Comparison of Risk Analysis Index and 5-Factor Modified Frailty Index as predictors of outcomes in septic revisions of total hip and knee joints

Arsalaan Sayyed, Hannah Janelle Grimmett, Victor Koltenyuk, Aruni Suchir Areti, Connor J Tupper, Tyler Kade Williamson, Jack Weick¹, Benjamin Craig Taylor², Christian Andrew Bowers

¹Ohiohealth Physician Group, ²Ortho Trauma and Reconstr Services

NHD

INTRODUCTION: Periprosthetic joint infection (PJI) is a significant complication associated with joint arthroplasty, often requiring a revision arthroplasty which specifically requires two separate stages further increasing the probability of morbidity. Patient frailty is an established risk factor for adverse primary joint arthroplasty outcomes, including higher reoperation rates, readmission, and other complications. However, the Risk Analysis Index (RAI-rev) has shown better prediction of negative outcomes compared to the 5-Factor Modified Frailty Index (mFI-5). A comparison of these two perioperative risk assessment indices has yet to be performed amongst septic revisions of total hip and knee joints. Thus, this study seeks to assess the performance of the RAI-rev and mFI-5 in preoperative stratification in patients undergoing septic hip or knee arthroplasty revision.

METHODS: A guery of The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) was performed to obtain cases of hip or knee PJI managed with revision arthroplasty between 2015 and 2020. PJI cases without revision arthroplasty were excluded. The RAI-rev and mFI-5 frailty scores were calculated for each patient. Frailty's predictive value was evaluated through multivariate regression analysis, and its discriminative accuracy was measured using ROC curve analysis. Outcomes included major complications, mortality, and non-routine hospital discharges (NHD). Significance was indicated by p<0.05

RESULTS: A total of 6.753 patients were included with a median age of 66 (interguartile range 59-74). Within the cohort. 46.25% were female and 29.95% were discharged to a skilled care facility rather than home. Frailty as determined by RAI-rev an increased odds ratio for NHD (24.52, p < 0.001) and mortality (22.33, p < 0.001) in the severely frail category compared to mFI-5, which showed an odds ratio of 6.58 (p < 0.001) for NHD and 11.25 (p < 0.001) for mortality in the severely frail category. Additionally, the RAI-rev index showed increased odds ratios for major complications in the frail (2.70, p = 0.032) and severely frail (5.49, p < 0.001) categories, while the mFI-5 index showed an odds ratio of 1.25 (p =0.030) for major complications in the prefrail category and 1.59 (p < 0.001) in the frail category, RAI-Rev demonstrated significantly superior discriminatory accuracy when compared to mFI-5 for NHD (C statistic: 0.68 vs 0.60, p<0.001), mortality (C statistic: 0.82 vs 0.62, p<0.001) and major complication (C statistic: 0.58 vs 0.55, p<0.001).

DISCUSSION AND CONCLUSION: The RAI-rev is more accurate than mFI-5 for predicting NHD, mortality, and major complications in frail patients undergoing total joint septic revision. These findings reveal the potential for RAI-rev in predicting surgical outcomes in the frail population suffering from PJI especially those resulting in NHD and mortality for frail and severely frail individuals. This information would enable surgeons to optimize their surgical candidate selection better and minimize postoperative complications in patients undergoing septic total joint revision.

