Preoperative Optimization for Total Knee Replacement Decreases Complications and Cost

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INTRODUCTION:

With increased total joint replacement surgical volume, the demand on existing resources likewise rises. Systems continue to refine candidacy for a total joint replacement, with an effort toward identifying and managing modifiable risk factors in the preoperative period and reducing the incidence of adverse outcomes in the postoperative period. Preoperative Orthopaedic Surgical Homes (POSH) work to efficiently utilize resources while avoiding excess cost of care to the system.

Over the past decade, numerous studies have identified multiple modifiable risk factors which should be addressed prior to primary hip and knee joint replacement, as well as recommended interventions. A non-exhaustive list included: MRSA/MSSA colonization, nutritional deficiencies (malnutrition, obesity, vitamin D deficiency), poorly controlled diabetes, tobacco abuse, poor dentition, opioid and alcohol use, and other medical comorbidities. Studies have shown that optimizing modifiable risk factors leads to improved outcomes, with decreased length of stay, readmissions, complications, and costs.

The purpose of this pilot study was to examine a group of total knee replacement patients who worked with an optimization program prior to joint replacement surgery. Variables to be studied included the length of stay, emergency department visits within the 30 days and 90 days after surgery, hospital readmission within 30 days and 90 days of surgery, complications, and cost of care

We also identified a matched group of patients who did not undergo optimization prior to their surgeries for the same outcomes parameters. Our goal was to compare the outcomes measures of the two groups to determine if there is a quantifiable benefit to delaying total joint surgery to improve modifiable risk factors utilizing a formal optimization program led by an Advanced Practice Provider.

METHODS:

A preoperative optimization program or POSH managed by an Advanced Practice Provider (Physician Assistant [PA]) was instituted at an Academic Medical Center (AMC). Patients with any modifiable risk factors which delay joint replacement candidacy are referred to the Optimization PA for risk assessment. The PA meets with the patient to discuss modifiable risk factors, quantify risk, and utilize an individualized approach to recommended resources, such as weight management (medical or surgical), nutrition, or referrals to specialty providers. The PA follows the patient until the optimization goals are met.

A modified readmission risk assessment tool (RRAT) was developed to quantify patient risk. Resources within the system were identified (Center for Weight Management and Wellness, Pain Management, and others) and utilized when possible. Since our patient pool is geographically diverse, we are not always able to direct patients to specific resources within our system but sometimes need to identify providers in other health systems closer to their home. This provides an individualized approach, targeting resources and plans with which the patient is more likely to engage.

Demographics and Medical History were used to match patients (age, gender, body mass index (BMI), and a review of medical comorbidities to calculate the modified RRAT).

A pilot group of 15 total knee replacement (TKR) patients who worked with an optimization program prior to TKR and a 2:1 matched cohort (Gender, Age, Comorbidities, RRAT Score) of 30 patients who did not undergo optimization but had matched comorbidity and RRAT profiles, were studied. Variables evaluated included length of stay, emergency department visits within 30 days and 90 days after surgery, hospital readmission within 30 days and 90 days after surgery, complications, and cost.

Clinical characteristics of the patient population in the sample were described using chi-square tests for categorical variables and Kruskal Wallis non-parametric testing for continuous variables. An alpha of 0.05 will be used for significance. Statistical analysis was performed.

RESULTS:

The 15 optimized patients had no reoperations or readmissions and 1 ER visit within 90 days of operation. The 30 matched, non-optimized patients had 5 reoperations, 2 ER visits within 30 days, and 5 within 90 days, as well as 2 readmissions within 30 days and 3 within 90 days. Average LOS for the optimized patients was 2 days (0-4) and for the non-optimized patients, 2.97 days (1-11). Hospital costs and complications for the optimized cohort were significantly less than for the non-optimized ($p<.003$).

DISCUSSION AND CONCLUSION:

Perioperative optimization using a Preoperative Orthopaedic Surgical Home led by an advanced practitioner successfully reduced complication rates, length of stay, and hospital costs when compared to a non-optimized, matched, TKR cohort at an AMC.