

UAB Trauma Open Fracture Guidelines

- 1) Antibiotic administration within 1 hour after injury, no later than 1 hour from presentation to ED (See Table 1 for classification and Table 2 for appropriate antibiotic dosing)
- 2) Tetanus administration, if appropriate
 - a. Tetanus toxoid: incomplete primary immunization, >10 years since last booster dose, immunization history is unknown
 - b. Tetanus immunoglobulin: >10 years since the patient's last booster dose or history of incomplete primary immunization.
- 3) Stabilization and coverage of fracture
- 4) Imaging and orthopedic consultation
- 5) Bedside irrigation and operative debridement/washout within 24 hours for Type I open fractures; within 12 hours, if possible for Type II open fractures; and as soon as possible within the clinical picture and patient stability for Type III open fractures. Severe fracture with gross contamination should be taken for operative debridement/washout as soon as clinically feasible.
- 6) Soft tissue coverage should be completed within seven days of injury for open fractures associated with wounds requiring skin grafting or soft tissue transfers (Type IIIB)

Gustilo-Anderson Classification of Open Fractures¹	
<u>Type I</u>	Open fracture with a wound less than 1 cm long, low energy, without gross contamination
<u>Type II</u>	Open fracture with a wound 1 – 10 cm, low energy, without gross contamination or extensive soft-tissue damage, flaps, or avulsions
<u>Type III</u>	Open fracture with a wound greater than 10 cm with extensive soft-tissue damage, traumatic amputation, any open fracture due to high-energy trauma or with gross contamination, regardless of the size of the wound A. Adequate soft tissue coverage B. Significant soft tissue loss with exposed bone that requires soft tissue transfer to achieve control C. Associated vascular injury that requires repair for limb preservation

Prophylactic Antibiotics for Open Fractures		
Antibiotic administration should occur as soon as possible, preferably <u>within 1 hour after injury</u> , however if this is not possible, the first dose of antibiotics should be administered <u>no later than 1 hour from presentation to the ED</u>		
	Preferred Antibiotics Regimen (Coverage of skin flora)	Duration of Prophylaxis
<u>Type I</u>	< 120 kg: Cefazolin 2 g IV q8h [^]	24 hours from injury OR Maximum 24 hours after initial debridement
<u>Type II</u>	≥ 120 kg: Cefazolin 3 g IV once, 2 g IV q8h [^] Beta-lactam allergy [⚡] : Clindamycin 900 mg IV q8h	
<u>Type III</u>	Ceftriaxone 2 g IV q24h Beta-lactam allergy [⚡] : Clindamycin 900 mg IV q8h + Aztreonam 2 g IV q6h [^]	72 hours after injury or no more than 24 hours after soft tissue coverage has been achieved (whichever is shorter)
Environmental Exposure Considerations		
<u>Farm-related injuries, fecal contamination (<i>Clostridia spp</i>), and soil contamination:</u>	Add Metronidazole 500mg PO/IV q12h (not required if on Piperacillin/Tazobactam)	
<u>Water exposure</u>	Freshwater (<i>Aeromonas spp</i> and <i>Pseudomonas spp</i>): Piperacillin/tazobactam (Zosyn) 4.5 g IV once over 30 minutes Followed by Piperacillin/tazobactam (Zosyn) 4.5 g IV q6h infused over 3 hours* [^] Saltwater (<i>Vibrio spp</i>): Piperacillin/tazobactam (Zosyn) 4.5 g IV once over 30 minutes Followed by Piperacillin/tazobactam (Zosyn) 4.5 g IV q6h infused over 3 hours* [^] + Doxycycline 100mg PO/IV q12h Beta-lactam allergy [⚡] : Replace Piperacillin/tazobactam with Clindamycin 900 mg IV q8h + Aztreonam 2 g IV q6h [^]	

*: Extended infusion beta-lactams and cephalosporins recommended to optimize pharmacokinetics and pharmacodynamics

[^]: Renal dose adjustments required. Seek pharmacy consultation for guidance.

[⚡]: Obtain history of beta-lactam allergy including the offending medication, reaction, and when the event occurred (i.e. childhood). If patient has a mild penicillin allergy, may consider 3rd generation (i.e. ceftriaxone) or 4th generation (i.e. Cefepime) cephalosporin.

Prophylactic Antibiotics for Ballistic Fractures		
Antibiotic administration should occur as soon as possible, preferably <u>within 1 hour after injury</u> , however if this is not possible, the first dose of antibiotics should be administered <u>no later than 1 hour from presentation to the ED</u>		
	Preferred Antibiotics Regimen	Duration of Prophylaxis
High Velocity (greater than 2,000 ft/sec)	Treat as Grade III Gustilo (see regimens above)	
Low Velocity (less than 2,000 ft/sec)	Non-operative management of extremity fractures, hip/pelvis/spinal fractures without bowel contamination: no prophylaxis required	
	Operative management of extremities fractures, hip/pelvis/spinal fractures without bowel contamination: < 120 kg: Cefazolin 2 g IV q8h^ ≥ 120 kg: Cefazolin 3 g IV once, 2 g IV q8h^	Extremities and Hip/pelvis: 24 hours from injury OR Maximum 24 hours after initial debridement Spinal: 48 hours from injury OR Maximum 48 hours after initial debridement
	Hip/pelvis/spinal fractures with concomitant bowel injury: Ceftriaxone 2 grams IV q24h + metronidazole 500 mg IV q8h Beta-lactam allergy: replace ceftriaxone with aztreonam 2g IV q 6 + metronidazole 500 mg IV q8h	Hip/pelvis: 24 hours from injury OR Maximum 24 hours after initial debridement Spinal: 5 days therapy

Note: This guidance document is not intended to be used for active infection. Active infection treatment should be guided by cultures and susceptibilities.

References:

1. Gustilo et al. *J Bone Joint Surg Am* 1976;58:453-458
2. Hoff, William S et al. "East Practice Management Guidelines Work Group: update to practice management guidelines for prophylactic antibiotic use in open fractures." *J Trauma*. 2011;70(3):751-754
3. Garner et al. *J Am Acad Orthop Surg*. 2020;28(8):309-315
4. Noonburg G. Management of extremity trauma and related infections occurring in the aquatic environment. *J Am Acad Orthop Surg*. 2005

5. ACS TQIP BEST PRACTICES IN THE MANAGEMENT OF ORTHOPAEDIC TRAUMA
6. Mahmood, Bilal et al. "Duration of antibiotics for penetrating spine trauma: a systematic review." *Journal of spine surgery (Hong Kong)* vol. 6,3 (2020):
7. Olinger et al. Effect of under-dosing px abx in open tib fx. *J Orthop Trauma* 2018
8. Rodriguez et al. Evidence-based protocol for prophylactic antibiotics in open fractures: Improved antibiotic stewardship with no increase in infection rates. *J Trauma Acute Care Surg.* 2014; 22(3)