

Do Patient Risk Factors Impact 90-Day Readmission after Total Ankle Arthroplasty?

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Introduction/Purpose: The Comprehensive Care for Joint Replacement model (CJR) provides bundled payments for in-hospital and 90-day post-discharge care of patients undergoing lower extremity joint replacement including hip, knee, and ankle arthroplasty (THA, TKA, and TAA). Pre-operative risk factors influencing in-hospital and post-discharge costs are, thus, of keen interest. While THA and TKA have been reported to have a 5.3% 90-day readmission rate associated with race, gender, increased BMI, >2 medical comorbidities, increased length of stay, and discharge to inpatient rehab, little is known about factors that influence readmission rates after TAA. The purpose of this study is to identify risk factors associated with 90-day readmission after TAA.

Methods: 1,048 patients undergoing TAA (ICD-9 81.56 or ICD-10 0SRF/G) at a single academic institution were prospectively enrolled into an ongoing, IRB-approved longitudinal TAR outcome study between 2007 and 2016. Records were retrospectively reviewed to determine patient, operative, and post-operative characteristics including age, gender, race, risk factors of the Charlson-Deyo comorbidity and Elixhauser indices, post-discharge disposition, BMI, length of stay, and ASA score. Pre-operative Elixhauser and Charlson-Deyo comorbidities were recorded using standardized ICD-9 and ICD-10 codes. Univariate tests of significance (t-tests for continuous inputs and chi-square tests for categorical inputs) were performed to determine the potential relationship between patient characteristics and 90-day readmission using JMP Pro version 13.0.0. The tables display pre-operative cohort-level and outcome-specific patient characteristics as well as the results of significance testing for comorbidities with >1% prevalence.

Results: Thirty of 1048 (2.9%) patients were readmitted after TAA during the 90 day post-discharge window. Twenty-two (73%) of the patients were readmitted for surgical wound complication. The majority of the remaining 8 admissions were for medical illnesses not clearly related to the index procedure. Prevalent comorbidities included hypertension, cardiac arrhythmias, depression, obesity, rheumatoid arthritis, diabetes, hypothyroidism, and chronic obstructive pulmonary disease. However, there were no significant differences in patient characteristics between those who were readmitted and those who were not readmitted although patients that were readmitted tended to be slightly older, were less likely to be discharged to SNF or in-hospital rehabilitation, and had higher ASA score and Charlson-Deyo comorbidity index. No individual patient comorbidities were statistically associated with 90-day readmission.

Conclusion: The 90-day readmission rate of 2.9% after TAA at our institution is lower than reported rates for THA and TKA nationally (5.3%). Although our patient population had a similar prevalence of risk factors when compared to THA/TKA patients, none of these factors were significantly associated with 90-day readmission. These data suggest that grouping TAA with THA and TKA for CJR may not be advisable. In an emerging era of bundled payments, further work is needed to delineate factors strongly associated with costly readmissions specific to surgical treatment and individualized based on pre-operative patient profile.

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Table 1: Patient and treatment characteristics separated by 90-day (90d) readmission status. Averages and standard deviation or proportion and percentage are displayed. *P* value represents univariate significance testing on differences in patient characteristics between patients with and without 90d readmission.

Patient characteristics	90d readmission	No 90d readmission	<i>P</i> value
N	30	1018	N/A
Age	65.5 (7.6)	62.9 (10.5)	.167
Female gender	13 / 30 (43.3%)	499 / 1018 (49%)	.53
Caucasian race	29 / 30 (96.6%)	958 / 1018 (94.1%)	.52
Charlson-Deyo score	2.7 (1.8)	2.2 (1.4)	.094
Discharge to acute rehab	0 / 30 (0%)	40 / 1018 (3.9%)	.123
BMI (n = 900)	29.4 (6.2)	29.8 (5.6)	.73
Length of stay (days, n = 900)	1.5 (0.7)	1.4 (0.7)	.79
ASA (n = 677)	2.6 (0.5)	2.3 (0.5)	.062
Pre-op Charlson-Deyo comorbidities	90d readmission	No 90d readmission	<i>P</i> value
Diabetes	2 / 30 (6.6%)	87 / 1018 (8.5%)	.6
Rheumatic disease	2 / 30 (6.6%)	80 / 1018 (7.8%)	.8
Chronic pulmonary disease	1 / 30 (3.3%)	68 / 1018 (6.6%)	.42
Malignancy	3 / 30 (10%)	36 / 1018 (3.5%)	.122
Peripheral vascular disease	2 / 30 (6.6%)	33 / 1018 (3.2%)	.36
Cerebrovascular disease	2 / 30 (6.6%)	21 / 1018 (2%)	.167
Congestive heart failure	1 / 30 (3.3%)	19 / 1018 (1.8%)	.59
Myocardial infarction	0 / 30 (0%)	17 / 1018 (1.6%)	.31
Renal disease	0 / 30 (0%)	15 / 1018 (1.4%)	.34
Pre-op Elixhauser comorbidities	90d readmission	No 90d readmission	<i>P</i> value
Hypertension uncomplicated	16 / 30 (53.3%)	424 / 1018 (41.6%)	.2
Cardiac arrhythmias	3 / 30 (10%)	105 / 1018 (10.3%)	.95
Depression	4 / 30 (13.3%)	92 / 1018 (9%)	.44
Obesity	3 / 30 (10%)	91 / 1018 (8.9%)	.84
Collagen vascular diseases	2 / 30 (6.6%)	89 / 1018 (8.7%)	.67
Diabetes uncomplicated	2 / 30 (6.6%)	87 / 1018 (8.5%)	.7
Hypothyroidism	3 / 30 (10%)	85 / 1018 (8.3%)	.75
Chronic pulmonary disease	1 / 30 (3.3%)	68 / 1018 (6.6%)	.42
Solid tumor without metastasis	4 / 30 (13.3%)	48 / 1018 (4.7%)	.071
Deficiency anemia	2 / 30 (6.6%)	48 / 1018 (4.7%)	.63
Peripheral vascular disorders	2 / 30 (6.6%)	38 / 1018 (3.7%)	.45
Fluid and electrolyte disorders	0 / 30 (0%)	34 / 1018 (3.3%)	.156
Valvular disease	0 / 30 (0%)	26 / 1018 (2.5%)	.21
Congestive heart failure	1 / 30 (3.3%)	19 / 1018 (1.8%)	.59
Coagulopathy	0 / 30 (0%)	18 / 1018 (1.7%)	.3
Renal failure	0 / 30 (0%)	15 / 1018 (1.4%)	.34
Psychoses	1 / 30 (3.3%)	14 / 1018 (1.3%)	.44
Other neurological disorders	0 / 30 (0%)	12 / 1018 (1.1%)	.4
Diabetes complicated	0 / 30 (0%)	12 / 1018 (1.1%)	.4
Peptic ulcer disease	1 / 30 (3.3%)	10 / 1018 (0.9%)	.31