Gustilo-Anderson Type III Open Fractures β-Launch Presentation

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Boston Children's Hospital
HARVARD MEDICAL SCHOOL

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Agenda

- Study introduction (background, aims, definitions, eligibility criteria)
- Cohort identification
- REDCap Housekeeping
- Data Collection Forms

Background

- Pediatric open fractures are serious injuries with high morbidity risk, yet standardized guidelines are limited for the most severe fx types
  - Most guidance **extrapolated from adult literature** and leads to **marked practice variation**
- Pediatric anatomy, growth potential, and biomechanics differ from adults
- Anticipated complications and recovery timelines in children are underreported in the literature
- Goal: to characterize current treatment practices and identify factors associated with adverse outcomes in children with GA type III open fractures

β Sites

Boston Children's Hospital
Cincinnati Children's Hospital
Children's Hospital of Atlanta
Le Bonheur Children's Hospital | Campbell Clinic
Monroe Carell Jr. Children's Hospital at Vanderbilt

Primary Aim

To estimate the infection rate following ED admission in pediatric patients aged 0-18 years undergoing treatment for long bone Type III open fractures, excluding pelvic fractures and lawnmower and firearm mechanisms of injury, at CORTICES institutions between January 2015 to May 2026.

Hypothesis: The 180-day post ED admission infection rate for pediatric patients undergoing treatment for Type III open fractures at CORTICES institutions will be between 2.8-40.5%

Secondary Aims

#1: To assess the association between time to IV antibiotic administration, type of antibiotics administered, and duration of antibiotics with the occurrence of the 180-day post ED admission infection rate in pediatric long bone GA III open fractures

Hypothesis: In patients aged ≤18 treated at CORTICES institutions for Type III open fractures, a shorter time to antibiotic administration, the use of a combination of antibiotics, and a longer duration of IV antibiotics is associated with lower rates of 180-day post ED admission infection following treatment.

#2: To assess the association between perioperative factors and the occurrence of 180-day post ED admission infections in pediatric long bone type III open fracture patients treated at CORTICES institutions.

Hypothesis: In patients aged ≤18 seen at CORTICES sites for Type III open fractures, a longer time to the OR and more than one surgical procedure results in a higher occurrence of 180-day post ED admission infections following treatment.

Secondary Aims (continued)

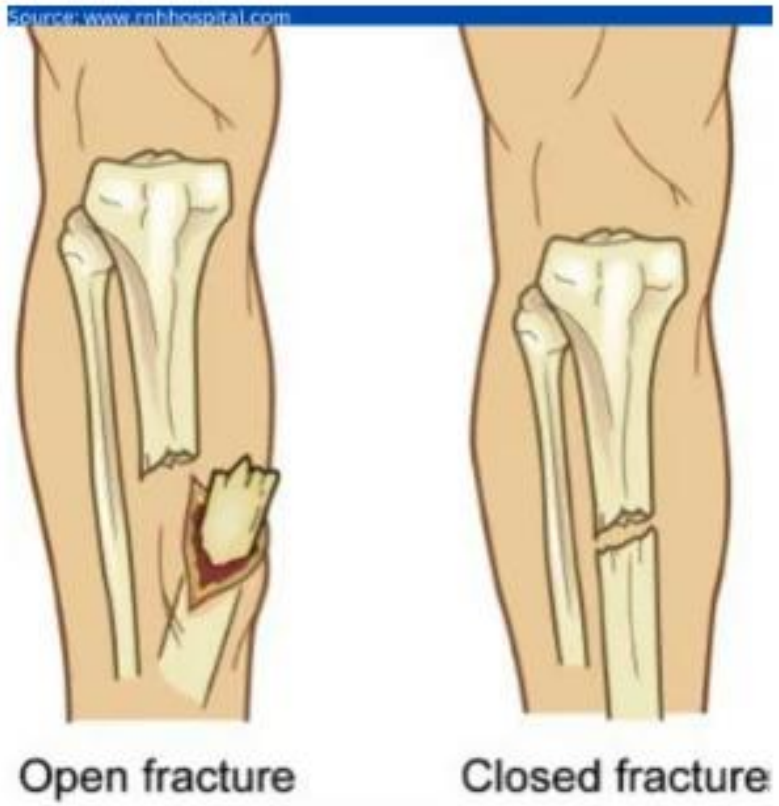
#3: To estimate the 180-day post ED admission complication rate in pediatric patients treated for long bone GA III open fractures at CORTICES institutions

Hypothesis: In patients aged ≤18, the estimated 180-day complication rate following type III long bone open fracture treatment is 5%

Defining Open Fractures

- **Open fracture** → a broken bone that pierces through the skin and/or a deep wound that exposes the bone through the skin

- **Closed fracture** → a broken bone that does not penetrate the skin barrier



Defining Gustilo-Anderson Type III Fx

Type	Description
Type I	Clean wound <1 cm in diameter with simple fracture pattern and no skin crushing
Type II	A laceration >1 cm and <10 cm without significant soft tissue crushing. The wound bed may appear moderately contaminated
Type III	An open segmental fracture or a single fracture with extensive soft tissue injury >10 cm. Type III injuries are subdivided into three types
Type IIIA	Adequate soft tissue coverage of the fracture despite high energy trauma or extensive laceration or skin flaps
Type IIIB	Inadequate soft tissue coverage with periosteal stripping **Requiring soft tissue coverage w/ rotational or free flap**
Type IIIC	Any open fracture that is associated with vascular injury that requires repair

Any open fracture caused by a farm injury is automatically a Type III

Some GA Type IIIs may be <10 cm if there is a high-energy injury mechanism, extensive soft tissue injury, requires flap or graft coverage, vascular injuries, or farm contamination

Defining Long Bones

- Eligible patients must have an open fracture of a **long bone**, defined as
  - Femur
  - Tibia and/or fibula
  - Humerus
  - Radius and/or ulna

- Open fractures of the following bones are not considered long bones and are **ineligible**:
  - Pelvis
  - Clavicle
  - Skull
  - Hand
  - Foot
  - Spine
  - Ribs



Any patient with an open long bone fracture that is GA Type III will be included in this study. Due to the traumatic nature of these injuries, eligible patients will likely sustain additional open or closed fractures to long bones or non-long bones. These injuries will be recorded in REDCap for eligible patients.

Inclusion & Exclusion Criteria

Inclusion

- Pediatric patients aged 0 to 18.99 years at ED presentation
- Diagnosis of a GA Type III open fracture of a long bone
- Received treatment at a CORTICES institution between 1/1/2015 – 5/31/2026

Exclusion

- Open fractures of the pelvis, clavicle, skull, face, hand, or foot
- Immunocompromised patients
- Firearm mechanism of injury*
- Lawnmower mechanism of injury*

**Please complete the REDCap eligibility form and keep a record of these patients for a future follow-up study*

Data Codes

ICD Codes:

ICD-10 The letter 'C' in the final position indicates a type III open fracture. The base codes for each eligible bone are as follows

- **Femur -- S72.XXXC**
- **Tibia/Fibula -- S82.XXXC**
- **Humerus -- S42.XXXC**
- **Radius/Ulna -- S52.XXXC**

ICD-9 Eligible patients will fall within the code range **810-829** with an **odd value after the decimal point** (ex: 810.3)

Natural Language Processing: "type III open fracture", "grade III open fracture", "GA III", "GA IIIa", "GA IIIb", "GA IIIC", "type IIIa", "type IIIb", "type IIIc"

CPT Codes*: 11010; 11011; 11012

**** Will capture all open surgical management of a fracture, including ineligible cases such as a closed fracture treated with ORIF. Please confirm patient eligibility.***

Identifying Patient Cohort

"Ideal" Cohort Pull

- Natural language processing (NLP) model for type III open fractures (if available at your institution)
- Cross-reference with ICD-9/10 diagnosis codes
- CPT code + relevant ICD pairing should capture open GA III fractures
- Designed to efficiently identify eligible patients at each institution

How Lead Site Found Patients

Initial NLP & ICD combined query yielded high volume open fracture cases (GA I-III)

Among identified patients (56), we:

- Manually screened ED visit note, operative notes, and postop clinic visit notes
- Confirmed GA III type prior to inclusion
- Manual review allowed accurate isolation of true type III fractures (n=33)

REDCap Housekeeping: Record ID

- When entering your patient data, you will be asked to enter a new or existing **Record ID**.
- To generate your REDCap Record IDs, please use the following format (below), where '**S**' is the 2-digit site code and '**P**' is the 3-digit record ID

S S – P P P

2-digit Unique **Site** Number

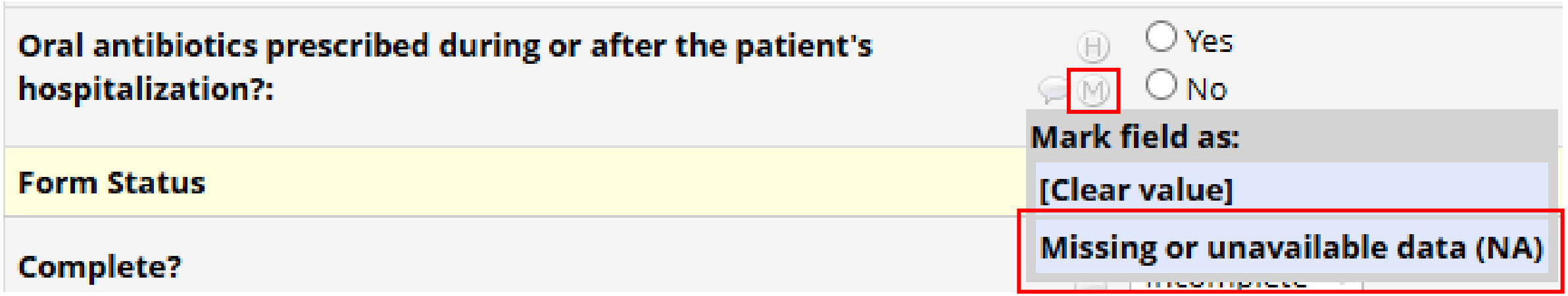
3-digit Sequential **Patient** ID Number

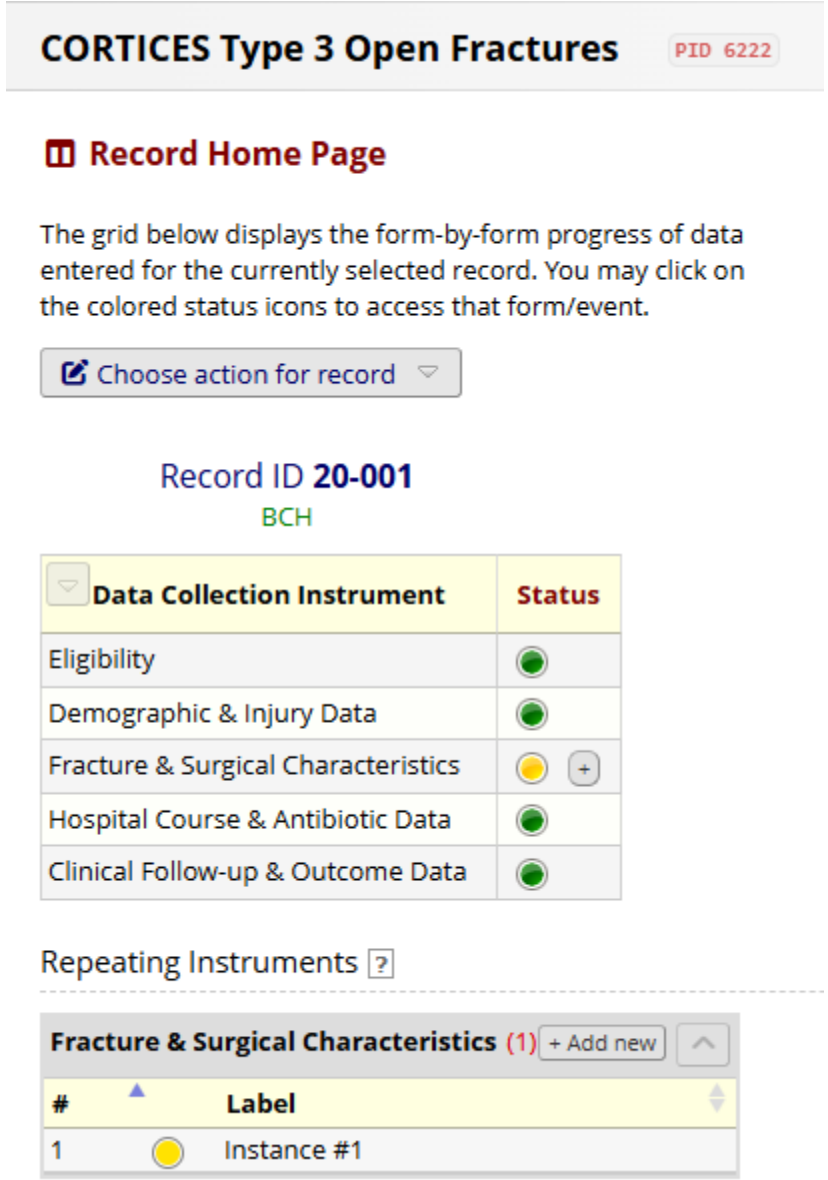
For example, BCH's first patient would have a REDCap ID of "20-001". BCH's twentieth patient would have a REDCap ID of '20-020'. It is crucial that sites use the correct site ID to avoid duplicating REDCap IDs.

Site #	Site	Site #	Site
20	Boston Children's	32	Nationwide Children's
22	Children's Atlanta	33	Rady Children's
23	Children's Colorado	34	Seattle Children's
24	Children's Dallas	35	St. Louis Children's
25	Children's LA USC	36	Texas Children's
26	Children's Philadelphia	37	Vanderbilt Children's
27	Cincinnati Children's	38	UCSF
28	CS Mott Children's (Michigan)	39	Nemours Children's Delaware
29	Gillette Children's	40	Nemours Children's Florida
30	Le Bonheur Children's	41	Phoenix Children's
31	Lurie Children's		

REDCap Housekeeping: Missing Data

- If there is no unknown option, please utilize the missing code (i.e., no fields should be left blank) when appropriate. All fields are marked with a circular **"M"** indicate that a missing data code may be used





REDCap Instruments

1) Eligibility Form

2) Demographic & Injury Data

3) Fracture & Surgical Characteristics *(REPEATING)*

4) Hospital Course & Antibiotic Data

5) Clinical Follow-up & Outcome Data

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Eligibility

REDCap Data Collection Instrument

Editing existing Record ID **20-001.**

Record ID 20-001

To rename the record, see the record action drop-down at top of the Record Home Page.

Site: Boston Children's

INCLUSION CRITERIA

Is the participant between 0 and ≤18 years of age at presentation?
* must provide value
(●) Yes ( ) No reset
Patient considered to be no older than 18 years old at time of presentation

Has the patient been diagnosed with a Gustilo-Anderson Type III open fracture of a long bone?
* must provide value
(●) Yes ( ) No reset
Includes humerus, radius, ulna, femur, tibia, and fibula fractures

Was the patient's Type III open fracture treated between the time period of 01/01/2015 to 12/31/2025?
* must provide value
(●) Yes ( ) No reset

EXCLUSION CRITERIA

Is the patient immunocompromised?
* must provide value
( ) Yes (●) No reset
Conditions include known immunodeficiency, undergoing chemotherapy, taking chronic immunosuppressive medications, or otherwise having a condition that impairs the immune system

Was the mechanism of injury a firearm-related incident (ballistic injury)?
* must provide value
( ) Yes (●) No reset

Was the mechanism of injury a lawnmower-related incident?
* must provide value
( ) Yes (●) No reset

ELIGIBILITY

If you answered NO for any of the inclusion questions or YES for any exclusion questions, the patient is NOT eligible for data collection. Please do not continue further.

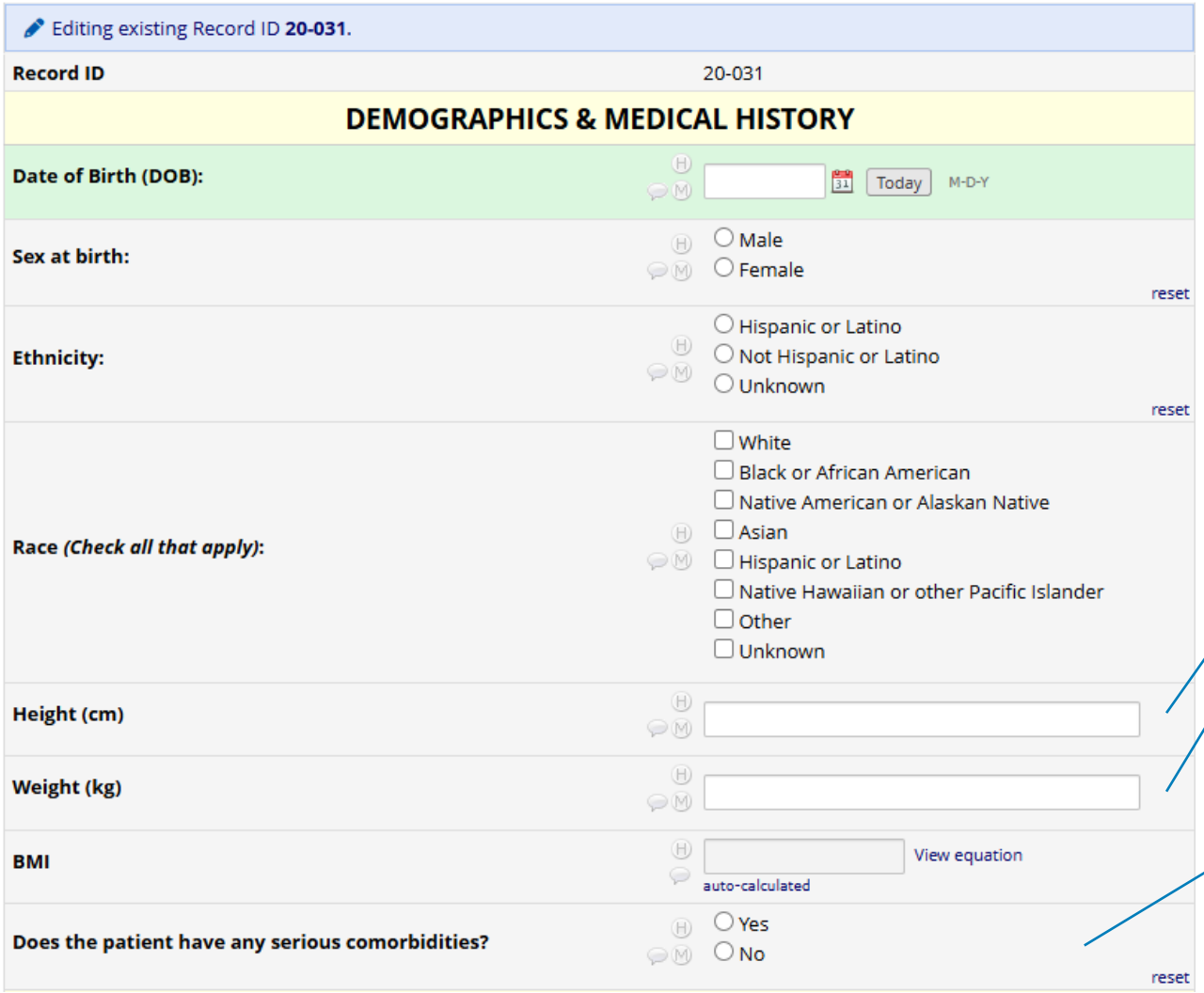
Is the participant eligible for data collection?
* must provide value
(●) Yes ( ) No reset

PAY ATTENTION TO BRANCHING WARNING

Warning: Your responses to the eligibility questions do not align with the final eligibility determination. Please confirm all values above

Demographic & Injury Data

REDCap Data Collection Instrument



Editing existing Record ID **20-031**.

Record ID	20-031

DEMOGRAPHICS & MEDICAL HISTORY

Date of Birth (DOB):	Today M-D-Y
Sex at birth:	○ Male ○ Female reset
Ethnicity:	○ Hispanic or Latino ○ Not Hispanic or Latino ○ Unknown reset
Race *(Check all that apply)*:	☐ White ☐ Black or African American ☐ Native American or Alaskan Native ☐ Asian ☐ Hispanic or Latino ☐ Native Hawaiian or other Pacific Islander ☐ Other ☐ Unknown
Height (cm)	
Weight (kg)	
BMI	View equation auto-calculated
Does the patient have any serious comorbidities?	○ Yes ○ No reset

Weight should be documented in the ED. Height is not always documented in the ED. Please use a recorded height within +/- 1 month of ED admission date, if available

Any significant comorbidities that may impact medical care (i.e. osteogenesis imperfecta, diabetes, chronic kidney disease).

Often listed under PMH in an ED visit note or in a pre-anesthesia systems evaluation.

INJURY CHARACTERISTICS

Date of injury 06-11-2024 Today M-D-Y

Mechanism of injury:
- ○ Motor vehicle collision
- ◉ Pedestrian struck by motor vehicle
- ○ Bicycle or scooter
- ○ E-bike or E-scooter
- ○ Playground
- ○ Trampoline
- ○ Sport
- ○ Fall not otherwise specified
- ○ ATV/UTV
- ○ Motorcycle
- ○ Other

Did the patient sustain multiple type III open fractures at the designated long bone fracture sites? ◉ Yes ○ No reset

Eligible sites include humerus, radius/ulna, femur, and tibia/fibula. Refer to the data entry guide for classification details.

Did the patient sustain other fractures (other than the open fracture)? ○ Yes ◉ No

Injury severity score (ISS): 13

ISS Category: Moderate (9-15)

leave blank if ISS unknown

Polytrauma? ○ Yes ◉ No

Polytrauma: Multiple injuries across ≥2 body systems, often wit high injury severity

Non-orthopaedic injuries sustained? ○ Yes ◉ No

Head injury sustained? ○ Yes ◉ No

Includes concussion or head bleed (including intracranial

Emergency department note contains information for most of these questions related to injury characteristics

Read ED note to determine date of injury, may differ from ED presentation date

If multiple, do the Type III open fractures involve distinct eligible fracture site, different articulating surfaces, or separate injury patterns that were treated as discrete injuries? ◉ Yes ○ No reset

If Yes, complete a separate repeating instrument for each unique fracture site. Refer to the data entry guide for examples.

Record multiple open fractures occurring at different limbs as separate injury event on the “Fracture & Surgical Characteristics” instrument

i.e., closed lumbar spine fracture, open metatarsal fracture

Recorded as part of a trauma registry at our institution. May not be explicitly mentioned in the patient’s chart. Confirm how this is collected at your institution with the site PI or ED team.

alert activated. No signs of head trauma on exam and no LOC or emesis to suggest significant head trauma. No evidence of trauma anywhere else on exam, negative FAST exam.

From ED note

Fracture & Surgical Characteristics

REDCap Data Collection Instrument

Repeating Instrument

FRACTURE CHARACTERISTICS

Please create a *repeating instance* and complete a separate fracture detail for *each* instance of a Type III open fracture

Open fracture location:	○ Femur ◉ Tibia and/or fibula ○ Humerus ○ Radius and/or ulna reset
Laterality of the Type III long bone open fracture	○ Left ○ Right reset
Gustilo-Anderson Type III Fracture Subtype:	
AO/OTA Fracture and Dislocation Classification:	*To be completed by PI* [Bone][Segment]-[Subsegment] / [Child][Severity][Displacement].
Was gross contamination of the open fracture noted upon arrival or in the OR?	○ Yes ○ No reset Ex: gravel in wound
Measurement of open wound (cm):	○ Less than 1cm ○ Between 1 to 10 cm ○ Greater than 10 cm ○ Unknown reset

Emergency department note or operative notes most helpful for collecting these fracture characteristics

May be listed in operative note or discharge note. Please refer to slide 7 or the data entry guide for more details.

YES gross contamination from op note

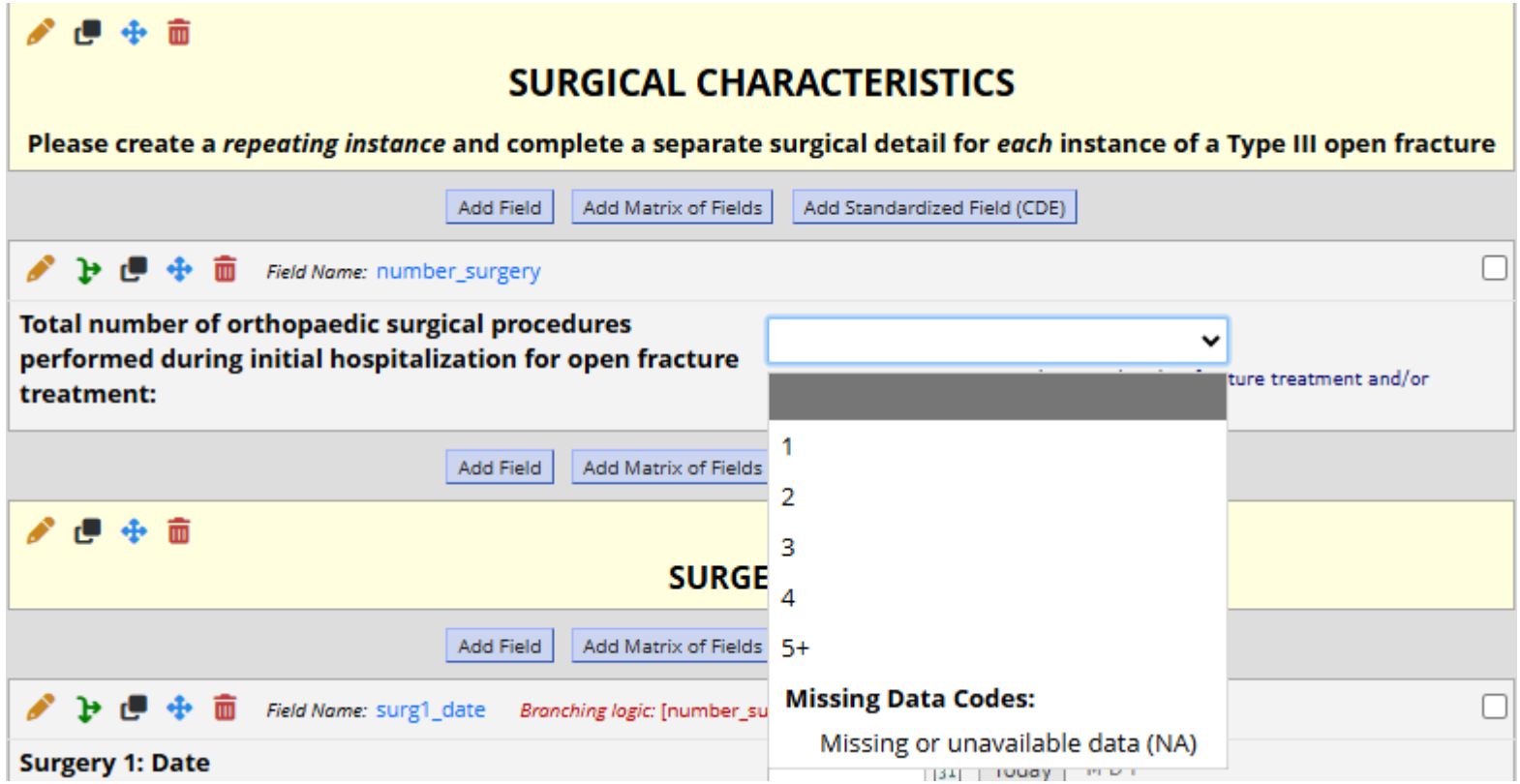
85 kg and had an unstable fracture pattern with exposed bone and gross contamination of the wound, it was recommended that

NO gross contamination & wound measurement from op note

We started by examining the wounds. She had a 8 x 3 cm wound at the level of
the fracture site that was slightly oblique but more transverse than
vertical. This probed down to bone. There was some mild contamination
within the wound which was removed. We systematically

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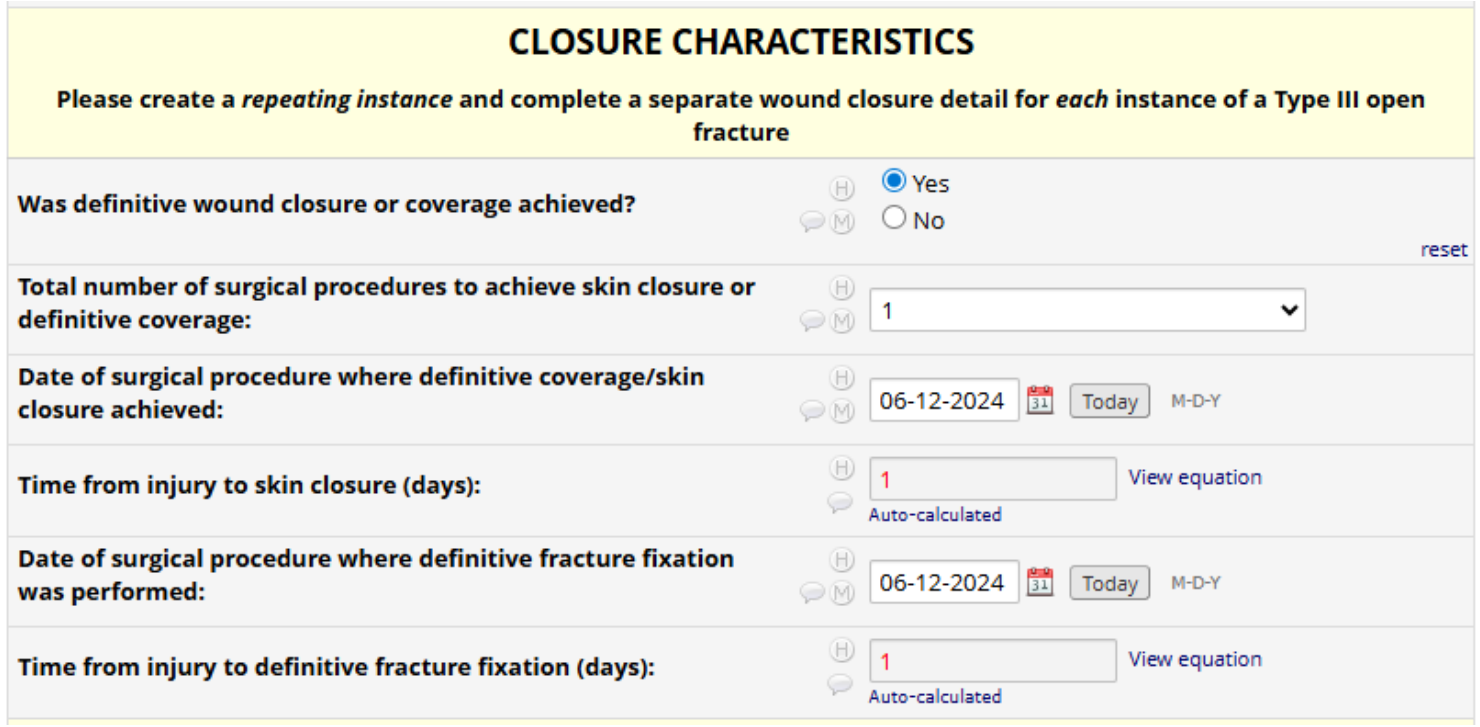


# of separate trips to the OR pertaining to open fracture bone stabilization or soft tissue procedures on the ipsilateral affected limb

SURGERY #1	
Surgery 1: Date	Today M-D-Y
Surgery 1: Bone stabilization procedure	☐ Internal fixation ☐ External fixation ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☐ None ☐ Other
Surgery 1: Procedure specialty	☐ Orthopaedics ☐ Plastic surgery ☐ Other
Surgery 1: Soft tissue procedure	☐ Irrigation & debridement ☐ Complete primary closure (at index surgery) ☐ Partial primary closure (at index surgery) ☐ Local or rotational flap ☐ Free flap ☐ Skin graft (split thickness, full thickness, synthetics) ☐ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

SURGERY #2	
Surgery 2: Date	Today M-D-Y
Surgery 2: Bone stabilization procedure	☐ Internal fixation ☐ External fixation ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☐ None ☐ Other
Surgery 2: Procedure specialty	☐ Orthopaedics ☐ Plastic surgery ☐ Other
Surgery 2: Soft tissue procedure	☐ Irrigation & debridement ☐ Delayed primary closure (complete) * ☐ Delayed primary closure (partial) * ☐ Local or rotational flap ☐ Free flap ☐ Skin graft (split thickness, full thickness, synthetics) ☐ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

Operative notes will contain the relevant information to complete this section



CLOSURE CHARACTERISTICS

Please create a *repeating instance* and complete a separate wound closure detail for *each* instance of a Type III open fracture

Was definitive wound closure or coverage achieved?	(●) Yes ( ) No — reset
Total number of surgical procedures to achieve skin closure or definitive coverage:	1
Date of surgical procedure where definitive coverage/skin closure achieved:	06-12-2024 Today M-D-Y
Time from injury to skin closure (days):	1 View equation — Auto-calculated
Date of surgical procedure where definitive fracture fixation was performed:	06-12-2024 Today M-D-Y
Time from injury to definitive fracture fixation (days):	1 View equation — Auto-calculated

Definitive wound closure and/or coverage is defined clinically as the complete repair of a wound with tissue continuity restored, and the wound edges are brought together with sutures, staples, tissue flaps, or surgical skin grafts.

Definitive wound closure and/or coverage is not achieved with ‘secondary intention’. This is defined clinically as a wound that is purposefully left open to heal gradually, and is often used when tissue loss is extensive. Select “No” for the field “Was definitive wound closure or coverage achieved?” when secondary intention is used.

For definitive fracture fixation, please record the date of the ORIF

Data Collection Case Study:

SURGERY #1	
Surgery 1: Date	06-12-2024 Today M-D-Y
Surgery 1: Bone stabilization procedure	☐ Internal fixation ☑ External fixation ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☐ None ☐ Other
Surgery 1: Procedure specialty	☑ Orthopaedics ☐ Plastic surgery ☐ Other
Surgery 1: Soft tissue procedure	☑ Irrigation & debridement ☐ Complete primary closure (at index surgery) ☑ Partial primary closure (at index surgery) ☐ Local or rotational flap ☐ Free flap ☐ Skin graft (split thickness, full thickness, synthetics) ☑ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

Patient had an open fracture with a large degloving injury extending from fracture site to ankle

Primary closure for wound over open fracture + degloving wound left open for further care = partial primary closure

SURGERY #2	
Surgery 2: Date	06-13-2024 Today M-D-Y
Surgery 2: Bone stabilization procedure	☐ Internal fixation ☑ External fixation Revision Ex-Fix ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☐ None ☐ Other
Surgery 2: Procedure specialty	☑ Orthopaedics ☐ Plastic surgery ☐ Other
Surgery 2: Soft tissue procedure	☑ Irrigation & debridement ☐ Delayed primary closure (complete) ☐ Delayed primary closure (partial) ☐ Local or rotational flap ☐ Free flap ☐ Skin graft (split thickness, full thickness, synthetics) ☑ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

SURGERY #3	
Surgery 3: Date	06-17-2024 Today M-D-Y
Surgery 3: Bone stabilization procedure	☐ Internal fixation ☐ External fixation ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☑ None ☐ Other
Surgery 3: Procedure specialty	☑ Orthopaedics ☐ Plastic surgery ☐ Other
Surgery 3: Soft tissue procedure	☑ Irrigation & debridement ☐ Delayed primary closure (complete) ☐ Delayed primary closure (partial) ☐ Local or rotational flap ☐ Free flap ☐ Skin graft (split thickness, full thickness, synthetics) ☑ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

SURGERY #4

Surgery 4: Date	06-20-2024 Today M-D-Y
Surgery 4: Bone stabilization procedure	☐ Internal fixation ☐ External fixation ☐ Percutaneous pin fixation (i.e. K-wires) without formal open reduction ☐ Cast or splint only ☑ None ☐ Other
Surgery 4: Procedure specialty	☐ Orthopaedics ☑ Plastic surgery ☐ Other
Surgery 4: Soft tissue procedure	☑ Irrigation & debridement ☐ Delayed primary closure (complete) ☐ Delayed primary closure (partial) ☐ Local or rotational flap ☐ Free flap ☑ Skin graft (split thickness, full thickness, synthetics) ☑ Wound vac ☐ Not closed/wound care (e.g. wet-to-dry dressings) and/or left to close by secondary intention ☐ Antibiotic bead or powder ☐ Fasciotomy ☐ Amputation ☐ Other

CLOSURE CHARACTERISTICS

Please create a *repeating instance* and complete a separate wound closure detail for *each* instance of a Type III open fracture

Was definitive wound closure or coverage achieved?	◉ Yes ○ No reset Select no for wounds left to close via secondary intention
Total number of surgical procedures to achieve skin closure or definitive coverage:	4
Date of surgical procedure where definitive coverage/skin closure achieved:	06-20-2024 Today M-D-Y
Time from injury to skin closure (days):	9 View equation Auto-calculated
Date of surgical procedure where definitive fracture fixation was performed:	06-12-2024 Today M-D-Y
Time from injury to definitive fracture fixation (days):	1 View equation Auto-calculated

Hospital Course & Antibiotic Data

REDCap Data Collection Instrument

HOSPITAL COURSE

Date of ED admission:	06-11-2024 Today M-D-Y For subsequent calculated field
Datetime of ED admission:	06-11-2024 20:44 Now M-D-Y H:M Please use military time (24 hour) for all timing calculated fields
ED arrival mode:	◉ Ambulance ○ Medical flight ○ Walk or private transport ○ Transfer from outside hospital ○ Unknown reset
Admitting service:	◉ Orthopaedics ○ Trauma ○ General surgery ○ Plastic surgery ○ ICU ○ Other reset
Orthopedic surgery procedure start datetime (wheels in the OR):	06-12-2024 00:08 Now M-D-Y H:M Please complete for index surgery
Orthopedic surgery procedure end datetime (wheels out of OR):	06-12-2024 03:01 Now M-D-Y H:M Please complete for index surgery
Operative time (minutes):	173 View equation Auto-calculated
Time from ED admission to OR (hours):	3.4 View equation Auto-calculated
Hospital discharge datetime:	06-30-2024 18:02 Now M-D-Y H:M
Length of hospitalization (days):	18.8875 View equation Auto-calculated

Emergency department note, operative intraprocedure summaries, & discharge notes most helpful for collecting these variables

EPIC Intraprocedure Summary → Case Tracking Events

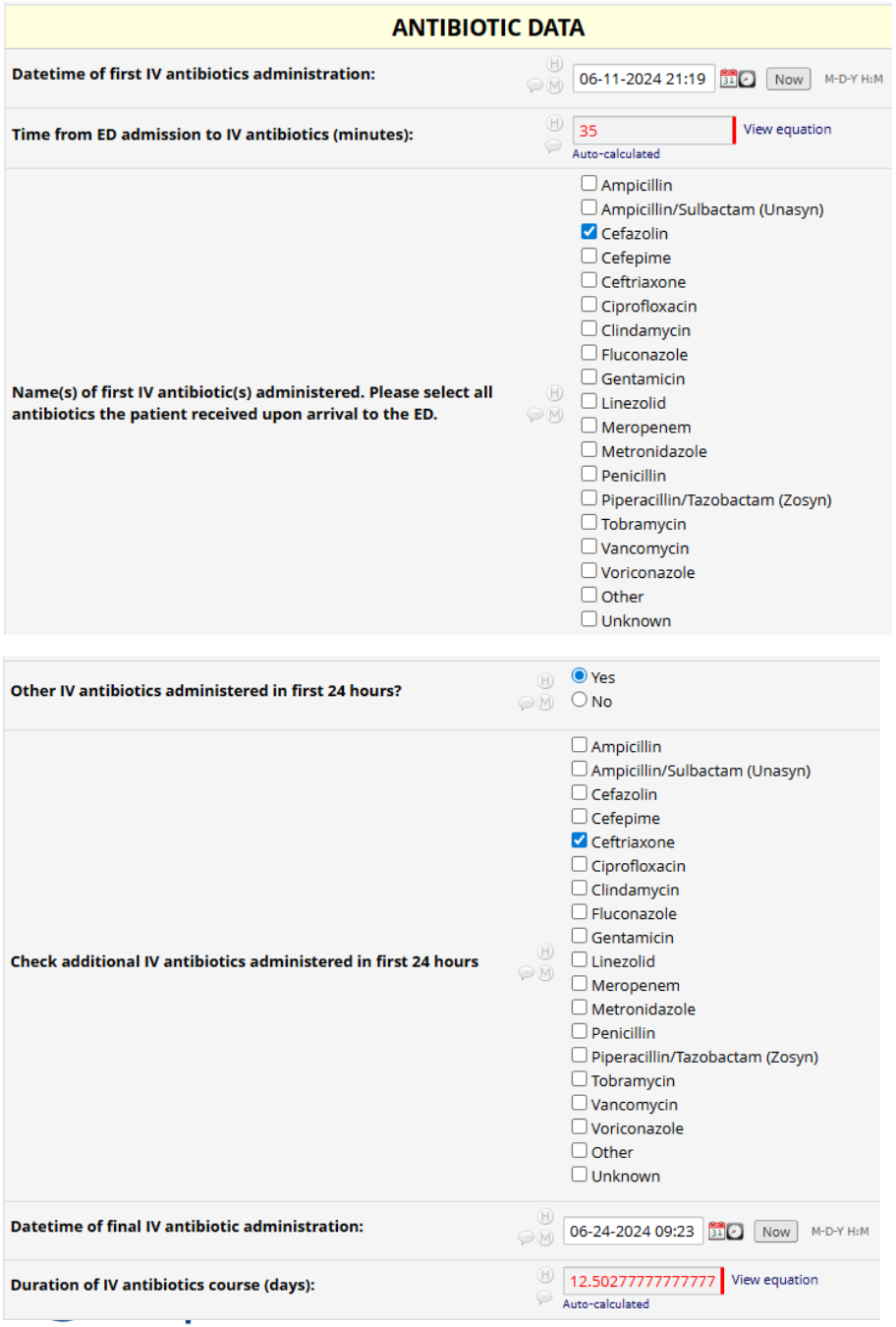
Case Tracking Events

Event	Time In
Setup Start	
Setup Complete	
GI Scope Setup Complete	
In Room	0738
Proceduralist Start	
Sedation Start	
Case Start	0816
Convert to Open	
Case Closing	
PACU Announcement	1102
ICU Announcement	
Case Finish	1200
Out of Room	1209

Care Timeline

06/12 *Admitted from ED 0615
06/13 LEG, INCISION AND DRAINAGE
06/17 VAC DRESSING APPLICATION/CHANGE
06/20 IRRIGATION AND DEBRIDEMENT WITH VAC DRESSING CHANGE
06/30 Discharged 1802

*This is NOT the same as ED admission time; defer to data pull or ED course notes



ANTIBIOTIC DATA

Datetime of first IV antibiotics administration: 06-11-2024 21:19 Now M-D-Y H:M

Time from ED admission to IV antibiotics (minutes): 35 View equation
Auto-calculated

Name(s) of first IV antibiotic(s) administered. Please select all antibiotics the patient received upon arrival to the ED.

- [ ] Ampicillin
- [ ] Ampicillin/Sulbactam (Unasyn)
- [x] Cefazolin
- [ ] Cefepime
- [ ] Ceftriaxone
- [ ] Ciprofloxacin
- [ ] Clindamycin
- [ ] Fluconazole
- [ ] Gentamicin
- [ ] Linezolid
- [ ] Meropenem
- [ ] Metronidazole
- [ ] Penicillin
- [ ] Piperacillin/Tazobactam (Zosyn)
- [ ] Tobramycin
- [ ] Vancomycin
- [ ] Voriconazole
- [ ] Other
- [ ] Unknown

Other IV antibiotics administered in first 24 hours?

- (•) Yes
- ( ) No

Check additional IV antibiotics administered in first 24 hours

- [ ] Ampicillin
- [ ] Ampicillin/Sulbactam (Unasyn)
- [ ] Cefazolin
- [ ] Cefepime
- [x] Ceftriaxone
- [ ] Ciprofloxacin
- [ ] Clindamycin
- [ ] Fluconazole
- [ ] Gentamicin
- [ ] Linezolid
- [ ] Meropenem
- [ ] Metronidazole
- [ ] Penicillin
- [ ] Piperacillin/Tazobactam (Zosyn)
- [ ] Tobramycin
- [ ] Vancomycin
- [ ] Voriconazole
- [ ] Other
- [ ] Unknown

Datetime of final IV antibiotic administration: 06-24-2024 09:23 Now M-D-Y H:M

Duration of IV antibiotics course (days): 12.50277777777777 View equation
Auto-calculated

Navigate to the medications tab on your institution's EMR and locate **the earliest instance of an IV antibiotic administration after the patient's ED arrival datetime**. Please record the intravenous antibiotic time of administration, NOT the time the order was placed.

In Epic, please click on the drug and navigate to the administration record to open the full administration report and record the earliest action time. In other EMRs, this may be listed as the medication start datetime.

All Administrations of cefTRIAXone (Rocephin) injection in D5W 1,000 mg

The administrations shown are only for this specific order and not for other orders for the same medication that

Administration	Action Time	Recorded Time
New Bag : 1,000 mg : : intravenous	06/18/24 0833	06/18/24 0833
New Bag : 1,000 mg : : intravenous	06/17/24 0849	06/17/24 0849
New Bag : 1,000 mg : : intravenous	06/16/24 0839	06/16/24 0839
New Bag : 1,000 mg : : intravenous	06/15/24 1000	06/15/24 1144
New Bag : 1,000 mg : : intravenous	06/14/24 0820	06/14/24 0821
New Bag : 1,000 mg : : intravenous	06/13/24 0859	06/13/24 0905
New Bag : 1,000 mg : : intravenous	06/12/24 1050	06/12/24 1051

CORTICES
ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Oral antibiotics prescribed during or after the patient's hospitalization?:	◉ Yes ○ No
Specify oral antibiotic(s) prescribed:	☐ Amoxicillin ☐ Augmentin ☐ Bactrim ☑ Cephalexin ☐ Ciprofloxacin ☐ Clindamycin ☐ Doxycycline ☐ Levofloxacin ☐ Rifampin ☐ Other ☐ Unknown
Date of first oral antibiotics administration:	06-23-2024 Today M-D-Y
Date of final oral antibiotic administration:	06-26-2024 Today M-D-Y
Duration of oral antibiotics course (days):	3 View equation Auto-calculated

Medication reports and hospital discharge summary most helpful for collecting these variables

EPIC Medications Tab → Administration report

Administration	Action Time
Given : 500 mg : : oral	06/26/24 0906
Given : 500 mg : : oral	06/25/24 2012
Given : 500 mg : : oral	06/25/24 1402
Given : 500 mg : : oral	06/25/24 0923
Given : 500 mg : : oral	06/24/24 2031
Given : 500 mg : : oral	06/24/24 1431
Given : 500 mg : : oral	06/24/24 0816
Given : 500 mg : : oral	06/23/24 2002
Given : 500 mg : : oral	06/23/24 1615
Not Given : 500 mg : : oral	06/23/24 1120
Given : 500 mg : : oral	06/23/24 1114

Medications on Discharge

Located in discharge summary for PO antibiotic course

	What	How Much	When
	acetaminophen (acetaminophen 500 mg oral tablet)	1 tab(s) by mouth	Every 4 hours
	aspirin (aspirin 81 mg oral tablet, chewable)	1 tab(s) by mouth	Once a day
	bisacodyl (bisacodyl 5 mg oral delayed release tablet)	2 tab(s) by mouth	Once a day as needed for Constipation
	cephalexin (cephalexin 250 mg oral capsule)	2 cap by mouth	Three times a day
	diazePAM	2 Milligram by mouth	Every 6 hours as needed for Spasm

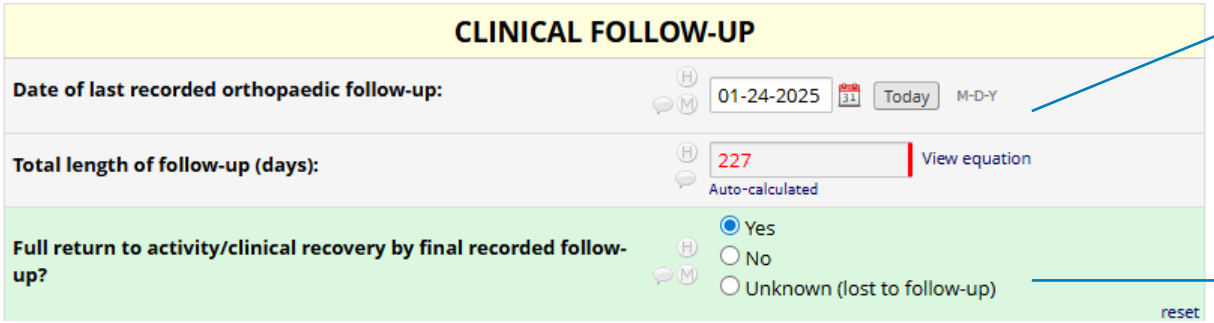
Boston Children's Hospital HARVARD MEDICAL SCHOOL

CORTICES ADVANCING EVIDENCE-BASED ORTHOPEDIC CARE

Clinical Follow-up & Outcome Data

REDCap Data Collection Instrument

Postoperative clinic follow-up notes most helpful for this data collection



CLINICAL FOLLOW-UP

Date of last recorded orthopaedic follow-up:	01-24-2025 Today M-D-Y
Total length of follow-up (days):	227 View equation Auto-calculated
Full return to activity/clinical recovery by final recorded follow-up?	Yes / No / Unknown (lost to follow-up) reset

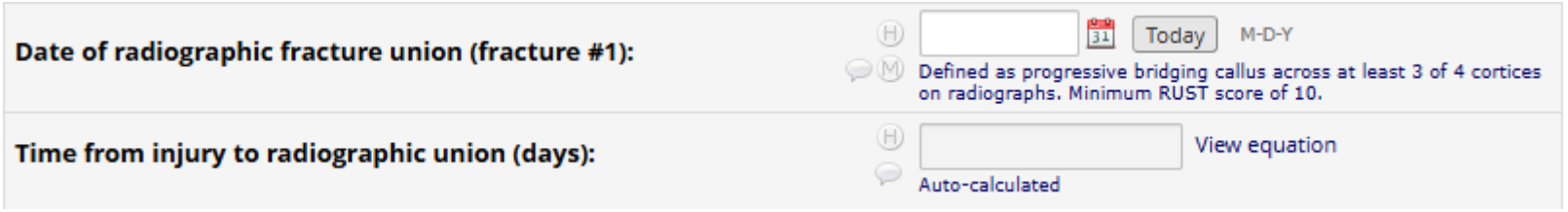
Last recorded orthopaedics or sports med follow-up related to open fx injury

Not always explicitly mentioned in postop clinic visit notes. Infer from activities performed

Since then she has been doing well. She is in the 6th grade, likes karate, has an adult blue belt! Report no pain, able to ambulate long distances, no PT/ OT formally anymore. Parents notice that she slouches when she sits. No concerns

She is doing well without pain
She is walking well without boot
She is doing PT
She is running

To be completed by PI



RUST score[6]

	Radiographic criteria	
Score	**Fracture line**	**Callus**
1	Visible	Absent
2	Visible	Present
3	Invisible	Present

Each of the four cortices will be assigned a score between 1-3. Total RUST scores range from 4-12. A RUST score of 10 or above is indicative of bony union.

For this study, radiographic fracture union is defined as bridging callus across at least 3 out of the 4 cortices, and a minimum RUST score of 10.

POSTOPERATIVE COMPLICATIONS

Did the patient develop a complication?
- (•) Yes
- ( ) No

reset

Specify complication(s):
- [x] Unexpected return to ED
- [ ] Need for additional unplanned surgery (UPROR)
- [ ] Infection
- [x] Wound/surgical site complications (non-infectious)
- [ ] Delayed union or nonunion (time to union >180 days)
- [ ] Acute compartment syndrome
- [ ] Amputation or loss of limb
- [ ] Neurological deficit
- [ ] Vascular injury
- [ ] DVT or PE
- [ ] Sepsis
- [ ] Death
- [ ] Other

Describe complication: pain & foul smell at skin graft donor site, contir

If multiple Type III open fractures, please specify fracture location pertaining to complication

Date complication was first recorded in the patient's chart: 07-11-2024 Today M-D-Y

If multiple complications, please record the date of the complication with the highest CDS grade

Specify additional surgical procedure:
- [ ] Irrigation & debridement
- [ ] Hardware removal (unplanned)
- [ ] Revision fixation
- [ ] Soft tissue coverage (local flap, free flap, skin graft)
- [ ] Fasciotomy
- [ ] Antibiotic bead placement
- [ ] Other

Occuring after initial hospitalization discharge

Type of postoperative infection:
- (•) Superficial (requiring local wound management and/or oral antibiotics)
- ( ) Deep (requiring surgical wound management and/or IV antibiotics)

reset

Infection requiring antibiotic treatment?
- [ ] Intravenous (IV)
- [x] Oral (PO)
- [ ] None

Infection requiring surgical washout?
- ( ) Yes
- (•) No

reset

Clavien-Dindo-Sink (CDS) Complication Classification:	○ Grade I: Any deviation from normal postop course (ex: nausea/fever/pain medications, physiotherapy, electrolytes) ○ Grade II: Pharmacological treatment (ex: antibiotics, blood transfusion, IV iron, total parenteral nutrition) ○ Grade III: Surgical, endoscopic, or radiologic intervention (ex: surgical washout, hardware removal, CT scan) ○ Grade IVa: Life or limb threatening w/ potential for long-term disability, but treatable (may require organ/joint resection/replacement; ex: malunion or nonunion) ○ Grade IVb: Life or limb threatening that is not treatable or with long-term disability, requiring organ/joint resection/replacement (ex: subsequent major reconstructive surgery) ○ Grade V: Death reset If the patient has multiple complications, please record the most severe

Thank you!

Questions?