

Validation of an Online Readmission Calculator: Poor Prediction in Primary Total Knee Arthroplasty

David C Landy, Franco Martin Sabatini, Cale Jacobs, Joshua Coleman Joiner, Jeffrey B Selby¹, Stephen Thomas Duncan
¹University of Kentucky

INTRODUCTION:

Predicting readmission following total knee arthroplasty (TKA) could guide preoperative optimization and postoperative resources at the patient level if highly accurate. Even predictions with fair accuracy may aid risk adjustment at a higher level such as estimating hospital quality. We sought to validate the Duke calculator for post arthroplasty readmission, defined as unexpected readmission or observation within 90 days of surgery, in a real-world setting using the online calculator with external data.

METHODS:

A consecutive series of 500 patients undergoing primary TKA at a large, academic institution from 2019 to 2021, prior to transitioning to increasing same-day discharge, were reviewed for calculator variables (age, American Society of Anesthesiologists level, surgical duration, postoperative hemoglobin, smoking, alcohol dependence, cardiac arrhythmia, congestive heart failure, chronic pulmonary disease, depression, complicated diabetes, drug abuse, hypertension, lymphoma, neurologic disease, peripheral vascular disease, pulmonary circulation disease, and renal failure) and readmission. A readmission probability was obtained for each patient using the online calculator, accessed through the link published in the 2019 article. Logistic regression assessed the association of predictions and readmission with area under the curve (AUC) values.

RESULTS:

Overall, 6.8% of patients (34 of 500), in the external cohort had a readmission compared to 5.0% in previously published cohort. When applied to the external cohort, the calculator showed poor predictive discrimination (AUC, 0.66; 95% C.I., 0.57±0.76), less than that from the development cohort (AUC, 0.71). Even when a new logistic regression model was fit using only external cohort data, prediction remained fair (AUC, 0.76; 95% C.I., 0.67±0.86).

DISCUSSION AND CONCLUSION: The Duke readmission calculator had poor prediction in a real-world setting using an external cohort and appears limited by the selected variables. Research is needed to understand predictors of readmission and future calculators may benefit from consideration of social determinant of health factors and real-world use.