

## The Epidemiology, Management, and Outcomes of Open Tibial Fractures: An Analysis of a Registry Dataset from England and Wales

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**Purpose:** Open tibial fractures (OTFs) are serious injuries that are challenging to treat and associated with significant morbidity. There is a lack of epidemiological evidence relating to these fractures, and the national perspective of care pathways for these fractures has not been reported. The aim of the study was to utilize the UK national trauma registry to evaluate epidemiological patterns and treatment trends in a large population of OTFs, considering these in the context of death and clinical outcome.

**Methods:** We searched the UK Trauma and Orthopaedic Audit Research Network (TARN) for all patients with OTF between April 1, 2012 and December 31, 2017. Descriptive statistics were used to characterize the population and treatment pathways; Poisson regression techniques were used to determine incidence, and logistic regression modeling was used to explore the relationship between patient variables, mortality, and early wound complication.

**Results:** 7124 cases were included in the analysis. Crude incidence rate of OTF was 2.85 cases per 100,000 persons per year. These injuries occurred most frequently in young male patients (aged 25-30 years); however, incidence was greatest among the older population, with an incidence rate ratio (IRR) of 2.82 (confidence interval [CI]: 2.58-3.08) in the 15-40 age group and IRR of 3.25 (CI: 2.95-3.57) in those over 65 years. The study identified an increased risk of mortality (odds ratio [OR]: 2.34, CI: 1.60-3.42) among patients with comorbidity (Charlson index >3), after adjusting for other known risk factors including age, gender, NISS (New Injury Severity Score) and GCS (Glasgow Coma Scale). Evaluation of surgical pathways was limited to 2157 patients who sustained Gustilo 3B or 3C fractures. Of these 1898 (88.0%) were treated in a Level-I trauma center; 1148 (57.4%), 671 (33.5%), and 179 (8.2%) were managed with internal fixation, external fixation, and amputation, respectively. Inpatient (early) wound complications were reported in 60 patients (2.8%); in an adjusted model to explore the relationship between time to soft-tissue closure and early wound complications the proportion of individuals experiencing wound complication increased by 0.3% per hour until definitive soft-tissue cover (CI: 1.001-1.004).

**Conclusion:** These injuries are known to occur in young working age males, but our analysis identifies a significant incidence in older patients. In addition, we found a relationship between comorbidity, age, and mortality. Both findings in turn outline a requirement for treatment pathways for OTF in the older population. The national picture of treatment was one of variation, although relational analysis identified an increased risk of early wound complications with every hour delay to definitive closure, which is clinically relevant for those treating this group.