Recovery Trajectories of Pain and Function following THA and TKA Related to Mental and Physical Health: A Longitudinal Multivariable Clustering Analysis of a Large Cohort

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INTRODUCTION:

Postoperative health-related quality of life recovery following total hip (THA) and knee arthroplasty (TKA) is variable. It is poorly understood how postoperative pain and function may be related to overall mental and physical health. The purpose of this study was to evaluate for discrete clusters of recovery using longitudinal measures of symptomatic and functional recovery, as well as overall mental and physical health. Our hypothesis was that recovery clusters would be similar following THA and TKA, and that although most patients would experience significant improvements in pain and function, some may experience delayed recovery of overall mental and physical health.

METHODS:

Patients undergoing primary THA and TKA at our institution were included. Patient-Reported Outcomes Measurement Information System Global Mental Health (PROMIS GMH) and Physical Health (PROMIS-GPH) as well as Knee or Hip Osteoarthritis Outcome Score (KOOS or HOOS) were collected on patients at baseline, three months, one year, and two years postoperatively **(Figure 1)**. Recovery clusters were generated separately for the THA and TKA cohorts using longitudinal k-means clustering on HOOS/KOOS, PROMIS-GMH, and PROMIS-GPH jointly. With this method, each cluster is derived from the joint postoperative evolutions of each outcome.

RESULTS:

1,171 THA and 1,207 TKA patients were included. For each surgery, Calinski-Harabatz criteria were optimized with three clusters. In each surgery, cluster A (44.5% THA, 44.0% TKA) was characterized by rapid improvement in HOOS/KOOS, with high PROMIS-GPH and GMH (**Figure 2, Figure 3)**. In contrast, cluster B (28.0% THA, 30.9% TKA) was characterized by rapid improvement in HOOS/KOOS, but with lower PROMIS-GPH and GMH. Finally, cluster C (27.5% THA, 25.1% TKA) was characterized by slower improvements in HOOS/KOOS and low PROMIS-GPH and GMH.

DISCUSSION AND CONCLUSION:

While most patients experience significant rapid improvements in symptoms with correspondingly high mental and physical health, 1 in 4 patients undergoing THA or TKA may experience slower recovery in pain and function, in parallel with worse overall physical and mental health. Other patients may recover function but without corresponding improvements in mental and physical health. The ability to predict an individual patient's recovery could improve counseling, risk stratification, and surgical decision-making.

Figure 1: Generation of postoperative recovery trajectories following THA and TKA.

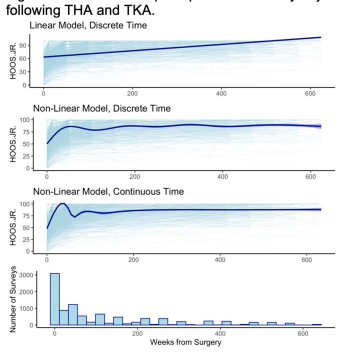

Figure 2: Recovery trajectories by cohort for KOOS, PROMIS-GPH and PROMIS GMH following TKA.

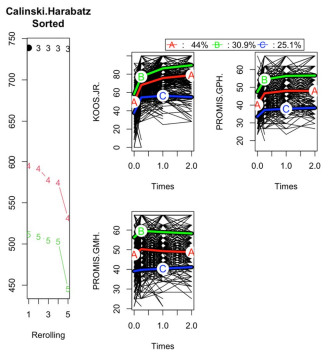

Figure 3: Recovery trajectories by cohort for KOOS, PROMIS-GPH and PROMIS GMH following THA