

Extended Antibiotic Coverage in the Management of Type-2 Open Fractures

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Purpose: Responsible antibiotic stewardship requires that surgeons treating open fractures use the narrowest appropriate antibiotic coverage possible to prevent infection. Because interobserver agreement in Gustilo-Anderson open fracture classification is moderate at best, antibiotic selection may be overly aggressive in an effort to ensure adequate treatment is provided. The purpose of this study is to evaluate the outcomes of type-2 open fractures treated with gram+ coverage only versus type-2 open fractures treated with gram+ and gram- coverage.

Methods: A retrospective review of all type-2 open fractures was performed at a single Level-I trauma center over a 4-year period (2015-2019). All patients received open fracture antibiotics upon arrival based on the best estimate of classification by the house officer on call. Final Gustilo-Anderson open fracture classification was assigned intraoperatively by the operating surgeon. Two groups were created, a gram+ coverage group (cefazolin or clindamycin) and a broad-spectrum coverage group (piperacillin/tazobactam). Minimum of 3-month follow-up was required for inclusion. Patient demographics, cost of treatment, and infection rates were assessed.

Results: The group receiving gram-positive coverage (GP) contained 92 patients with 94 open fractures and the group receiving broad spectrum coverage (piperacillin/tazobactam regimen) (PT) contained 74 patients with 75 open fractures. Between the groups, there were no differences in age, sex, race, or smoking status. The GP group was more likely to include an upper extremity fracture ($P = 0.016$), and was more likely to have been injured in a low-energy mechanism than a motor vehicle/motorcycle collision ($P = 0.0471$). There were no significant differences in fixation method, rate of documented open fracture contamination, rate of staged management with external fixation, open fracture primary closure rate, or mean number of debridements before final closure. The PT group had a higher rate of infection requiring return to the operating room (12.0% vs 6.4%) but this did not reach significance ($P = 0.2771$). The hospital charge for 4 doses of 2-g cefazolin is \$73.92 while the hospital charge for 4 doses of 3.375-g piperacillin/tazobactam is \$324.24 (4.39x the cost of cefazolin).

Conclusion: The use of piperacillin/tazobactam did not decrease the rate of infection in type-2 open fractures, and in fact there was a trend favoring gram-positive coverage only. Furthermore, the hospital charge for piperacillin/tazobactam is 4.39 times more expensive than cefazolin. The use of extended antibiotic coverage in type-2 open fractures should be avoided because it does not result in decreased infection rates and adds significant cost to patient care.