

Factors Affecting Timing of IV Antibiotic Administration for Patients with Open Fractures

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Purpose: The objective of this study is to evaluate the time to antibiotic administration after patients with open fractures treated at one Level I trauma center. Our hypothesis is that patients will receive cefazolin faster than gentamicin, and those evaluated formally by the trauma surgery team will receive their antibiotics faster.

Methods: A retrospective study was performed at our Level I trauma center over a 2-year period from January 1, 2013 to March 31, 2015 where 117 patients with open fractures were evaluated. All adult patients who presented to the Emergency Department (ED) with open fractures of the extremities and/or pelvis were considered for this study. Subjects were identified using the CPT codes 11010, 11011, and 11012. Patients aged 18 and older were analyzed for age, gender, body mass index (BMI), transportation method to the hospital, fracture location, Gustilo type, side of injury, presence of polytrauma, any associated injuries, mechanism of injury, antibiotics administered in the emergency department, the presence of an antibiotic allergy, postoperative antibiotic regimen, the number of repeat debridements (if indicated), the need for and type of soft-tissue coverage, and whether there was a reported infection at the operative site. Also included was whether patients were formally evaluated by the general surgery trauma team. Outcome measurements included time to intravenous (IV) antibiotic administration and time to surgical debridement. Statistical analysis was undertaken using both parametric (*t* test and analysis of variance) and nonparametric (Wilcoxon and Kruskal-Wallis) testing for the timing to administration of cefazolin, and the timing to administration of gentamicin, respectively. Statistical significance was defined as a *P* value <0.05 and high statistical significance was defined as a *P* value <0.01.

Results: Patients received IV cefazolin on average 17 minutes after arrival. 85 patients who were made trauma activations received cefazolin 14 minutes after arrival while 24 nontrauma patients received cefazolin 53 minutes after arrival (*P* <0.0001). There was no statistically significant difference between the timing to cefazolin based on Gustilo type. Patients with type I open fractures received antibiotics 18 minutes after arrival; type II, 19 minutes after arrival; type IIIa, 15 minutes after arrival; type IIIb, 13 minutes after arrival; and type IIIc, 13 minutes after arrival (*P* = 0.4912). The average time to gentamicin administration for all patients was 180 minutes. Patients not upgraded to a trauma received gentamicin 263 minutes after arrival, while patients upgraded to a trauma received gentamicin 176 minutes after arrival (*P* = 0.3750). Patients with type I fractures received gentamicin 165 minutes after arrival; type II, 188 minutes after arrival; type IIIa, 176 minutes after arrival; type IIIb, 227 minutes after arrival; and type IIIc, 424 minutes after arrival (*P* = 0.9620).

Conclusion: Overall, patients who arrive at our institution with open fractures receive IV

cefazolin within 1 hour after arrival and receive IV gentamicin within 3 hours after arrival. This is likely due to the fact that cefazolin is stocked in our hospital's ED, while gentamicin is not and has to be sent up from the hospital pharmacy. Gentamicin is not stocked in the ED due to weight-based dosing requirements precluding a standard dose. Patients formally assessed by the general surgery trauma team received their antibiotics more promptly. Improvements can be made in the treatment of nontrauma patients and for patients requiring gentamicin.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.