## Baseline Admission Rates Make a Difference: An Analysis of 90-Day Readmissions Following Primary Total Knee Arthroplasty

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The current iteration of the Comprehensive Care for Joint Replacement (CJR) model appoints the hospital accountable for expenses from the time of the procedure through 90 days afterwards, although the appropriate duration of the bundle remains in question.

In this context, the current study utilizes a national dataset to characterize 30- and 90-day readmission rates after total knee arthroplasty (TKA) and then interprets these rates in the setting of the expected baseline admission rate in this patient population.

## METHODS:

A cohort of patients was extracted from the 2018 data year of the Nationwide Readmission Database (NRD) based upon an ICD-10 procedural code for TKA. Exclusions include patient under the age of 18 and revision procedures. Patient variables extracted from the NRD included demographic information (age, gender, obesity status) as well as patient comorbidity information. Using the aforementioned data, the Charlson Comorbidity Index was calculated. The diagnoses associated with the TKA procedure were tabulated and the length of the index hospital stay was also recorded. The outcome variable for this study was all readmissions within 90 days.

Readmission rates were calculated as a daily percent of the sample population. These re-admissions rates were calculated through both 30- and 90-days post-discharge for the entire sample population.

A baseline admission rate was also calculated for this patient population, which is indicative of the admissions that these individuals would have had regardless of their arthroplasty procedure. This was performed by identifying patients who had a TKA procedure done in the first quarter of the year (Q1) and then following them through the fourth quarter of the year (Q4). The number of hospital admissions in Q4 for this population was divided by the Q1 sample size and then by 92 days to determine the average percentage of the Q1 sample that was admitted each day in Q4. This calculation relied upon the postulation that the readmission rate, surgical or not, for this population would have stabilized by half a year after their TKA procedure.

Finally, using this baseline admission rate, the 30-day and 90-day readmission rates were re-calculated subtracting the baseline admission rate from the observed daily readmission rates.

The Student's T-Test was used to assess for statistically significant differences between the re-admission trends and the calculated baseline readmission rate. The level of significance for all tests was set at p < .05.

## **RESULTS**:

Ultimately, there were 242,746 patients in this sample. The average age was 67 years, 63% of the patients were female, and the majority of patients had a Charlson Comorbidity Index Score of 0 points during the index admission. Nearly 99% of patients had a diagnosis of osteoarthritis and the most common length of index hospital admission was 2 days (Table 1).

Of the patients in this sample, 8,220 of them or 3.4% were re-admitted at least once within 30 days and 15,611 or 6.4% were re-admitted at least once within the 90-day window. Of the 17,992 readmissions during the first 90 days, 8,727 or 48% of them occurred within the first 30 days (Figure 1).

In terms of the baseline admission rate, there were 85,799 documented TKAs in the HCUP-NRD in Q1. In Q4, this subpopulation had 4,426 total admissions, which averages to 49 admissions per day or 0.057% of the population per day. This value is indicated via the horizontal gray dashed line on the Figure 2.

With this in mind, 69% of readmissions within 90 days were attributed to the baseline admission rate for this patient population (Figure 3). Furthermore, 79% of the first 90-day readmissions occurred within the first 30 days. Additionally, the

readmission pattern of this sample was not significantly different then our calculated baseline admission rate on days 35-40.

## DISCUSSION AND CONCLUSION:

This study characterizes readmission trends after primary TKA and interprets them in the CJR relevant 30- and 90-day windows. It demonstrates that 48% of 90-day readmissions occur within the first 30 days. Additionally, it highlights the baseline admission rate of 0.057% of the population per day in this population and assesses the impact this has on interpretation of readmission patterns. More specifically, this study demonstrates that, with baseline admission patterns in mind, 79% of the first 90-day readmissions occurred within the first 30 days and that the readmission patterns of this sample are not significantly different than the calculated baseline admission rate on days 35-40. This finding calls into question the length of the current CJR defined episode of care.

