

# The Significant Role of Baseline Patient-Reported Outcome Measure in Prediction of Success following Total Knee Arthroplasty; A FORCE-Total Joint Replacement Cohort

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## INTRODUCTION:

Total Knee Arthroplasty (TKA) can dramatically improve quality of life in patients with advanced knee arthritis. Patient-reported outcomes (PROs) are increasingly used to measure outcomes following TKA. Accurate prediction of improvement in PROs after TKA is important for comparing surgical quality of healthcare institutions and is valuable for physicians and patients to make shared decisions about surgical treatment. The purpose of this study was to examine how a baseline PRO measure could affect the prediction of TKA success.

## METHODS:

A multi-center cohort of patients undergoing primary unilateral TKA was identified from a comparative effectiveness consortium. The patients were enrolled prospectively by 235 surgeons in 28 states. The cohort includes diverse patient populations and delivery models; surgeon practices vary in size, reimbursement models (e.g., private, health maintenance organizations, Medicare), teaching hospital status, and geographic settings. Patient-reported outcomes were collected preoperatively and one year postoperatively using Knee Injury and Osteoarthritis Outcome Score (KOOS) and KOOS JR (Joint Replacement). We developed an “Original” model, closely following a CMS-proposed measure to predict TKA success - defined as achieving substantial clinical benefit (SCB), that is, at least a 20-point one-year improvement on KOOS JR - and an “Enhanced” model with just one additional predictor: baseline KOOS JR. We evaluated each model’s performance using area under the receiver operator characteristic curve (AUC) and observed to expected (O:E) ratios, where expected outcomes are those predicted by that model.

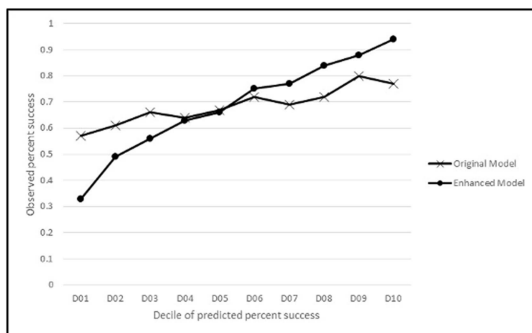
## RESULTS:

The cohort included 5,985 patients with an average age of 67 years; 63% were women; 93%, non-Hispanic white; 87% were overweight or obese. The AUC for the Enhanced model is 0.73 versus 0.58 for the Original model ( $p < 0.001$ ). The observed percentage of TKA success by decile-of-predicted-success ranges from 34% to 94% for the Enhanced model, as opposed to 57% to 77% for the Original Model (Figure 1). The O:E ratios for the Enhanced model are close to 1 (1.00 representing perfect prediction), while the Original model shows varying predicted probabilities of TKA success (Figure 2).

## DISCUSSION AND CONCLUSION:

Adding a baseline PRO score to a quality measurement model dramatically improved the ability to predict TKA success. The Enhanced model provided a broader and more accurate prediction range and required no additional data collection. Improved accuracy is important as CMS intends to publicly report TKA patient-reported outcome-based performance measure (PRO-PM) as a hospital level quality measure that will affect hospital reimbursement beginning in fiscal year 2028.

**Figure 1.** Observed rate of surgical success by decile of predicted success: Original versus Enhanced Model



**Figure 2.** Observed to Expected (O:E) Success Ratio by Baseline KOOS\_JR Score: Original versus Enhanced Model

