Title: External Validation For A Score Predicting Orthopaedic Trauma Surgery Fracture Related Infections

Introduction: Fracture-related infections (FRI's) are unfortunate, serious, and often devastating complications that may occur following orthopedic fracture surgery. Current rates of infection following open reduction and internal fixation (ORIF) are 1-3% but can be as high as 50% in certain at-risk fractures and musculoskeletal regions. Wise et al. 2019 performed a retrospective cohort study at a level one trauma center to identify independent risk factors for FRI and established a predictive scoring system to identify patients most at risk for developing a FRI. This "Wise Score" helps consolidate a multitude of patient factors that contribute to fracture patients' predisposition to infection and may prove to be useful in highlighting patients at risk and allow surgeons to counsel and treat their patients accordingly. Whether or not this information is generalizable to other populations has yet to be determined. The purpose and goal of our study was to determine if this study could be reproduced at a level 1 trauma center in the Midwest, with an entirely different demographic and patient population.

Methods: We analyzed the same 8 independent predictors of fracture related infection cited by the previous study. We then used the area under the curve (AUC) of the receiver operating characteristics curve (ROC) to compare the derivation and validation groups. The validation and derivation groups were then compared by grouping patients into 4 strata of Wise Score groups. The current study was performed at a Level 1 academic trauma center and incorporated 147 study group patients with fracture related infections as well as 300 control group patients.

Results: The data collected at our demographically and geographically distinct institution yielded a nearly identical AUC (0.74) as the previously studied center. It was also found that the relative risk of infection correlated with the Wise score in the same way the initial model did with the absolute risks being very similar.

Discussion: The Wise Score predictive model previously studied was externally validated and shown to be generalizable to a different patient population. The relative risk of a fracture related infection can be determined using this scoring model preoperatively with the goal of aiding in patient counseling and surgical decision making, giving a quantitative value to patient risk factors.

Significance/Clinical Relevance: With an externally validated predictive score for fracture related infections, patients can be accurately classified and treated based upon their absolute and relative risk of infection in the setting of orthopedic fracture surgery.