CLINICAL GUIDELINE

ANTIBIOTIC PROPHYLAXIS IN PATIENTS WITH OPEN FRACTURES

Children's MINNESOTA

Aim: To standardize antibiotic prophylaxis administration for patients with open fractures

Non-Contaminated (In-To-Out) Open Fractures			
Type of Fracture	**Standard Prophylaxis**	**Severe Beta-Lactam Allergy or Known MRSA Colonization**	**Duration of Antibiotics**
Type I (skin opening < 1 cm) **or Type II** (skin opening > 1 cm)	**IV Cefazolin** 30 mg/kg IV q8h (max: 2000 mg per dose) - **Oral Cephalexin** 30 mg/kg PO q8h (max: 1250 mg per dose)	**Vancomycin** 20 mg/kg IV q8h (max: 1250 mg/dose initially)	24 hours

Contaminated (Out-To-In) Open Fractures			
Type of Fracture	**Standard Prophylaxis**	**Severe Beta-Lactam Allergy or Known MRSA Colonization**	**Duration of Antibiotics and Other Considerations**
Contaminated (outdoor injury where skin/bone/injury may have been exposed to the environment-soil, water) **Type I** (skin opening < 1 cm) **Or Type II** (skin opening > 1 cm)	**Piperacillin-tazobactam** 80 mg piperacillin/kg IV q8h (max: 4000 mg piperacillin per dose)	**Vancomycin** 20 mg/kg IV q8h (max: 1250 mg/dose initially) **PLUS** **Ciprofloxacin** 15 mg/kg IV q12h (max: 400 mg per dose) **PLUS** **Metronidazole** 10 mg/kg IV q8h (max: 750 mg per dose) - **Oral Agents:** **TMP-SMX** 5 mg TMP/kg PO q12h (max: 160 mg TMP per dose) **PLUS** **Ciprofloxacin** 20 mg/kg PO q12h (max: 750 mg per dose) **PLUS** **Metronidazole** 10 mg/kg PO q8h (max: 750 mg per dose)	24 hours • Assess need for tetanus prophylaxis.
Type III (significant skin compromise [> 10 cm] or high energy/comminuted fracture)	**Piperacillin-tazobactam** 80 mg piperacillin/kg IV q8h (max: 4000 mg piperacillin per dose)		• Discontinue antibiotics 24 hours after definitive closure. • If there is concern to continue antibiotics longer than 24 hours after definitive closure, ID consultation is recommended to determine antibiotic duration and route. • Assess need for tetanus prophylaxis
Penetrating (Non-Bite)	**Piperacillin-tazobactam** 80 mg piperacillin/kg IV q8h (max: 4000 mg piperacillin per dose)		
Open Fractures Associated with Human or Animal Bites (Dog, Cat, Other Mammal)	**Ampicillin-sulbactam** 50 mg ampicillin/kg IV q6h (max: 2000 mg ampicillin per dose) - **Oral Agent:** **Amoxicillin-clavulanate (7:1 formulation)** 22.5 mg amoxicillin/kg PO q12h (max: 875 mg amoxicillin per dose)	**TMP-SMX** 5 mg TMP/kg IV q12h (max: 160 mg TMP per dose) **PLUS** **Clindamycin** 10 mg/kg IV q8H (max: 900 mg per dose) - **Oral Agents:** **TMP-SMX** 5 mg TMP/kg PO q12h (max: 160 mg TMP per dose) **PLUS** **Clindamycin** 10 mg/kg PO q8H (max: 600 mg per dose)	• ID consultation is recommended to determine antibiotic duration. • Assess need for rabies prophylaxis.

ANTIBIOTIC PROPHYLAXIS IN PATIENTS WITH OPEN FRACTURES

Aim: To standardize antibiotic prophylaxis administration for patients with open fractures

NOTES

- If a patient with a **contaminated** open fracture received cefazolin at an outlying facility, administer the appropriate antibiotic as recommended by the table above as soon as possible and without regard of the cefazolin timing.
- **In addition to** the antibiotics recommended by the table above, **pre-operative** antibiotic prophylaxis is recommended when:
  - Patient received cefazolin, piperacillin-tazobactam, or ampicillin-sulbactam greater than 1 hour before the incision. A pre-operative dose of cefazolin 30 mg/kg/ dose (max 2000 mg) IV should be administered within 1 hour from incision.
  - Patient received vancomycin greater than 2 hours before the incision. A pre-operative dose of clindamycin 10 mg/kg/dose (max 900 mg) IV should be administered within 1 hour from incision.
  - Patient received clindamycin greater than 1 hour before the incision. A pre-operative dose of clindamycin 10 mg/kg/dose (max 900 mg) IV should be administered within 1 hour from incision.

REFERENCES

Bankhead-Kendall B et al. *Eur J Trauma Emerg Surg.* 2019;45: 125–129

Buckman et al. *Surg Inf.* 2022; 23:817 - 828

Chang W et al. JBJS Rev. 2019 doi: 10.2106/JBJS.RVW.17.00197

Depcinski SC et al. *Int J Crit Illn Inj Sci.* 2019;9: 127-131

Folse J et al. J Orthop Trauma 2018;32: 573–578

Hoff WF et al. *J Trauma* 2011;70: 751-754

Hospenthal DR et al. *J Trauma* 2011;71: S210–S234

Jha S et al. *Open Orthop J.* 2014;8: 194-198

Lloyd BA et al. *J Trauma Acute Care Surg.* 2017;83: 854–861

Miller AC & Stawicki SP. *Int J Crit Illn Inj Sci.* 2019; 9:110-112

Murray CK et al. *J Trauma* 2011;71: S235–S257

Redfern J et al. *J Orthop Trauma* 2016;30:415–419

Shawar S et al. *Surg Inf.* 2019 DOI: 10.1089/sur.2019.064

Trionfo A et al. *Orthop Clin N Am.* 2016;47: 565–578

Created: Christina Koutsari, PharmD PhD BCPS BCIDP and Bill Pomputius MD on 11/22/2019

Approved: Children's Minnesota Division of Infectious Disease (12/13/2019), Plastic Surgery (1/13/2020), Trauma Services (2/5/2020), Emergency Department (2/6/2020), Orthopedic Surgery (02/11/2020) and the Antimicrobial Stewardship Committee (02/12/2020)

Revised: **12/01/23** 1) Added considerations for tetanus and rabies screening
09/03/24 1) Updated vancomycin dosing per recommendations of Antibiotic Stewardship Team