A Comparison of Charlson Comorbidity, Elixhauser Comorbidity, Frailty Indices to Predict Outcomes following Total Knee Arthroplasty

Travis Mark Kotzur[1], Aaron Singh, Lindsey Noelle Peng, Ahmed Makhani[2], Ali Seifi, Chance C Moore
[1]University of Texas Health San Antonio, [2]UT Health San Antonio

INTRODUCTION: A number of tools exist to aid surgeons in risk assessment, including the Charlson Comorbidity Index (CCI), the Elixhauser Comorbidity Index (ECI), and various measures of frailty, such as the Hospital Frailty Risk Score (HFR). While all of these tools have been validated for general use, the best risk assessment tool is still debated. Risk assessment is particularly important in elective surgery, such as total joint arthroplasty. The aim of this study is to compare the predictive power of the CCI, ECI, and HFR in the setting of total knee arthroplasty (TKA).

METHODS:

All patients who underwent TKA were identified via ICD-10 code from the National Readmissions Database, years 2016-2019. Patient demographics, perioperative complications, and hospital associated outcomes were recorded. Receiver Operating Characteristic (ROC) curves were created and Area Under the Curve (AUC) evaluated to gauge the predictive capabilities of each risk assessment tool (CCI, ECI, and HFR) across a range of outcomes.

RESULTS:

A total of 1,930,803 patients undergoing TKA were included in our analysis. For mortality, ECI was most predictive (0.95 Area Under the Curve (AUC)), while HFR and CCI were 0.75 and 0.74 AUC, respectively. For periprosthetic fractures, ECI was 0.78 AUC, HFR was 0.68 AUC, and CCI was 0.66 AUC. For joint infections, ECI was 0.78 AUC, HFR was 0.63 AUC, and CCI was 0.62 AUC. For 30-day readmission, ECI was 0.79 AUC, while HFR and CCI were 0.6 AUC. For 30-day reoperation, ECI was 0.69 AUC, while HFR was 0.58 AUC and CCI was 0.56 AUC.

DISCUSSION AND CONCLUSION: Our analysis shows that ECI is superior to CCI and HFR for predicting short-term postoperative outcomes following TKA. Surgeons should consider assessing patients using ECI prior to TKA.