**DEVELOPMENT AND EXTERNAL VALIDATION OF A PATIENT-LEVEL PREDICTION MODEL FOR 60-DAY MORTALITY FOLLOWING TOTAL KNEE ARTHROPLASTY: A MULTINATIONAL COHORT STUDY**

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**Objective:** Total knee replacement (TKR) is the most effective intervention available for the treatment of severe knee osteoarthritis. A small proportion of patients undergoing TKR are at risk of postoperative complications. We aimed to develop and externally validate algorithms for the prediction of post-operative mortality.

**Methods**: We conducted a multinational, multidatabase cohort analysis using claims data from the USA (Optum® de-identified Clinformatics® Datamart, Extended - Date of Death (Optum)) and The Health Improvement Network (THIN) UK primary care database. Both data sources were mapped to the Observational Medical Outcomes Partnership (OMOP) common data model, and processed using the same analytical platform developed by the Observational Health Data Sciences and Informatics (OHDSI) initiative. All subjects undergoing a primary TKR, aged 40 years or older and registered in any of the contributing data sources for at least one year before surgery were included. Study outcome was postoperative (60-d) all-cause mortality. Lasso logistic regression models were fitted with predictors with prevalence 0.1% using Optum, assessing discrimination and calibration and externally validated in THIN. Model performance was assessed using area under curve, AUC and calibration plot.

**Results**: A total of 152,665 US and 40,950 UK participants were included, with 353 (0.23%) and 81 (0.20%) deaths identified in the 60 days post-TKR respectively. A total of 121/89,031 potential variables were included in the final model. 102 predictors covering morbidity, process of care, and prescription medicine codes were included in the final model. Discrimination performance of the model developed on the OPTUM database was AUC 0.78 in the internal, and 0.69 in the external validation. Calibration was acceptable based on visual assessment.

**Conclusions**: TKR is a common procedure with low (1/500) mortality in the 60 d following surgery. We have developed and externally validated a prediction tool for the identification of subjects at high risk of postoperative mortality. More research is needed to understand the impact of its use in clinical practice.

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