

Fracture-Related Infection in Open Long-Bone Fractures: A Bicenter Study in a Limited Resource Country
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Purpose: Fracture-related infections (FRI) are estimated to complicate approximately 1% of closed fractures and 30% of open fractures globally. These statistics, however, can vary significantly by region, with low- and middle-income countries experiencing a disproportionately high burden. The studies in these regions are often underpowered to evaluate the local prevalence and contributing factors of FRI. The objectives of this study are to assess the prevalence of FRI in open long bone injuries and to investigate the association between FRI and various risk factors identified in previous research.

Methods: A 5-year age- and sex-matched case-control study was conducted at two high-volume trauma centers in a limited-resource country. Closed fractures, infected fractures at presentation, incomplete documentation, follow-up periods shorter than 6 months, and superficial infections not requiring debridement were excluded.

Independent variables included were patient demographics, anatomic region, injury mechanism, Gustilo-Anderson grade, definitive fixation used, smoking status, history of blood transfusion, and timing to antibiotic administration, debridement, and soft-tissue cover. The primary outcome was the presence of FRI, defined according to Metsemakers et al. Data analysis was conducted using the R package.

Results: A total of 706 cases was reviewed, showing a 13.2% prevalence of FRI. The 84 infected cases and 168 matched controls were analyzed. Most patients experienced delays in antibiotics (77.4%) beyond 3 hours and debridement (76.6%) beyond 24 hours. Multivariate logistic regression revealed statistical significance only for a delay in antibiotic administration exceeding 12 hours ($p = 0.007$), the presence of polytrauma ($p = 0.008$) and non-intramedullary nail (IMN) mode of fixation ($p < 0.001$). Delays in debridement more than 24 hours ($p = 0.09$), soft-tissue coverage more than 7 days ($p = 0.06$), and antibiotic administration (3 to 12 hours) did not show statistically significant associations with an increased risk of infection.

Conclusion: Our study highlights the critical importance of prompt antibiotic administration, especially for high-energy wounds such as polytrauma, in reducing infection risk. A key strength of this study is that it stands as one of the few well-powered investigations conducted in resource-limited settings, where delayed presentations are prevalent.