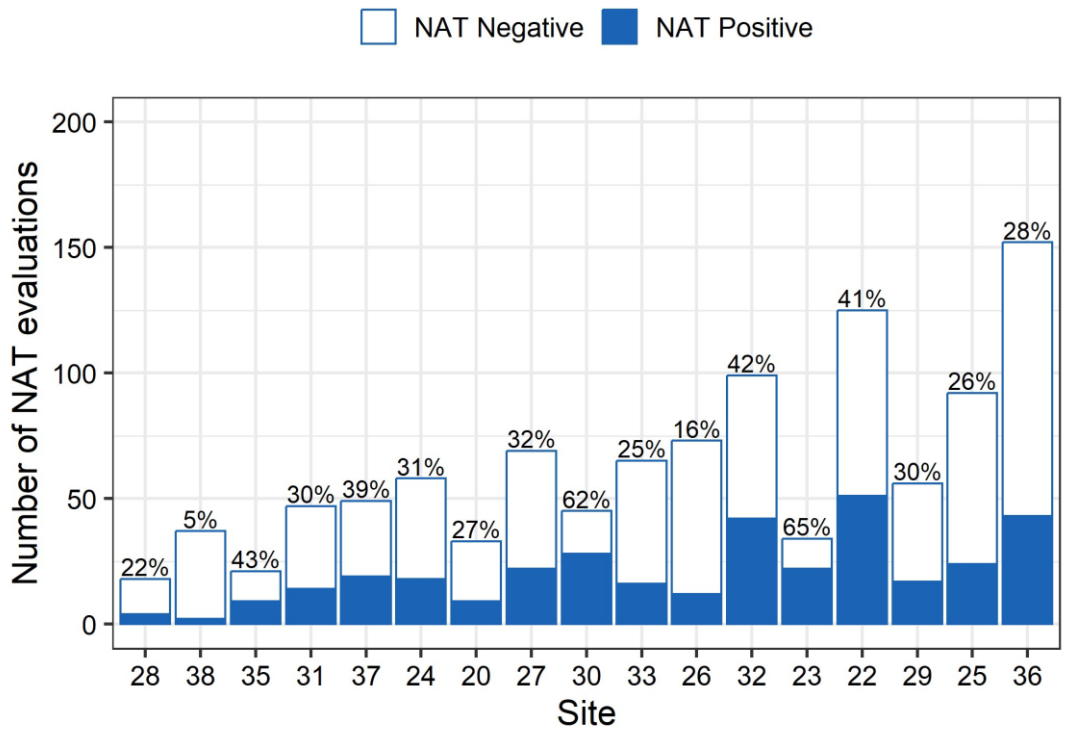


Positive NAT by site

Current



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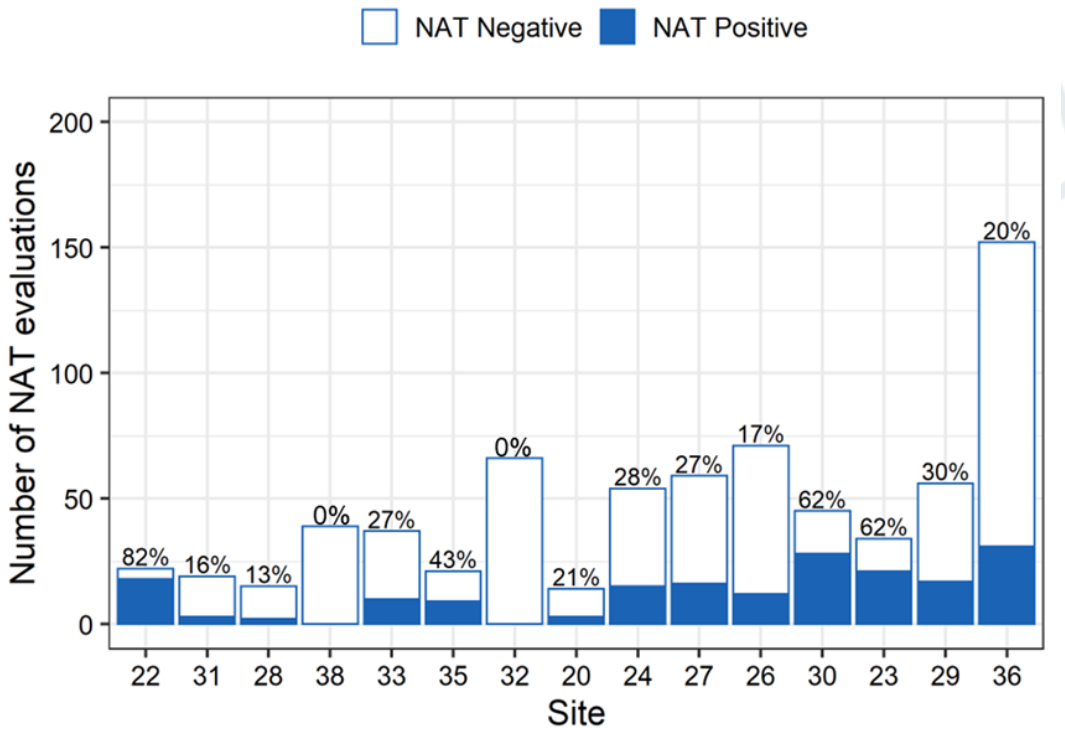

NAT Variables: Screening and Eligibility

Question/Variable	Response(s) / Units
Inclu: Age 36 months or younger at presentation	Y/N
Inclu: Diagnosed with a diaphyseal femur fx between Jan 2017 and June 2020	Y/N
Inclu: Presented at or transferred to a CORTICES-participating institution	Y/N
Exclu: Diaphyseal femur fx sustained via a MVA or during delivery/birthing process	Y/N
Exclu: Pathologic fx	Y/N
Exclu: Skeletal dysplasia: osteogenesis imperfecta	Y/N

NAT Variables: Demographics

Question/Variable	Response(s) / Units
Date of birth	mm/dd/yyyy
Date of presentation	mm/dd/yyyy
Age (calculated field)	months
Pre-injury Ambulatory Status	Not walking independently, walking independently
Sex	M/F
Race	White, Asian, Black or African American, American Indian / Alaskan Native, Native Hawaiian or Pacific Islander, Other, Refused, Missing/not recorded

Question/Variable	Response(s) / Units
Ethnicity	Hispanic or Latino
Insurance type	Private, Gov't, None
Neighborhood Atlas ADI score	National Percentiles
Chronic Illness	Cancer, Renal Disease, Sickle Cell disease, GI Disorder, Immunologic Disorder, Asthma, Diabetes, Seizure Disorder, Other
Ethnicity	Hispanic or Latino
Insurance type	Private, Gov't, None
Neighborhood Atlas ADI score	National Percentiles
Chronic Illness	Cancer, Renal Disease, Sickle Cell disease, GI Disorder, Immunologic Disorder, Asthma, Diabetes, Seizure Disorder, Other
Developmental Disability	Cerebral Palsy, Spina Bifida, Autism, other

NAT Variables: Injury Characteristics

Question/Variable	Response(s) / Units
Known date of injury?	Y/N; mm/dd/yyyy
Days between Injury and Presentation (calculated field)	days
Number of visits to the ED prior to femur fx presentation	
Description for each visit? Then specific injury	injury, illness, other
Worked up for NAT at prior ED visit?	Y/N
Result of prior NAT workup	Y/N based on NAT definitions
Number of visits to the ED after femur fx presentation	
Description for each visit?	injury, illness, other
If injury - specific injury	

Question/Variable	Response(s) / Units
Worked up for NAT at later ED visit?	Y/N
Result of prior NAT workup	positive/negative
Location of Presentation	ED/Clinic
Reported Mechanism of injury	Low energy fall, high energy fall, unknown to family, not recorded, other
Fracture type	Transverse, spiral, oblique, segmental, other
Treatment Modality	hard spica cast, soft spica, IMN, ORIF, pavlik, other
Spica Type and Location	Single, Double, 1.5 Spica Cast, ED or OR

NAT Additional Variables

Question/Variable
Child Abuse Blood Work Panel
All values of abnormal blood work
Additional Fractures
Additional Imaging done
Social worker, Trauma Team, Childe Abuse Team Consultation
Follow Up Test recommendation/completed
Official NAT Diagnosis
Subsequent NAT Evaluations?

Paper #1

1. Institutional Variations (ready to submit)

Paper #2

Prevalence & Epidemiology

Prevalence of NAT diagnosis in femur fractures in kids < 3 yo

- Use diagnosis bc it is objective
- NAT/total number = 20%
- NAT/those screened = 33%
- Regional variations – plot the sites on a map to show variations by regions of USA
- Discuss the potential whys (leads to another paper about the why)

Table 5. Proportion of NAT positives out of all those evaluate for NAT by site

Site name	Site #	Total NAT Evaluation	NAT positive	% NAT positive
michigan	28	18	4	22.22
wustl	35	21	9	42.86
bch	20	33	9	27.27
colorado	23	34	22	64.71
ucsf	38	38	2	5.26
le_bonheur	30	45	28	62.22
lurie	31	47	14	29.79
vanderbilt	37	49	19	38.78
minnesota	29	56	17	30.36
dallas	24	58	18	31.03
rady_childrens	33	65	16	24.62
cincinnati_childrens	27	69	22	31.88
chop	26	73	12	16.44
chla	25	92	24	26.09
nationwide	32	99	42	42.42
choa	22	125	51	40.8
texas_childrens	36	152	43	28.29

Paper #3 – Risk Factors for Screening

Factors that increase tendency to screen for NAT in kids < 3 with femur fractures

- The “why” manuscript
- Age
- Race (our numbers show that non whites are screened to a greater extent than whites)(is this a stand alone paper?)
- ADI
- Mechanism
- ?Region?

Paper #4 – Can you predict NAT?

Factors that predict positive NAT in kids < 3 with femur fractures

- This was our original aim – can we still do this?
  - Goal was to try to use data to objectify the very subjective assessment of NAT
  - Especially to be used in smaller ERs where they don't have CAP team so they can decide whether or not to transfer for NAT eval
- Seems like being screened is the biggest risk factor for being positive

Paper #5 = Non NAT paper on femur fractures <3

Non NAT paper about femur fractures in kids < 3

- We have 1800 patients with data including age, mechanism, ADI, time to presentation, fracture pattern
- Are femur fractures more common in worse ADI?
- Does ADI or insurance type predict time to presentation?
- Look at radiographic follow up xrays? – length of time to callus formation by age group or fracture pattern? Can we use this to say how long each age group needs to be in a cast?
- Other ideas?

Gloat Fest

Differentiating Between Knee Septic Arthritis

Ying Li

CS Mott Children's Hospital

Differentiating Between Knee Septic Arthritis and Lyme Arthritis in Children: A Clinical Prediction Algorithm for a Geographically Diverse Population

Ying Li, MD,[1] Maanasa Bommineni, BS,[1] Keith D. Baldwin, MD, MPH,[2] Ryan M. Sanborn, BA,[3] Danielle Cook, MA,[4] Benjamin J. Shore, MD, MPH,[4] CORTICES Study Group

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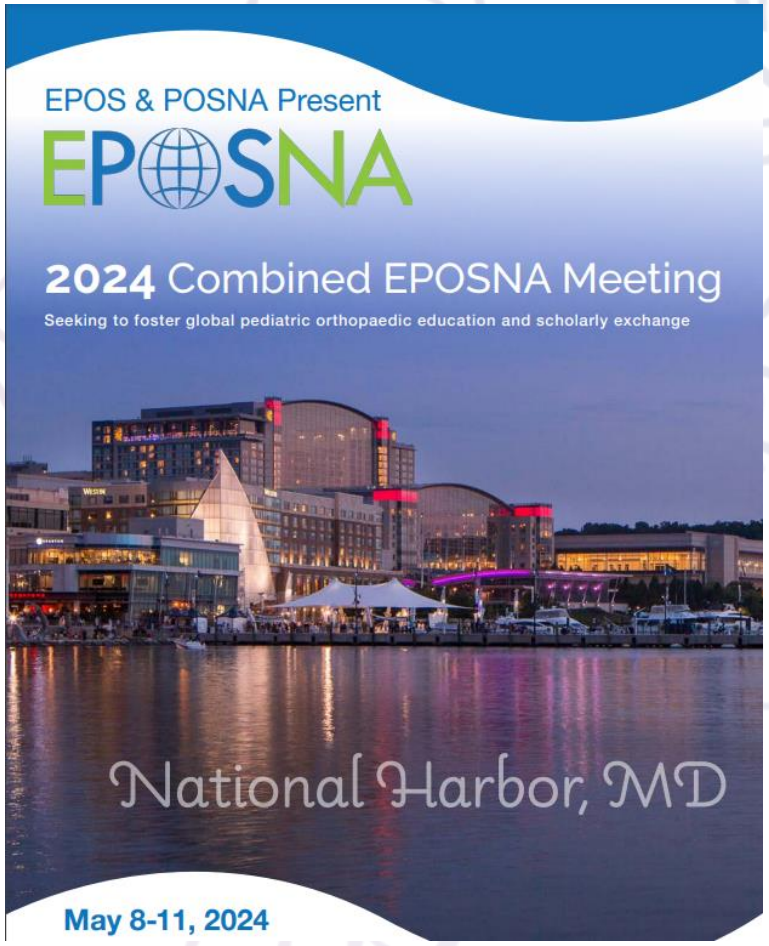
CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE



J Pediatr Orthop. 2024 Sep 6. doi: 10.1097/BPO.0000000000002814. Online ahead of print.

Differentiating Between Knee Septic Arthritis and Lyme Arthritis in Children: A Clinical Prediction Algorithm for a Geographically Diverse Population

Ying Li [1], Maanasa Bommineni [1], Keith D Baldwin [2], Ryan M Sanborn [3], Danielle Cook [4], Benjamin J Shore [4];
Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES) Study Group

Collaborators, Affiliations – collapse

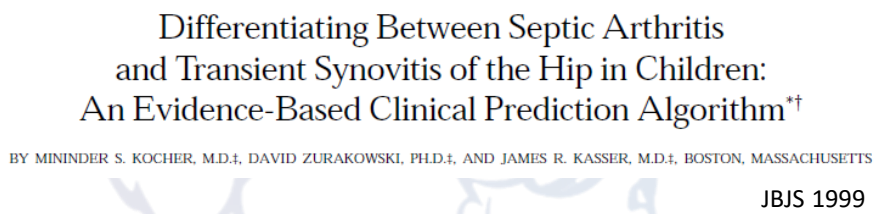
Collaborators

Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES) Study Group: Allan C Beebe, Todd J Blumberg, Lawson A Copley, Jaime R Denning, Rachel Y Goldstein, Benton E Heyworth, Jaclyn F Hill, Megan E Johnson, Jennifer C Laine, Collin J May, Mark L Miller, Stephanie N Moore-Lotridge, Joshua S Murphy, Brandon A Ramo, Anthony I Riccio, Scott B Rosenfeld, Julia Sanders, Jonathan G Schoenecker, David D Spence, Walter H Truong, Vidyadhar Upasani

Background

- Children with septic arthritis (SA) and Lyme arthritis (LA) of the knee often have similar clinical presentations and laboratory values
- Bacterial SA requires urgent surgical treatment to prevent cartilage destruction, whereas LA necessitates only antibiotics and observation
- It is imperative for clinicians to be able to differentiate between SA and LA to avoid sequelae of untreated SA, but also to prevent unnecessary surgery in patients with LA

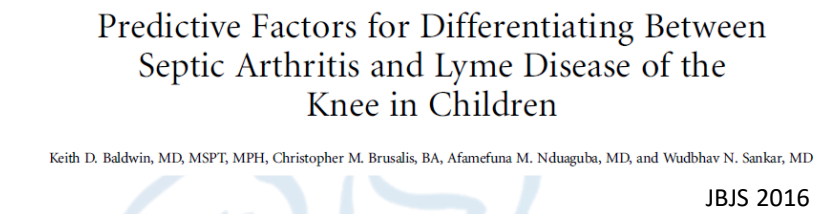
Background



Differentiating Between Septic Arthritis and Transient Synovitis of the Hip in Children: An Evidence-Based Clinical Prediction Algorithm*†

BY MININDER S. KOCHER, M.D.‡, DAVID ZURAKOWSKI, PH.D.‡, AND JAMES R. KASSER, M.D.‡, BOSTON, MASSACHUSETTS

JBJS 1999



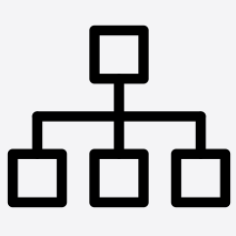
Predictive Factors for Differentiating Between Septic Arthritis and Lyme Disease of the Knee in Children

Keith D. Baldwin, MD, MSPT, MPH, Christopher M. Brusalis, BA, Afamefuna M. Nduaguba, MD, and Wudbhav N. Sankar, MD

JBJS 2016

- Predictive factors for differentiating SA and other infectious/inflammatory conditions have been published
- Kocher et al: predictive algorithm developed to distinguish between hip SA and transient synovitis that has been widely applied to identify patients at high risk of SA in other joints
- Baldwin et al: criteria developed at a single center in a Lyme-endemic area so may not be generalizable to a larger population and geographic area

Purpose



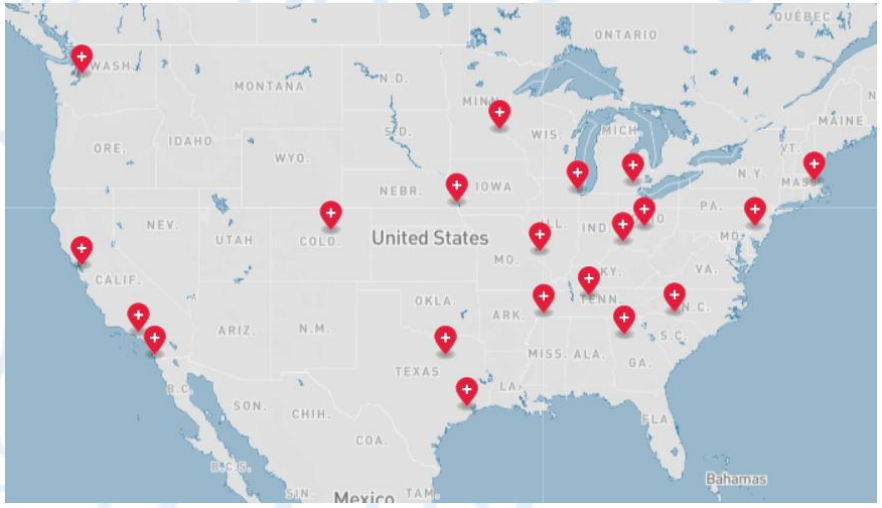
1) Test existing algorithms using patients with knee SA or LA from the CORTICES multicenter retrospective musculoskeletal infection database

2) Develop a predictive algorithm to distinguish between knee SA and LA that can be applied to a large, geographically diverse population

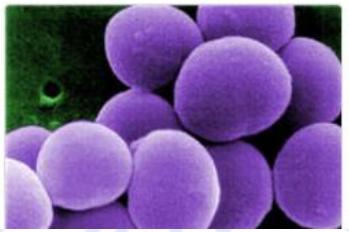
Methods

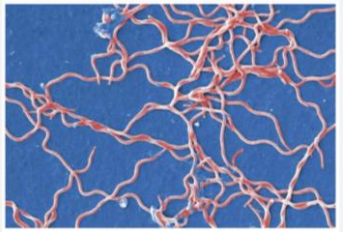
- CORTICES (**C**hildren's **OR**thopaedic **T**rauma and **I**nfection **C**onsortium for **E**videnced based **S**tudies)

- 18 institutions across the United States



Methods





- Patients ≤18 yo with isolated SA or LA of the knee
  - Exclusion criteria: patients with known adjacent musculoskeletal infection

- Diagnostic criteria:
  - SA: synovial WBC >50,000 cells/mm^3, imaging with fluid aspiration suggestive of SA, or joint aspirate/tissue sample that cultured positive for bacteria
  - LA: positive Lyme titer

- Demographics, WB status, admission vitals, lab tests collected

Kocher criteria
(hip SA vs transient synovitis)

- Non-weightbearing
- Temp >101.3^{o}F
- WBC >12.0 x 10^{9} cells/L
- ESR >40 mm/hr

+ CRP >20 mg/L

JBJS 1999

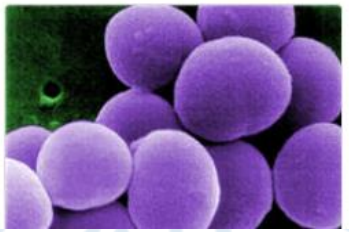
Baldwin criteria
(knee SA vs LA)

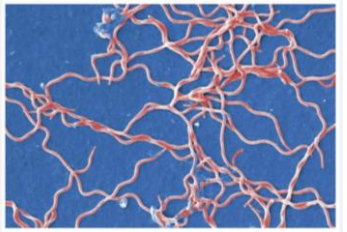
- Pain with short arc motion*
- History of fever
- CRP >40 mg/L
- Age <2 years

*not collected in CORTICES database

JBJS 2016

Methods





- Chi-square tests, Student's t-tests, Mann-Whitney U-tests performed to compare patient characteristics between SA and LA groups
- Stepwise model selection utilized to determine model that best distinguished between SA and LA
- Receiver operator characteristic (ROC) analysis and area under ROC curve (AUC) used to quantify diagnostic utility of Baldwin, Kocher, and our model criteria

Results

- 119 patients with SA (40% culture +), 36 patients with LA

- SA patients:
  - Younger
  - More likely NWB
  - Higher admission pulse
  - Higher admission WBC

Table 1. Comparison of patients with knee septic arthritis versus Lyme arthritis in overall cohort.

	Septic Arthritis (n=119)	Lyme Arthritis (n=36)	*P*-value*
Age at admission (years; median [IQR])	2.2 (1.3-6.0)	8.0 (5.0-10.5)	**<0.001**
Sex (n [%] male)	71 (60)	22 (61)	0.88
Non-weightbearing status (n [%])	84 (74)	12 (33)	**<0.001**
Admission temperature (°F; mean ± SD)	99.4 ± 1.7	99.1 ± 1.3	0.31
Admission pulse (mean ± SD)	127 ± 26	106 ± 16	**<0.001**
Admission WBC (x 10^9 cells/L; mean ± SD)	12.4 ± 4.2	10.2 ± 2.6	**<0.001**
Admission ESR (mm/hr, mean ± SD)	42 ± 25	39 ± 24	0.56
Admission CRP (mg/L; mean ± SD)	46.5 ± 36.9	41.7 ± 24.9	0.37
Admission platelets (x 10^9 cells/L; mean ± SD)	362 ± 125	330 ± 75	0.07
Synovial WBC count (cells/mm^3; median [IQR])	70,600 (43,195-117,480)	59,750 (41,800-81,983)	0.12
Synovial neutrophils (%; mean ± SD)	87.1 ± 14.3	86.4 ± 16.3	0.83

IQR indicates interquartile range; WBC, white blood cells; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein.
*Values in bold are <0.05.

Results

- Surgery performed in 112 (94%) patients with SA compared with 17 (47%) patients with LA

- Causative organism in patients with culture-positive SA:
  - MSSA (25 patients), Streptococcus (9 patients), Kingella kingae (4 patients), Staph epidermidis (2 patients), MRSA (1 patient), other (7 patients)

Results

- Regression analysis with backward stepwise elimination using CORTICES data identified **5 independent predictive factors** for SA

Table 3. Multivariable analysis for independent predictive factors.

Factor	OR*	*P*-value
Age <4 years	6.7 (1.85-24.16)	0.004
Non-weightbearing	4.6 (1.66- 12.57)	0.003
Admission WBC >13.0	11.5 (1.36-96.55)	0.03
Platelets <325	3.8 (1.35-10.69)	0.01
ESR >70	6.4 (1.06-38.19)	0.04

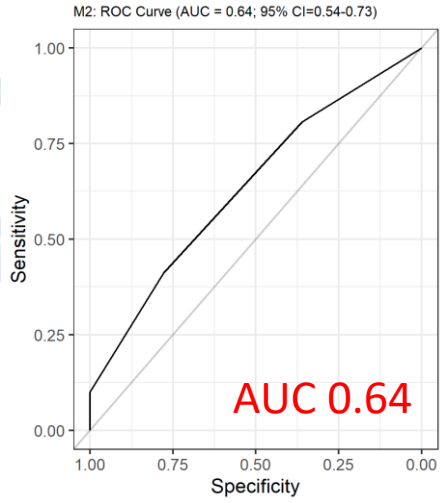
WBC indicates white blood cells; ESR, erythrocyte sedimentation rate; OR, odds ratio.
*95% confidence interval in parentheses.

Results

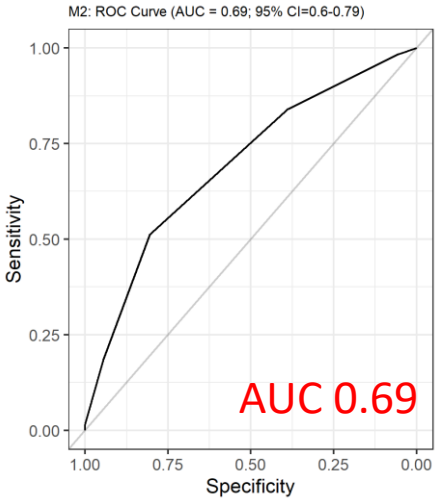
Table 2. Comparison of Baldwin criteria, Kocher criteria, and our model criteria.

Baldwin criteria – factors present	Predictive probability of SA
0	63%
1	76%
2	86%
3	92%
Kocher criteria – factors present	
0	41%
1	59%
2	75%
3	86%
4	93%
5	96%
Our model criteria – factors present	
0	16%
1	52%
2	86%
3	97%
4	100%

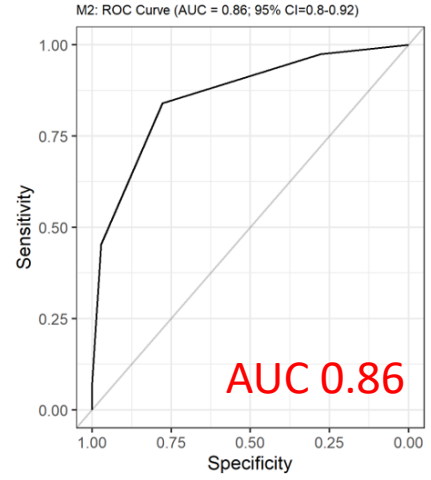
Baldwin criteria



Kocher criteria



Our model criteria



Results

- Sub-analysis of patients in Lyme-endemic areas (NE, Minnesota)
- Logistic regression: for each year increase in age, odds of having SA decreased by 26%

Table 4. Comparison of patients with knee septic arthritis versus Lyme arthritis in Lyme-endemic regions (n=61).

	Septic Arthritis (n=35)	Lyme Arthritis (n=26)	*P*-value*
Age at admission (years; median [IQR])	1 (1-5)	8 (5-10)	**<0.001**
Sex (n [%] male)	18 (51)	21 (81)	0.46
Non-weightbearing status (n [%])	15 (43)	12 (46)	0.05
Admission temperature (°F; mean ± SD)	99.5 ± 1.8	99.2 ± 1.3	0.38
Admission pulse (mean ± SD)	130 ± 27	106 ± 16	**<0.001**
Admission WBC (x 10^9 cells/L; mean ± SD)	12.5 ± 3.5	10.1 ± 2.6	**0.005**
Admission ESR (mm/hr; mean ± SD)	39 ± 18	40 ± 24	0.89
Admission CRP (mg/L; mean ± SD)	35.2 ± 22.1	42.0 ± 25.2	0.27
Admission platelets (x 10^9 cells/L; mean ± SD)	378 ± 161	329 ± 76	0.17
Synovial WBC count (cells/mm^3; median [IQR])	79,250 (48,000-174,540)	62,055 (42,232-81,983)	0.11
Synovial neutrophils (%; mean ± SD)	84.4 ± 20.3	86.6 ± 16.5	0.68

IQR indicates interquartile range; SD, standard deviation; WBC, white blood cells; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein.
*Values in bold are <0.05.

Conclusion

- Our study provides a clinical predictive algorithm to help differentiate between SA and LA of the knee that can be applied to a geographically diverse population of children

Age <4 years
Non-weightbearing
Admission WBC >13.0
Admission platelets <325
Admission ESR >70

The more factors present, the higher the likelihood of having SA vs LA

Conclusion

- Nearly half of our LA patients underwent I&D

- 12/17 LA patients likely would have been able to avoid surgery if our predictive algorithm had been applied
  - 4 patients had 0 predictors (16% prob SA), 8 had 1 risk factor (52% prob SA)

Differentiating Between Knee Septic Arthritis and Lyme Arthritis in Children: A Clinical Prediction Algorithm for a Geographically Diverse Population

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JPO submission

- Free text box for additional comments:

- “Additional CORTICES members should be included as searchable authors in PubMed after manuscript publication, as noted in the title page”

JPO proofs

- Second page of title page transcribed verbatim into proofs!

- Did not catch this with UESA proofs so knew to look for this

Descriptive Epidemiology of Upper Extremity Septic Arthritis in Children—Review of a Retrospective Multicenter Database

Ying Li, MD, Ryan M. Sanborn, BA,† Danielle Cook, MA,†*
Keith D. Baldwin, MD, MPH, MSPT,‡ Allan C. Beebe, MD,§ Jaime R. Denning, MD,‖
*Rachel Y. Goldstein, MD, MPH,¶ Joseph A. Janicki, MD,# Megan E. Johnson, MD,***
Walter H. Truong, MD,†† Benjamin J. Shore, MD, MPH,†
and Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES)

From the *Department of Orthopaedic Surgery, C.S. Mott Children's Hospital, Michigan Medicine, Ann Arbor, MI; †Department of Orthopaedic Surgery, Boston Children's Hospital, Boston, MA; ‡Department of Orthopaedic Surgery, Children's Hospital of Philadelphia, Philadelphia, PA; §Department of Orthopaedic Surgery, Nationwide Children's Hospital, Columbus, OH; ‖Department of Orthopaedic Surgery, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; ¶Department of Orthopaedic Surgery, Children's Hospital Los Angeles, Los Angeles, CA; #Department of Orthopaedic Surgery, Lurie Children's Hospital of Chicago, Chicago, IL; **Department of Orthopaedic Surgery, Texas Scottish Rite Hospital for Children and University of Texas Southwestern, Dallas, TX; and ††Department of Orthopaedic Surgery, Gillette Children's Specialty Healthcare, St Paul, MN.

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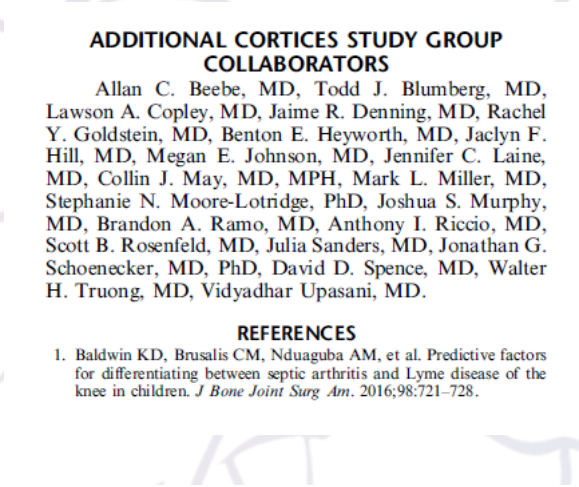
LI is currently receiving a grant from the Scoliosis Research Society, has received consulting fees from Medtronic, has received support for travel from Zimmer Biomet, is the Chair of the Scoliosis Research Society's Morbidity and Mortality Committee, and is the Chair of the Pediatric Orthopaedic Society of North America's Membership Committee. Denning has received a speaker honorarium from OrthoPediatrics. Goldstein is a Member At

JPO proofs

- Edited to “Additional CORTICES Study Group Collaborators”
- **AND** commented that the collaborators should be acknowledged at the end of the article
- **AND** commented that the collaborators should be included as searchable authors in PubMed after manuscript publication, similar to prior CORTICES papers



ADDITIONAL CORTICES STUDY GROUP COLLABORATORS

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REFERENCES

1. Baldwin KD, Brusalis CM, Nduaguba AM, et al. Predictive factors for differentiating between septic arthritis and Lyme disease of the knee in children. *J Bone Joint Surg Am*. 2016;98:721–728.

› J Pediatr Orthop. 2024 Sep 6. doi: 10.1097/BPO.0000000000002814. Online ahead of print.

Differentiating Between Knee Septic Arthritis and Lyme Arthritis in Children: A Clinical Prediction Algorithm for a Geographically Diverse Population

Ying Li [1], Maanasa Bommineni [1], Keith D Baldwin [2], Ryan M Sanborn [3], Danielle Cook [4], Benjamin J Shore [4];
Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES) Study Group

Collaborators, Affiliations + expand

PMID: 39238118 DOI: 10.1097/BPO.0000000000002814

› J Pediatr Orthop. 2024 Sep 6. doi: 10.1097/BPO.0000000000002814. Online ahead of print.

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Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies (CORTICES) Study Group

Collaborators, Affiliations − collapse

Collaborators

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CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Management of Syndesmotic Injuries in Children and Adolescents: Results of a Cross-Sectional study

Collin May

Boston Children's Hospital

Background

Ankle injuries are common

Syndesmosis injuries, however, are rare

Original Clinical Article

JOURNAL OF CHILDREN'S ORTHOPAEDICS

Syndesmosis injuries in the pediatric and adolescent athlete: an analysis of risk factors related to operative intervention

D. E. Kramer[1]
M. X. Cleary[2]
P. E. Miller[1]
Y-M. Yen[1]
B. J. Shore[1]

Conclusions Operative ankle syndesmotic injuries in the paediatric population are often associated with a closed distal tibial physis and concomitant fibular fracture.

Cite this article: Kramer DE, Cleary MX, Miller PE, et al. Syndesmosis injuries in the pediatric and adolescent athlete. *J Child Orthop* 2017;11:57-63. DOI 10.1302/1863-2548.11.160180

<1% of patients presenting for ankle trauma

So…Is Suture-Button the Answer in Kids?

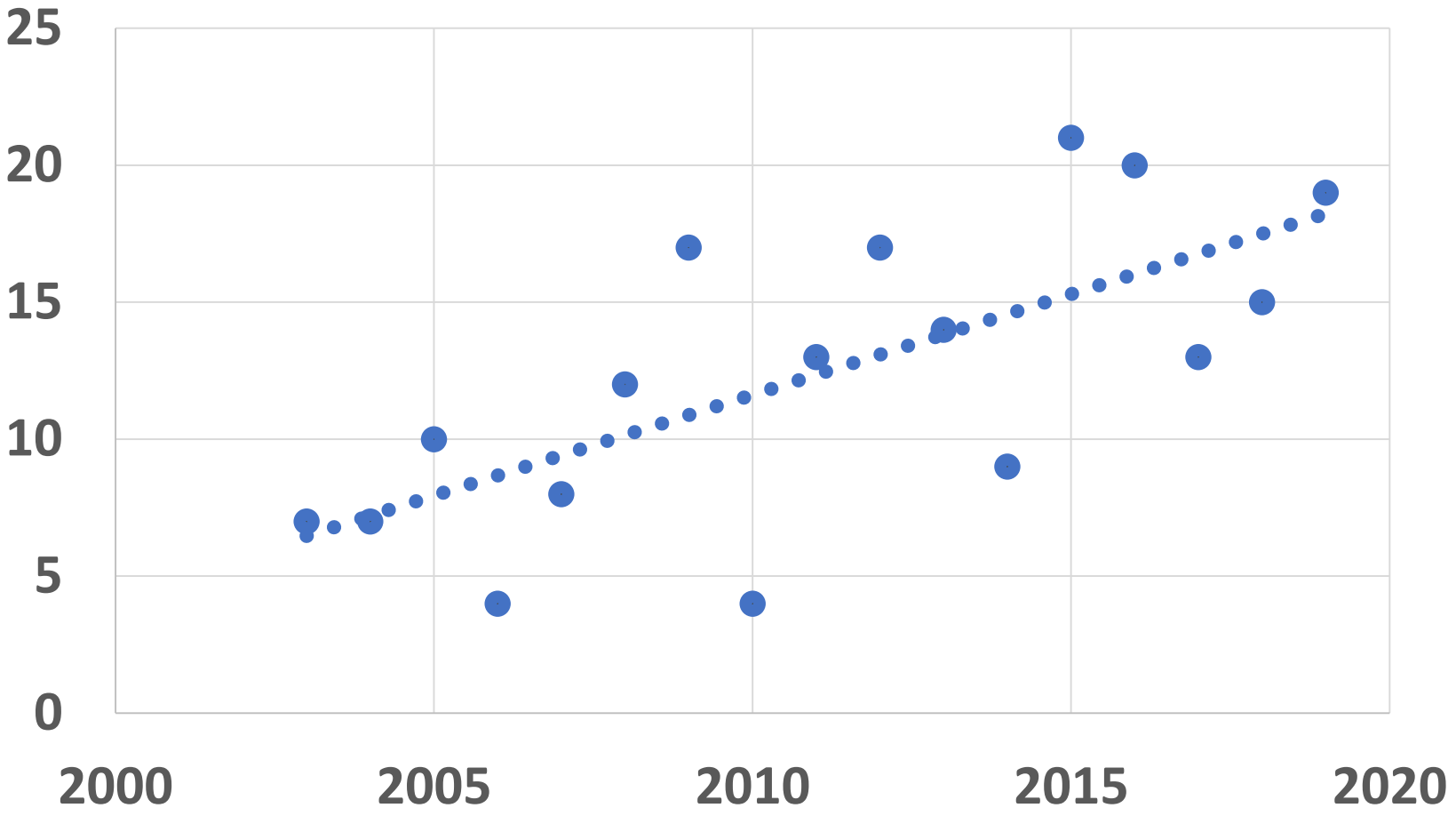
Little evidence in pediatric population

Extrapolations from adult data may not be appropriate

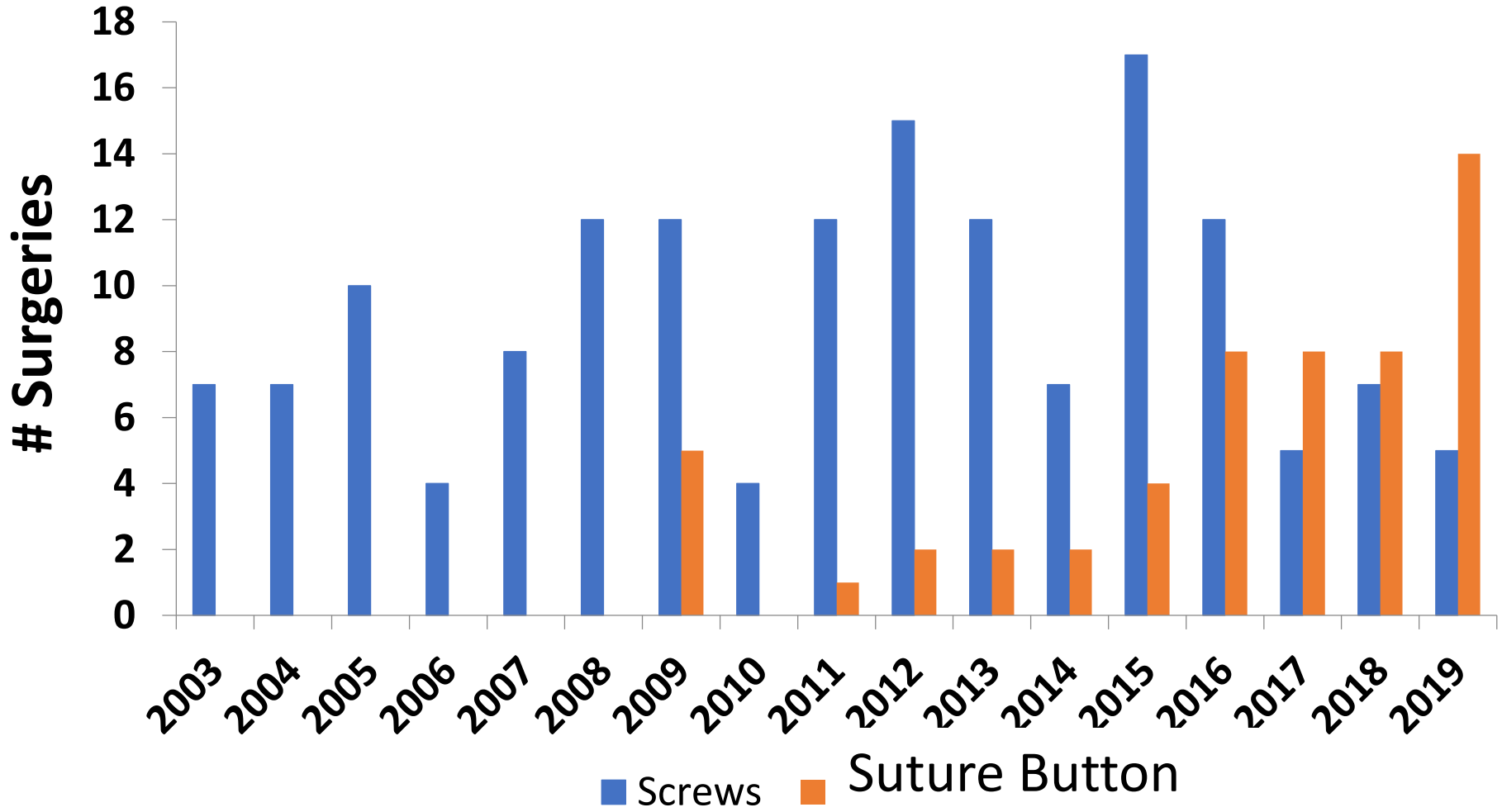
→ What decisions are being made in the absence of data?

Boston Children's Data

 # Operatively treated syndesmosis Injuries



Screw vs. Suture Button



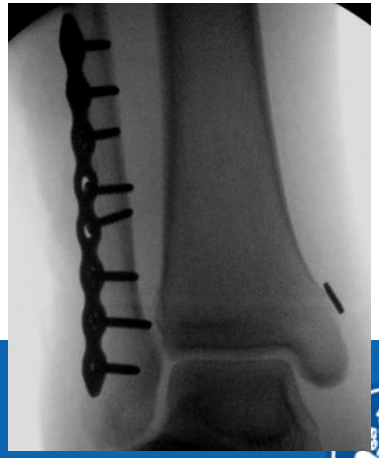
Screw vs. Suture Button

<u>172 Patients</u>

- 45% Female
- Mean age 16.2 yrs

128 Screw (74%)

44 Suture-button (26%)



****No difference in demographic or injury characteristics between treatment groups****

Screw vs. Suture Button

- Equivalent radiographic outcomes
- Equivalent complication rate
- Equivalent clinical outcomes (time to return to weight bearing, return to sports, range of motion, pain)

- ONLY DIFFERENCE: **Rate of Hardware Removal**
  - **Screws: 107/128 (84%) removed**
  - **Suture-button: 17/44 (39%) removed (p<0.001)**

CORTICES Survey Aim

To understand the trends in choice of fixation for management of syndesmosis injuries ***nationally***

Methods

Cross-sectional survey of members of CORTICES study group

Novel survey questions created to assess operative preferences regarding syndesmotic injuries

Built in Redcap

Instrument validation completed by 3 pediatric orthopaedic surgeons at our institution prior to distribution

Respondent Demographics

30/30 responded to the survey

Majority (73%) work at pediatric specialty hospital

Most (87%) work in metro setting (population >190,000)

Most (87%) treat <5 syndesmosis injuries/year

Years in Practice	# (%)
<5	8 (27%)
5-10	16 (53%)
11-15	4 (13%)
>15	2 (7%)

Respondent Demographics

30/30 responded to the survey

Majority (73%) work at pediatric specialty hospital

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Years in Practice	# (%)
<5	8 (27%)
5-10	16 (53%)
11-15	4 (13%)
>15	2 (7%)

Results

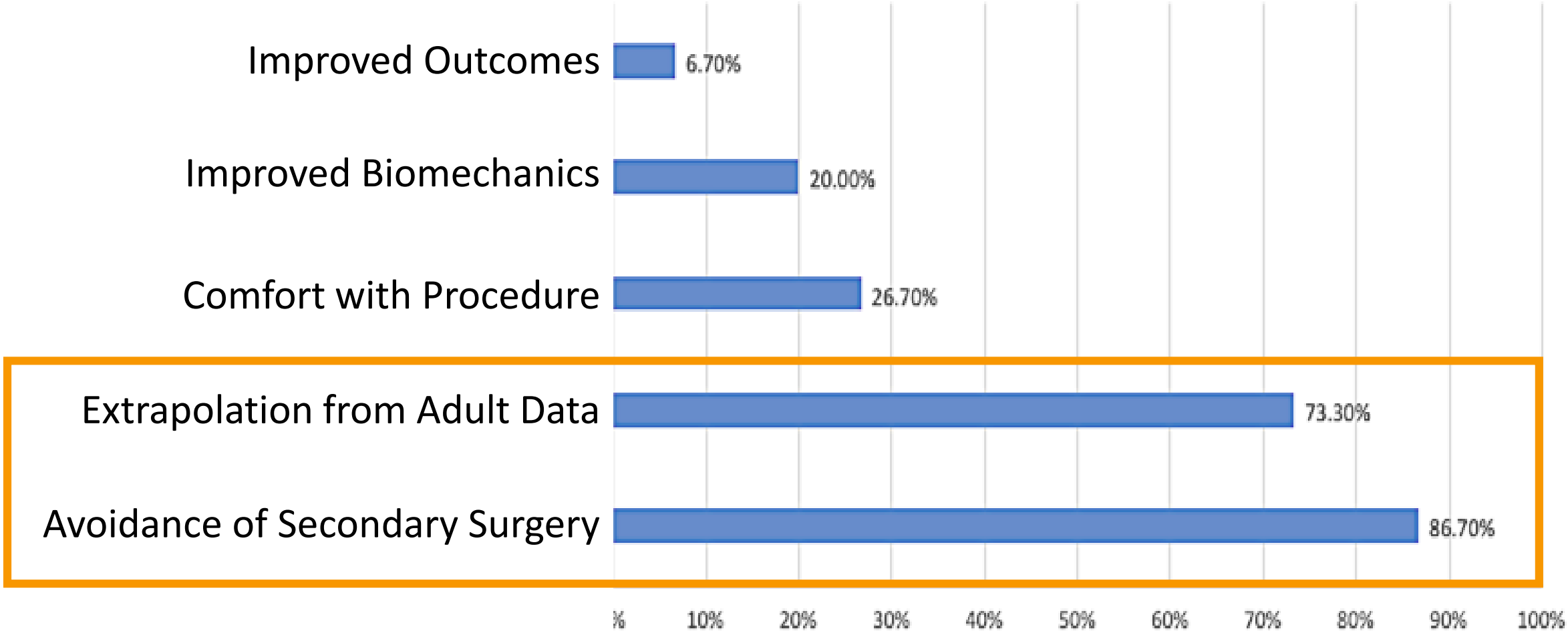
Overall, 21/30 **(70%) expressed preference for suture button** over screw for syndesmosis injuries

No statistically significant differences detected between years in practice, practice setting, hospital type, or number of injuries treated/year.

50% reported change in practice (All changes were from screw to suture button)

Results

Factors Contributing to Change in Implant Preference

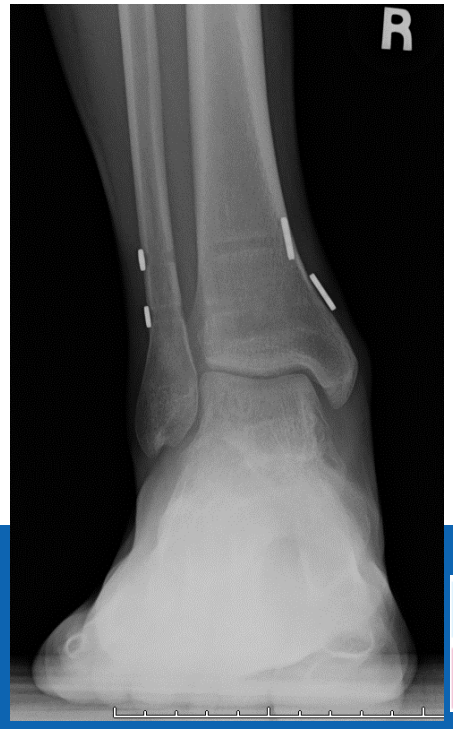


Discussion / Take Home

Clear trend toward suture-button implant preference over screws

Surgeons whose preference changed ALL changed from screw to suture button

Underlying reason for this trend multifactorial (most surgeons who switched selected more than one reason



OPEN Research Article

Management of Syndesmotic Injuries in Children and Adolescents: Results of a Cross-Sectional Survey of Pediatric Orthopaedic Surgeons

Caroline E. Williams, MD
Blair Stewig, BSc
Sang Won Lee, MSc
Benjamin J. Shore, MD, MPH, FRCSC
Collin J. May, MD, MPH
CORTICES Study Group

From the Department of Orthopedic Surgery, Boston Children's Hospital, Boston, MA (Dr. Williams, Ms. Stewig, Mr. Lee, Dr. Shore, and Dr. May); the Harvard Medical School, Boston, MA (Mr. Lee, Dr. Shore, and Dr. May)

Correspondence to Dr. May: Collin.May@childrens.harvard.edu

None of the following authors or any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this article: Dr. Williams, Ms. Stewig, Mr. Lee, Dr. Shore, and Dr. May.

Abstract presented at Pediatric Orthopaedic Society of North America Meeting 2021

The data set generated and analyzed during the current study is not publicly available, but is available from the corresponding author upon reasonable request. The data presented in this study were aggregated, de-identified, and derived from Boston Children's Hospital, Department of Orthopaedic Surgery. The data were stored on a secure department managed server. This study was conducted by Boston Children's Hospital.

JAAOS Glob Res Rev 2024;8: e24.00128

DOI: 10.5435/JAAOSGlobal-D-24-00128

ABSTRACT

Introduction: Although syndesmotic injury management in adults has shown improved outcomes with suture-button versus screw fixation, this has not been demonstrated in pediatric populations. This study investigates trends in syndesmotic injury management by conducting a survey of pediatric orthopaedic surgeons.

Methods: The Children's Orthopaedic Trauma and Infection Consortium for Evidence-Based Studies group was surveyed for information regarding their surgical fixation preference for syndesmotic ankle injuries.

Results: A survey response of 100% (30/30 members) was obtained. Most of the respondents practiced in a metropolitan setting (86.7%) and reported working in a pediatric specialty hospital (73.3%). 86.7% (n = 26) treated 0 to 5, 10% (n = 3) treated 6 to 10, and 3.33% (n = 1) treated over 10 pediatric syndesmotic ankle injuries in the past year. 70% (n = 21) of respondents preferred suture-button fixation while 30% (n = 9) preferred screw fixation. Furthermore, 50% (n = 15) of respondents reported a change in their implant preference since the start of their practice, with "avoidance of secondary surgery" and "extrapolation from outcomes in adults" as the most cited reasons at 86.7% and 73.3%, respectively.

Discussion: Our findings indicate that the shift from screw to suture-button fixation is due to an interest in avoiding secondary surgery for implant removal and by extrapolating results from adult studies.

Ankle injuries are common in the pediatric population, accounting for approximately 30% of pediatric sports medicine clinic visits.[1] Injuries to the ankle syndesmosis, however, are far less common, accounting for less than 1% of pediatric patients presenting with ankle trauma.[2] Also termed 'high ankle sprains,' syndesmosis injuries are defined as a disruption to the supportive ligaments between the tibia and fibula and are found to occur most frequently during sports that involve cutting and pivoting

THANK YOU!!

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Original Research: Management of Syndesmotic Ankle Injuries: Results of a Survey of POSNA Members

Caroline E. Williams, MD[a], Blair Stewig, BSc[a], Sang Won Lee, MSc[a,b], Danielle Cook, MA[a], Benjamin J. Shore MD, MPH, FRCSC[a,b], Collin J May, MD, MPH[a,b]

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Conflict of Interest/Disclosure of Funding: None of the authors received financial support nor have potential conflict of interest relating to this study.

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By-Laws Discussion & Committees

By-Laws Updates

Ben Shore

CORTICES Executive Committee

Membership & Points Discussion

Jennifer Laine
CORTICES Membership Committee

Coming up tomorrow…

- 8:00 to 8:30 AM: Breakfast & Chat
- 8:30 to 9:00 AM: Infection Grant
- 9:00 to 10:00 AM: New Studies
- 10:00 to 10:50 AM: Napkin Ideas
- 10:50 to 11:10 AM: Finances
- 11:10 to 11:30 AM: Housekeeping
- 12:00 PM: Annual Meeting Adjourned

Dinner

Ivar's Salmon House @6:30 PM

401 NE Northlake Way, WA, Seattle WA 98105

Thank you for joining us today!

Saturday CORTICES Agenda

- 8:00 to 8:30 AM: Breakfast & Chat
- 8:30 to 9:00 AM: Infection Grant- Schoenecker
- 9:00 to 10:00 AM: New Studies
  - Traumatic Arthrotomy- Livingston
  - Hip Dislocation- Baldwin
- 10:00 to 10:50 AM: Napkin Ideas
  - SH2 Distal Tibia Consensus Study- Swarup
  - Complication of Septic Arthritis of the Hip- Sanders
- 10:50 to 11:10 AM: Finances
  - Company External Funding Updates- Shore
- 11:10 to 11:30 AM: Housekeeping
  - Swag Ideas- Shore
- 12:00 PM: Annual Meeting Adjourned

Infection Grant

Jon Schoenecker

Monroe Carell Jr. Children's Hospital at Vanderbilt

New Studies

Traumatic Arthrotomy

Kristin Livingston
Boston Children's Hospital

Boston Children's Hospital
Where the world comes for answers

MANAGEMENT AND OUTCOMES OF TRAUMATIC ARTHROTOMY IN CHILDREN

Ikechukwu C. Amakiri, MD, MBA[1]; Andrew Homere, MD, MS[1]; Emi Schwab[2]; Shanika De Silva, PhD[2]; Kristin Livingston, MD[2]

[1]Harvard Combined Orthopaedic Residency Program, Boston, MA
[2]Department of Orthopaedic Surgery, Boston Children's Hospital, Boston, MA

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

PEDIATRIC TRAUMATIC ARTHROTOMIES

KEY FACTS

> Relatively infrequent injuries
> Majority occur in the knee > ankle/ elbow/ wrist/ shoulder
> Warrant expeditious diagnosis and treatment

DIAGNOSTIC METHODS

> History, physical examination, saline load test
> Recent studies show CT scans offer up to 100% sensitivity and specificity

TREATMENT & CONCERNS

> Risk of septic arthritis
> Adult studies recommend urgent intervention
> Early initiation of antibiotics is important
> Risk of septic arthritis in children remains unclear

RESEARCH GAP

NO studies on characteristics, management, and outcomes in pediatric population

METHODS

PRIMARY AIM

To determine the demographics, injury characteristics and complication rate in children with traumatic arthrotomy.

To identify risk factors associated with superficial and deep infection.

PATIENT IDENTIFICATION

Natural language processing, CT reports, and patient chart reviews within our institution from January 1st, 2003 to Feb 1, 2024.

PATIENT POPULATION

37 pediatric patients with traumatic arthrotomy of knee, ankle, shoulder.

No other joints identified

Excluded arthrotomy associated with open fracture

DATA ANALYSIS

Patient demographics, clinical characteristics, and outcomes were summarized using descriptive statistics, stratified by presence and absence of superficial or deep infections.

RESULTS

Table 1: Proportion of patients with each complication type

Type of complication	Frequency (%) (N=37)	95% CI for proportion
Deep infection/septic arthritis	0 (0%)	-
Superficial infection	2 (5%)	(1%, 18%)
Return to OR (not directly for arthrotomy)	4 (11%)	(3%, 25%)
Non-infectious complications	3 (8%)	(2%, 22%)
Keloid	1	-
Patellofemoral syndrome	1	-
PTSD	1	

RESULTS

Table 2: Demographic characteristic of patients, stratified by infection status

Demographic characteristic	No infection (N=35)	Patients with infection (N=2)	
		Patient 1	***Patient 2***
Age (years)	10 (4, 18)	4 years	9 years
Sex			
Female	9 (26%)	Male	Male
Male	**26 (74%)**		
Race			
Asian, South Asian	2 (7%)	White	White
Black, African American	4 (15%)		
Hispanic, Latino or Spanish origin	3 (11%)		
White	**18 (69%)**		
Insurance			
Public	9 (26%)	Private	Private
Private	**20 (57%)**		
Public and Private	6 (17%)		

RESULTS

Table 3: Clinical characteristic of patients, stratified by infection status

Clinical Characteristic	No infection (N=35)	Patients with infection (N=2)	
		Patient 1	*Patient 2*
Mechanism of injury			
Sports-related injury	6 (17%)		
Object falling onto patient	3 (9%)	Other	Other
Fall	**17 (49%)**	(Dog bite)	(Pedestrian struck)
Other	9 (26%)		
Joint involved			
Knee	**32 (91%)**		
Ankle	2 (6%)	Ankle	Shoulder
Shoulder	1 (3%)		
Polytrauma	7 (20%)	No	No
Associated soft tissue knee injury	14 (40%)		
Quadriceps Tendon	**8 (23%)**	No	No
Patellar Tendon	**5 (14%)**	No	No
Meniscal injury	1 (3%)	No	No
Method of diagnosis			
Physical exam	**27 (77%)**		
Injection	2 (6%)	Injection	CT imaging
CT imaging	5 (14%)		
MRI	1 (3%)		

RESULTS

Table 4: Outcomes of patients, stratified by infection status

Outcomes	No infection (N=35)	Patients with infection (N=2)	
		Patient 1	*Patient 2*
Surgery	35 (100%)	Yes	Yes
Time to OR (hours)	9 (2, 45)	8.3 hours	15.6 hours
Time from ED arrival to antibiotics (hours)	4 (0, 16)	2.4 hours	8.9 hours
Duration of antibiotics (days)	5 (0, 24)	16 days	7 days
Return to OR	4 (11%)	No	No
Other complications	2 (6%)	No	Yes (Keloid)

DISCUSSION

KEY FINDINGS

- Absence of deep infection/septic arthritis and low rate of superficial infection. No infections in knee arthrotomies.
- Surgeons should be vigilant in assessing associated soft tissue injuries (namely quadriceps and patellar tendon injuries).
- Optimal timing of antibiotics and surgical intervention remains unclear but septic arthritis appears to be a very unlikely occurrence if injuries are treated with antibiotics and surgery.

CONCLUSIONS

> There is a low risk of deep infection/septic arthritis after traumatic arthrotomy in children presuming treatment with standard of care (abx and surgery).

> It is unclear what the ideal time to surgery should be, what antibiotics should be given and for how long.

> There is a relatively high rate (40%) of injury to quad or patellar tendon in knee arthrotomise so these structures should be interrogated intraoperatively.

> Most children have complete recoveries without residual complications.

NEXT STEPS: CORTICES?

- Relatively low incidence and single institution data
- Very limited outcome data
- Difficulty searching for patients given lack of discrete ICD10, CPT

STUDY LIMITATIONS

Can we get better information through CORTICES multicenter study?
Opportunity to be the biggest/sole contribution to the literature on this subject

1) Survey of surgeon's preferred practices
2) Retrospective patient study – workup/treatment/outcomes

THANK YOU

Hip Dislocation

Keith Baldwin
Children's Hospital of Philadelphia
Virtual Presentation

Pediatric Traumatic Hip Dislocation

Alexandre Arkader MD, Keith D Baldwin MD,
Jonathan G. Schoenecker MD, PhD
Research Fellow: Akbar N. Syed MD

Children's Hospital of Philadelphia
Division of Orthopaedics

Perelman School of Medicine
University of Pennsylvania

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Thanks Supreme Leader!

Children's Hospital of Philadelphia
Division of Orthopaedics

Perelman School of Medicine
University of Pennsylvania

Background

- Biggest concern AVN- 3-15%
- AVN factors –Time to Reduction
  - AVN risk→ Recommendation <6 hours

Clin Orthop Relat Res. 2000 Jul:(376):68-79.

Traumatic hip dislocation in children. Long-term followup of 42 patients

C T Mehlman [1], G W Hubbard, A H Crawford, D R Roy, E J Wall

- Other Factors: BMI, Skeletal maturity, Associated fracture/injuries, Operative factors, Post-op protocols (immobilization, weight-bearing), etc. → Not evaluated
- Imaging not well evaluated
- Protocols not well evaluated
- Very little guidance for clinical care

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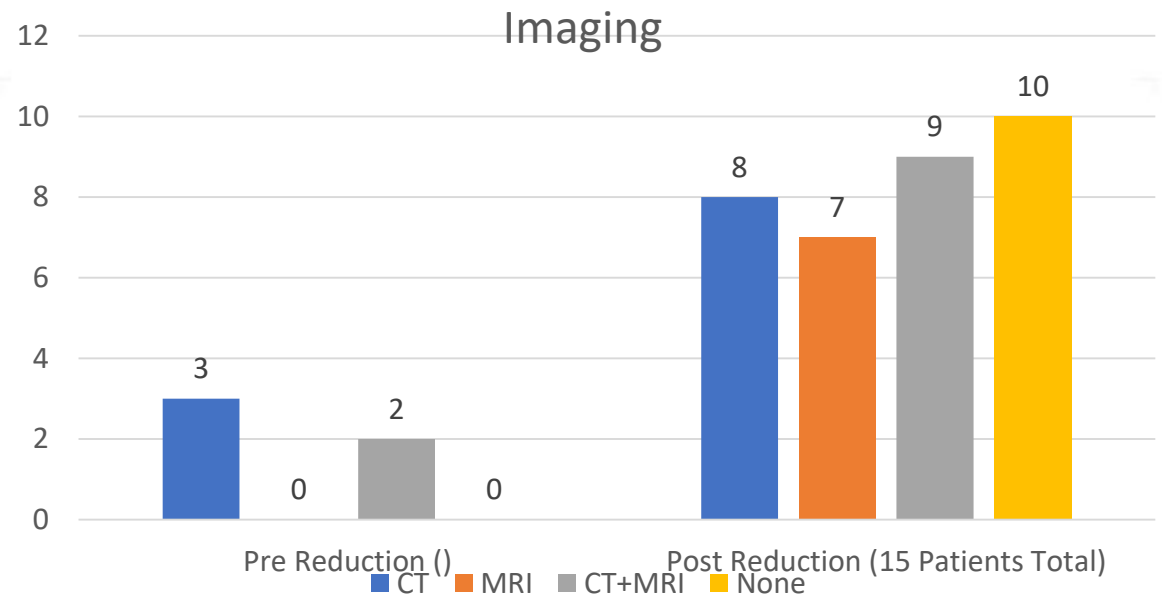
CHOP Data

- 34 patients over 10 years
- **Mean Age:** 11.1 years
- **Mean Follow-Up:** 404 days
- Time to reduction 17 h
- **Mechanism:**
  - **23/34 (67.6%) – Sport**

    100% Posterior Dislocation



- Reduction:
  - Closed – 29/34 (**5 in OR, 24 in ED**)
- Most were immobilized for ~2-6 wk
- Post Reduction Weightbearing:
  - **NWB – 19 (56%)**
  - **TTWB – 10 (30%)**

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- Systematic review 24 Studies
- 575 patients – Mean age 9.50 years
- AVN rate 15.5%

Associated Pathologies	N (%) out of 414 reported pathology
Sciatic Nerve Injury	9 (2.2%)
Leg Length and or Limp	16 (3.9%)
Hip OA	14 (3.4%)
Femur Fracture	20 (4.8%)
Physeal Injuries	14 (3.4%)

Multicenter Study > Eur J Trauma Emerg Surg. 2023 Aug;49(4):1897-1907.
doi: 10.1007/s00068-023-02280-2. Epub 2023 Jun 1.

Epidemiology and injury morphology of traumatic hip dislocations in children and adolescents in Germany: a multi-centre study

- One multicenter study
- 16 hospitals 42 years 76 patients
- AVN rate 15 %
- Mainly epidemiological

Associated Pathologies	N (%)
Sciatic Nerve Injury	7.8%
Bone	21%
Labrum	23%
Cartilage + Bone	6.5%

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University of Pennsylvania

Objectives

- Establish differences in:
  - reduction protocols/ incidence of fractures and other adverse events of reduction
  - Timing/ location of reduction
  - Imaging protocols
  - Rehabilitation protocols

- To determine:
  - rate and risk factors for AVN
  - factors influencing return to sports
  - risk factors for hip instability/re-dislocation/stiffness

- To develop a classification system for traumatic paediatric hip dislocations

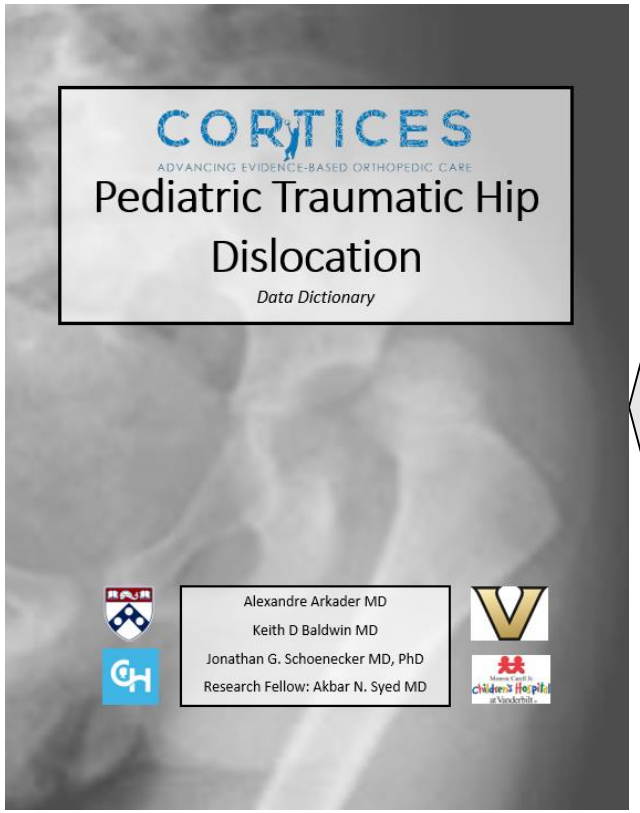
Hypotheses

1. Closed reduction will have similar complications in ED vs OR, and OSH vs CORTICES site, femoral head fracture/ epiphyseal separation rate will be low
2. Open reduction and associated injuries will be associated longer timed to recovery, and higher rates of persistant morbidity
3. Changes in management will be common after obtaining an MRI vs CT or MRI+CT
4. Shorter bracing periods and early weightbearing will show faster recovery of range of motion, return to sports without increased complication rates in simple isolated hip dislocations.
5. AVN will be associated with longer times to reduction, presence of femoral head fractures, open reduction and/or failed closed reduction.
6. Skeletal maturity patterns will be predictive of associated fracture patterns in hip dislocations
7. Injury patterns will be predictable based on MOI and direction of dislocation

Methods

- **Inclusion (All Studies):**
  - Presented with injuries between 1/1/2010 and 1/1/2024
  - Age 0 to 18 years at date of injury
  - Diagnosis of hip dislocation or fracture-dislocation (fractures of the proximal femur or acetabulum or pelvis)
  - Minimum 3 months follow-up
- **Exclusion:**
  - Previous history of fracture without dislocation.
  - Inadequate documentation or x-rays.

Data Dictionary



- **Demographics**
- **Presentation, Injury and Clinical Features**
- **Management**
  - Imaging (Pre and Post Reduction)
  - Reduction
  - Post Reduction
- **Post Discharge:**
  - 0-3m, 4-6m, 7-12m, 13-24m year, Additional follow-up 1 (2y – 3.99 years), follow up 2 (4+ year)

Children's Hospital of Philadelphia
Division of Orthopaedics

Perelman School of Medicine
University of Pennsylvania

Timeline and Submission Goals

- **Timeline:**
  - **Sept – Dec 2024**
    - Finalize Sites and Redcap (Alpha and Beta Testing)
  - **Dec – Summer 2025-Winter2025/6**
    - Data Collection
  - **Late Summer/Early Fall 2026**
    - Analysis, Results
  - **Q3 of 2026 – 2027: Manuscript/'s**

- **Submission:**
  - Conference: POSNA 2026, AAOS 2026-7
  - Publication: JBJS, JPO

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Napkin Ideas

SH II Distal Tibia Consensus Study

Ishaan Swarup
UCSF Benioff Children's Hospital

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Background

- There are no established indications for the surgical management of closed, Salter-Harris (SH) II distal tibia fractures
- Earlier studies suggested a lower rate of premature physeal closure (PPC) after surgical reduction of the physeal gap associated with this injury
- More recent studies have shown that surgical management may improve joint alignment, but does not decrease the risk of PPC

ORIGINAL ARTICLE

Variations in the Management of Closed Salter-Harris II Distal Tibia Fractures

Ishaan Swarup, MD,† Robert Pearce, BA,*† Ryan Sanborn, BS,‡*
Children's Orthopaedic Trauma and Infection Consortium for Evidence Based Studies (CORTICES), and Benjamin J. Shore, MD, MPH, FRCSC‡§

J Pediatr Orthop. 2023;43(9):e742-e74

UCSF School of Medicine

UCSF Benioff Children's Hospitals

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Take Home Points

- There is variation in the indications for operative and nonoperative management of closed, SH II distal tibia fracture
- Consensus was reached for nonoperative management in patients with <3mm of translation after closed reduction
- There was no consensus in cases with greater deformity
- The variation in the management of distal tibia SHII fractures is significant, suggesting that perhaps clinical equipoise exists between operative and nonoperative management

Proposal – Modified Delphi

- Can we come to a consensus with the existing literature and combined experience?
- Modified Delphi Method via app
  - Identify group of CORTICES members
  - Survey
  - Read existing literature
  - Re-survey
- Develop agreement on most important indications for surgical management based on experience and literature
- Identify relative indications – areas for future study

Thank You

Complication of Septic Arthritis of the Hip

Julia Sanders
Colorado Children's Hospital

Napkin Idea: Avascular Necrosis after Septic Arthritis

Julia Sanders, MD

- Nihalani S, Cruz F, Hawkins JK, Griswold BG, Mabry SE, McGwin G, Gilbert SR, Conklin MJ. Is choice of approach associated with risk of avascular necrosis in pediatric septic hip? J Child Orthop. 2024 Jun 17;18(4):399-403.
- 13/164 septic hips developed AVN (7.9%)

- Nielsen E, Mortimer JA, Bompadre V, Yandow S. The Price for Delayed Diagnosis of Pediatric Septic Hip: Increased Cost and Poor Outcomes. J Pediatr Orthop. 2024 Aug 28.
- 5/43 hips developed AVN (11.6%)

- Forlin E, Milani C. Sequelae of septic arthritis of the hip in children: a new classification and a review of 41 hips. J Pediatr Orthop. 2008 Jul-Aug;28(5):524-8.
- 42 hips with sequelae (no denominator)

- Vidigal Júnior EC, Vidigal EC, Fernandes JL. Avascular necrosis as a complication of septic arthritis of the hip in children. Int Orthop. 1997;21(6):389-92.
- 20/71 septic hips developed AVN (28%

Database Query

- Primary outcome: rate of AVN
  - By diagnosis (SA, SA+OM)
  - By joint
  - By region
- Secondary outcome
  - Possible associated lab markers (AVN vs no-AVN)
  - Organism?
  - Time to AVN diagnosis?

Next steps

- Power analysis
- Data query
- Deep dive into AVN cases?

Calcaneal Fractures

Collin May

Boston Children's Hospital

Background

- Rare injury
- Reported incidence of 1/100,000 fractures in kids
- Paucity of data looking at fracture patterns, operative indications, operative fixation options, and outcomes
- Different indications/outcomes for kids (or adolescents) vs. adults

Literature

ORIGINAL ARTICLE

Operative Treatment of Intraarticular Calcaneal Fractures in the Pediatric Population

Charles J. Petit, MD, B. Minsuk Lee,† James R. Kasser, MD,‡ and Mininder S. Kocher, MD, MPH‡*

(*J Pediatr Orthop* 2007;27:856–862)

- 14 fractures in 13 patients
- 50:50 tongue type: joint depression
- 13/14 treated with plate/screw via extensile lateral approach
- 4 minor complications, 0 major complications
- All doing well at final follow up

Literature

Clinical Outcome of Pediatric Calcaneal Fractures Treated With Open Reduction and Internal Fixation

Andrew Pickle, MD, Thierry E. Benaroch, MD, FRCSC, Pierre Guy, MD, FRCSC, and Edward J. Harvey, MD, FRCSC

J Pediatr Orthop • Volume 24, Number 2, March/April 2004

- 6 patients with 7 fractures treated with ORIF via extensile lateral approach
- 5/6 Male. Mean age 13 years
- All children healed. All back to sports without pain
- 5/7 had decreased subtalar range of motion
- No complications. No subsequent surgery at mean 30 months (min 18 mo)

Literature

A minimally invasive (sinus tarsi) approach with percutaneous K-wires fixation for intra-articular calcaneal fractures in children

Lei Tong[a], Mingjing Li[b], Fan Li[b], Jian Xu[b] and Tao Hu[b]

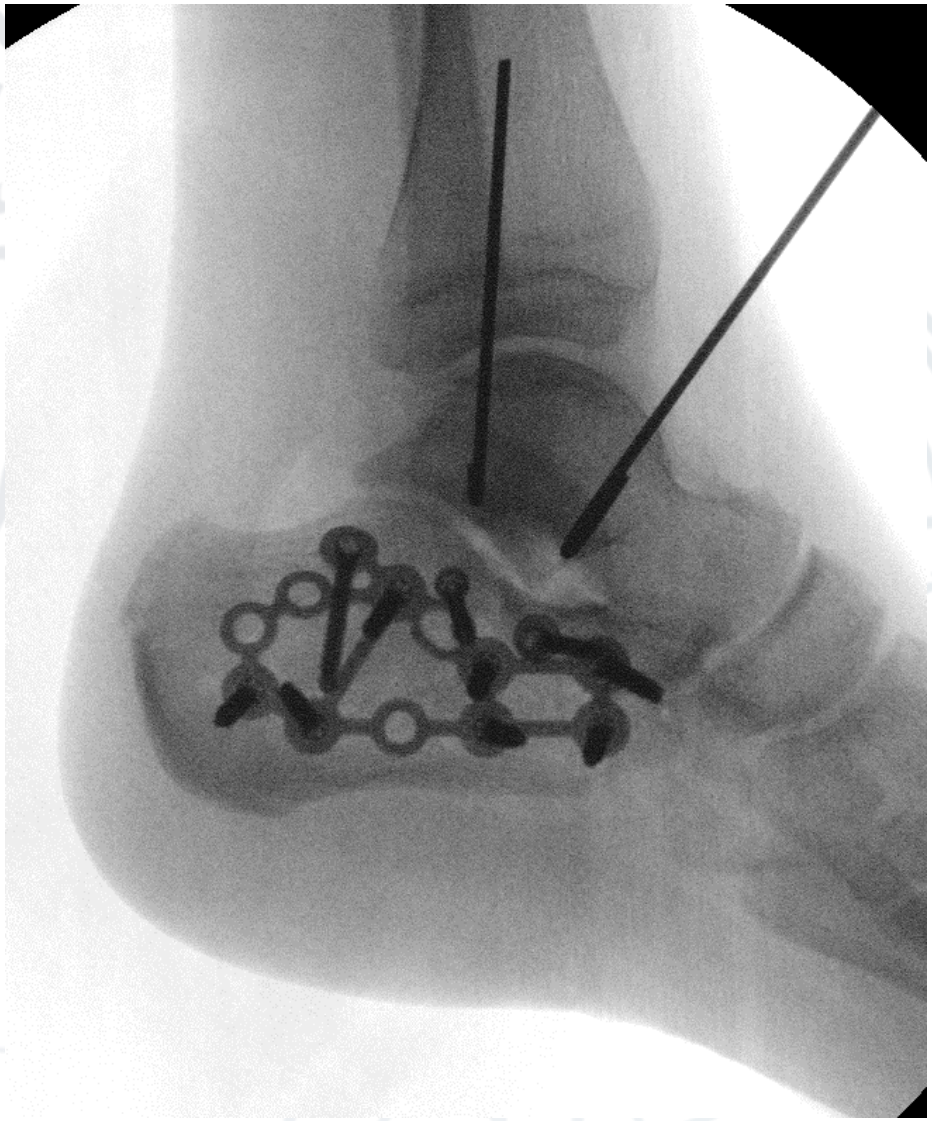
Journal of Pediatric Orthopaedics B 2018, 27:556–562

- 25 fractures
- 84% male. Mean age 9.8 years
- Overall good results
- 1 superficial infection

BCH Data 2013-2023

<u>ORIF</u>

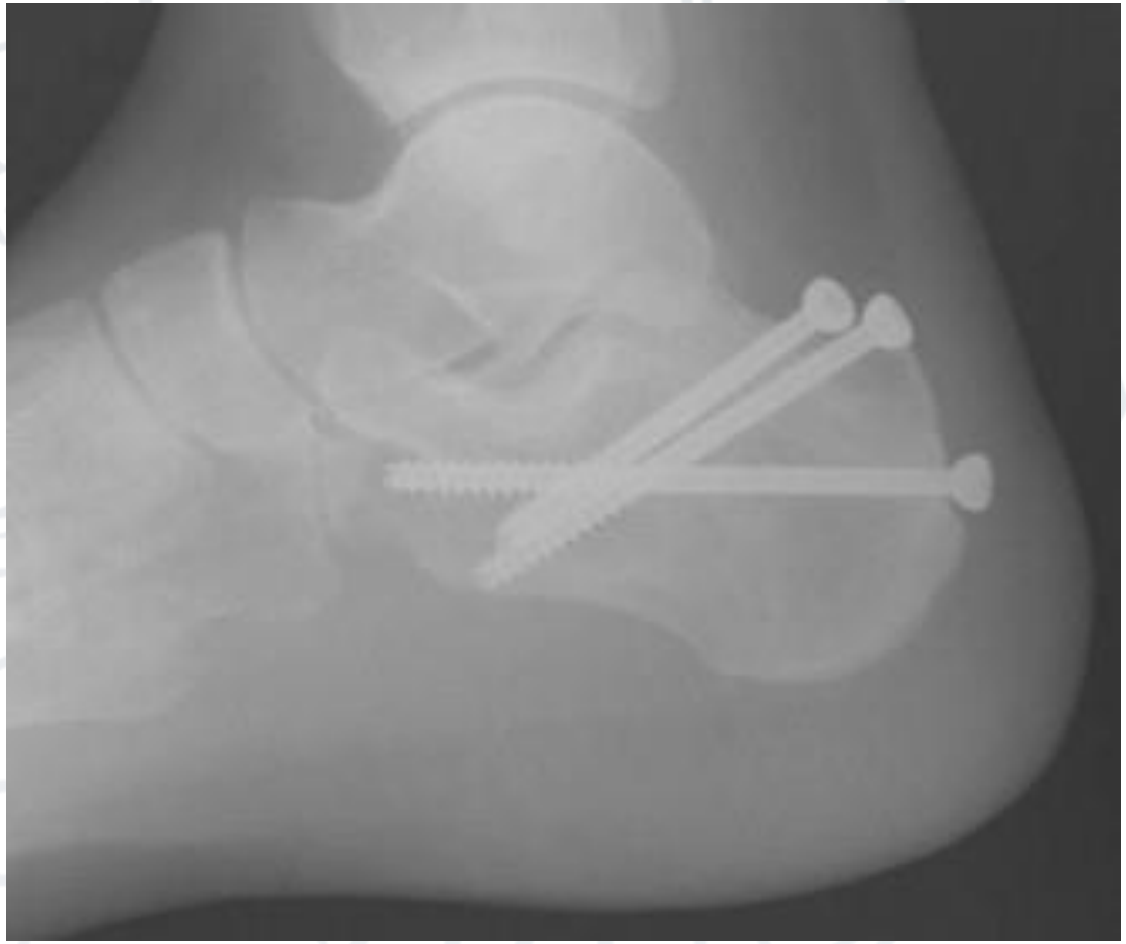
- 28 patients
- 47% Female
- Mean age 15.4
- Age range 8-27



BCH Data 2013-2023

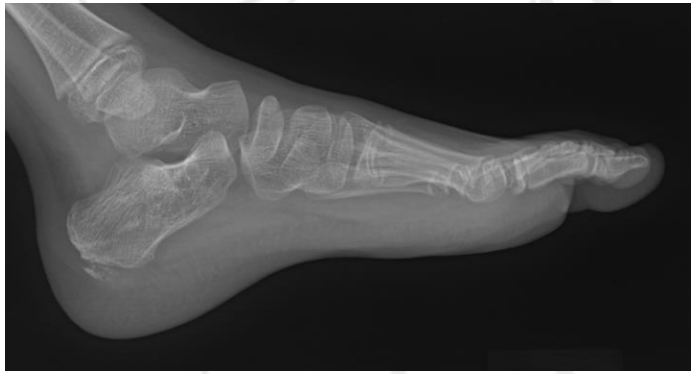
<u>CRPP</u>

- 5 Patients
- 60% Female
- Mean age 14.7
- Age range 12-17



BCH Data 2013-2023

8 years old

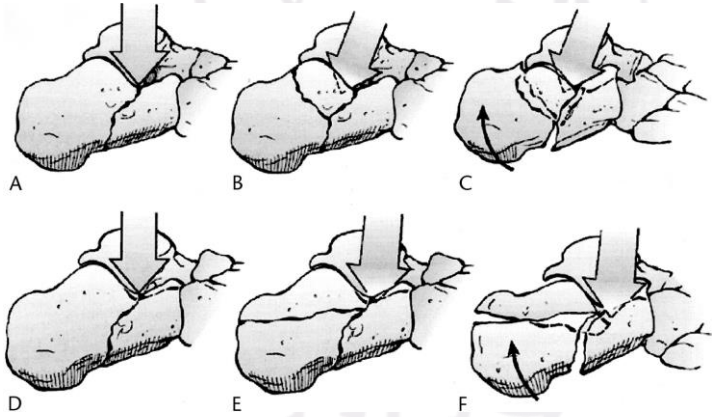


12 years old

15 years old

Potential Questions

- Fracture classification – are the patterns different in young people?



Potential Questions

- Fracture classification – are the patterns different in young people?
- What is the rate of associated injuries?

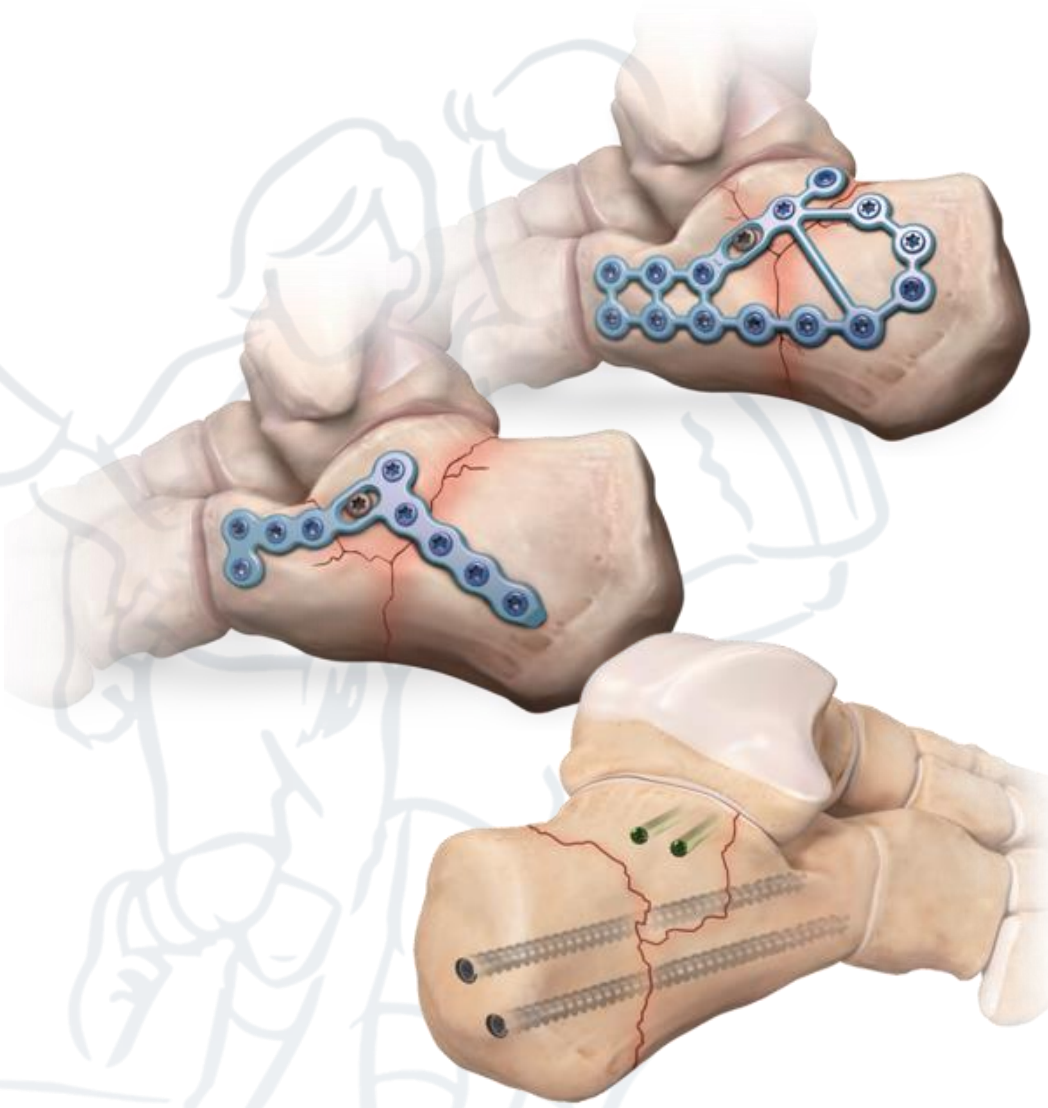
Potential Questions

- Fracture classification – are the patterns different in young people?
- What is the rate of associated injuries?
- Indications for surgery and decision making – is this different in a young, active population?

Potential Questions

- Who does these? Foot person? Traumatologist? Anyone?

- Open vs. percutaneous approaches?
- Sinus tarsi vs. extensile lateral?
- Plate/screw constructs vs. screw-only?



Potential Questions

- Surgical complication rate and risk factors?
- Long-term subtalar arthrosis risk?
- Secondary surgery rate?

Proposed Specific Aims

- Primary Aim:
  - Characterize pediatric and adolescent calcaneus fractures with regards to age, mechanism of injury, radiographic patterns, treatment, outcomes, and compared to historical cohorts
  - Hypothesis: mechanism of injury, fracture pattern, treatment modalities and outcomes will differ between peds and adult patients
  - Primary outcome: ability to and timing of return to sport, peri-operative complications, postoperative complications, need for supervised therapy services, radiographic outcome (residual displacement, arthritic changes and deformity)

Proposed Specific Aims

- Secondary Aim 1

  To compare outcomes between operatively and non-operatively managed patients and determine if fracture pattern/displacement threshold for poor outcomes with non-operative management.

  - Hypothesis: Surgical and non-surgically managed Calcaneus Fractures will have similar outcomes in fractures with minimal articular displacement

Proposed Specific Aims

- Secondary Aim 2

  To determine if the presence of open physes influences the outcome of pediatric Calcaneus injuries by comparing outcomes between pediatric patients with open physes to those less than 18 with closed physes.

  - Hypothesis: Pediatric patients with Calcaneus injuries and closed physes have worse outcomes than those with open physes

Methods

- Retrospective Review
- Inclusion
  - Age 0-18
  - Intra-articular calcaneus fracture
  - Minimum 6 month follow up
- Exclusion
  - Pathologic fracture
  - Isolated anterior process or tuberosity fracture

MRI in Setting of a Hip Effusion: Standard of Care or Unnecessary Cost?

Todd Blumberg
Seattle Children's Hospital

Institutional Patterns of Pediatric Pelvis Fx Treatment

Jessica McGraw-Heinrich
Texas Children's Hospital

Surgeon Preferences for Femoral Fracture IMN Fixation

Jessica McGraw-Heinrich
Texas Children's Hospital

Company External Funding Updates

Benjamin Shore
Boston Children's Hospital

Housekeeping

Benjamin Shore

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