

# Opioid Use and Its Impact on Long Term Functional Outcomes in Total Knee Arthroplasties

## INTRODUCTION:

Opioid overdose continues to be a public health crisis, accounting for almost 500,000 deaths in the United States every year [1]. For many patients, management of postsurgical pain is often their first experience with opioid analgesia, a subset becoming opioid dependent [2]. Aside from the risks associated with creating opioid dependence, long term opioid use has been shown to be an indicator for poorer patient outcomes with regards to both post-operative functional scores and pain reduction [3-4]. With a goal of decreasing perioperative opioid consumption and improving recovery, multimodal analgesia (MMA) pathways have become commonplace in many surgical disciplines [5-6]. We aimed to follow long-term functional outcomes in a cohort of patients undergoing elective total knee arthroplasty (TKA) who were recipients of an established, MMA pathway. These patients were objectively assessed using KOOS scores and opioid was noted pre- operative and followed for up to 12 months.

**METHODS:** Following IRB approval, patients who had undergone a primary, unilateral TKA with standardized MMA at the University of Virginia Health System (Charlottesville, VA) were identified. Patients were then contacted via telephone for formal consent prior to the acquisition of the following outcomes: Knee Injury and Osteoarthritis Outcomes Score (mini- KOOS) scores, analog pain scores, and opioid consumption. All outcomes were collected at 3 time points postoperatively: 3, 6, and 12 months. Baseline demographics, opioid use and pre-operative KOOS were then obtained from the electronic medical record (EMR).

## RESULTS:

One-hundred fifty patients were enrolled, fifty at each time point. Demographic data is summarized in Table 1. There was a demonstrated improvement in KOOS scores (Table 2) and a reduction in persistent opioid use (Table 3) over time, which summarizes lower functional scores with continued opioid use. There were not significant difference in analog pain scores (rest and with activity) between opioid and non-opioid users at each of the 3 time points. There was statistically significant difference with respect to KOOS Scores at 3 and 6 months between opioid and non-opioid users (Table 4). **DISCUSSION AND CONCLUSION:**

The aim of this study was to track the long-term functional patient outcomes (HOOS/KOOS scores), pain, and opioid consumption trends for patients undergoing unilateral TKA who received a standardized perioperative MMA regimen. The results demonstrated a decrease in opioid use with respect to time from 3 (18%) to 6 (6%) months, with no change noted between 6 and 12 months (6 %). This was comparable to results seen by Nilsdotter et al, which also found improvements in KOOS scores at 6 months and even greater improvements at 12 months [7]. Our results demonstrated a significant increase in functional scores at each of the timepoints from baseline, with an improvement between 3 and 6 months, and a plateau between 6 and 12 months. Our data found similar rates of pre-operative opioid use as compared to a large, national database study, which found 24% (17.3%) of patients utilizing narcotic pain medications prior to TKA, with 17% (12%) using opioids use at 12 months [8]. The data demonstrates that patients with continued opioid use post-operatively were associated with lower functional outcomes as demonstrated by the KOOS scores with statistically significant differences in the 3 and 6 month cohorts. Furthermore, patients with pre-operative opioid use were noted to have lower overall KOOS scores in each cohort post operatively, although this did not demonstrate statistical significance. This data further supports that pre/post-op opioid use is associated with poorer patient reported outcomes measures (PROM) as they relate to function following TKA. These findings are supported by additional arthroplasty literature, which support the deleterious effects of pre-operative opioid use [9]. There are numerous studies looking at the negative impact on quality metrics associated with opioid use, however the results from this study adds to the limited body of literature on the PROM with regards to TKA and its relationship with opioid use [10]. These data display several important trends and relationships between peri-operative opioid use and quantified functional outcomes surrounding TKA. Future studies can use these data to identify the effect of interventions on long-term functional outcomes with a goal of decreasing post- operative opioid use.

**Table 4**  
Pre-Operative opioid use and post-operative KOOS Scores

Cohort	Pre-Op Opioid Use	N	Mean KOOS	P Value
3	No	41	74.4	.055
	Yes	9	66.88	
6	No	43	77.9	.536
	Yes	7	81.8	
12	No	41	83.7	.052
	Yes	10	69.9	

**Table 1**  
Patient Demographics (mean and standard deviation)

Cohort	Average Age	BMI	Male (%)
3 month follow-up	67.4 (10.0)	32.8 (5.6)	46
6 month follow-up	68.5 (8.3)	31.7 (5.5)	48
12 month follow-up	68.7 (9.0)	31.5 (5.1)	37.25

**Table 3**  
KOOS Score Between Opioid and Non-Opioid Users with Morphine Equivalents

Cohort	Continued opioid Use	Morphine Equivalents	Opioid use (%)	Post Op KOOS Scores (Mean, SD)	p-value
3 month follow-up	Y	14.83	28	64.4 (13.8)	.046
	N		82	75 (13.5)	
6 month follow-up	Y	24	6	64.57 (4.0)	.009
	N		94	79 (13.9)	
12 month follow-up	Y	19	6	54.4 (15.0)	.051
	N		94	82.7 (13.9)	

**Table 2**  
Pre-op vs. Follow-Up Mini KOOS Score (mean and standard deviation shown; t-test for difference)

Cohort	Pre-op Mini KOOS	Follow-Up Mini KOOS	Delta	P-value
3 month follow-up	49.4 (11.1)	71.0 (13.1)	21.6	<0.001
6 month follow-up	44.1 (12.1)	78.5 (13.5)	34.9	<0.001
12 month follow-up	48.2 (14.0)	81.0 (15.3)	32.8	<0.001