



## **Post-Op Pain Management Through Opioids and Impact on Satisfaction for THA and TKA Patients**

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# Introduction

In the midst of the opioid crisis, it is imperative to evaluate whether patients are satisfied with their pain management options and how their pain levels influence medication-taking behaviors. The Force platform allows patients to log valuable information about their pain levels, medication use, and care plan satisfaction, which lends insight into how orthopedic patients are managing post-op pain and where there are opportunities for change. This population is particularly important to study due to the historic use of opioids in orthopedic patients and limited evidence of advantages of opioids compared to non-opioid alternatives.

## Motivation & Relevance

In light of the opioid epidemic, opioid prescribing practices are being re-evaluated, and opioid-sparing care pathways are gaining traction. Within the orthopedic space, opioids are a common part of post-op pain management but are being closely researched for their effectiveness compared to non-opioid or lower dose options. Organizations that collect medication-based outcomes on the Force Therapeutics platform have an opportunity to monitor post-operative pain and medication usage to identify opportunities for meeting the pain management needs of their patients while being mindful of opioid prescribing practices.

## Literature Review

Existing literature on orthopedic post-operative pain management and opioid consumption points to a shift in the industry as providers evaluate their prescribing practices in the face of the opioid epidemic. A JAMA study observed that while morphine milligram equivalents (MME) being prescribed by providers were decreasing, the percentage of patients receiving opioid prescriptions is increasing despite mounting evidence of limited efficacy in pain management compared to non-opioid alternatives.<sup>1</sup> Other studies have similarly come to the conclusion that pain management through opioids does not impact postoperative pain compared to non-opioid protocols.<sup>2</sup> Some comparative studies have concluded that THA patients experience less post-surgical pain on average than TKA patients.<sup>3</sup> A prospective study that tracked post-op medication usage found that patients use opioids for a median of 5 days post-op and have a median of 13 unused pills with an interquartile range of [0-57].<sup>4</sup> Of the cohort in the study, 85 percent did not know how to dispose of excess opioids, leading to continued presence of opioids in their households or improper disposal.<sup>5</sup> Oversupply of opioids, combined with emerging evidence of limited effectiveness in orthopedic practice, is pointing towards a need for orthopedic providers to monitor their patients through medication and pain tracking platforms and adjust prescribing behaviors accordingly.<sup>6</sup>

# Methods

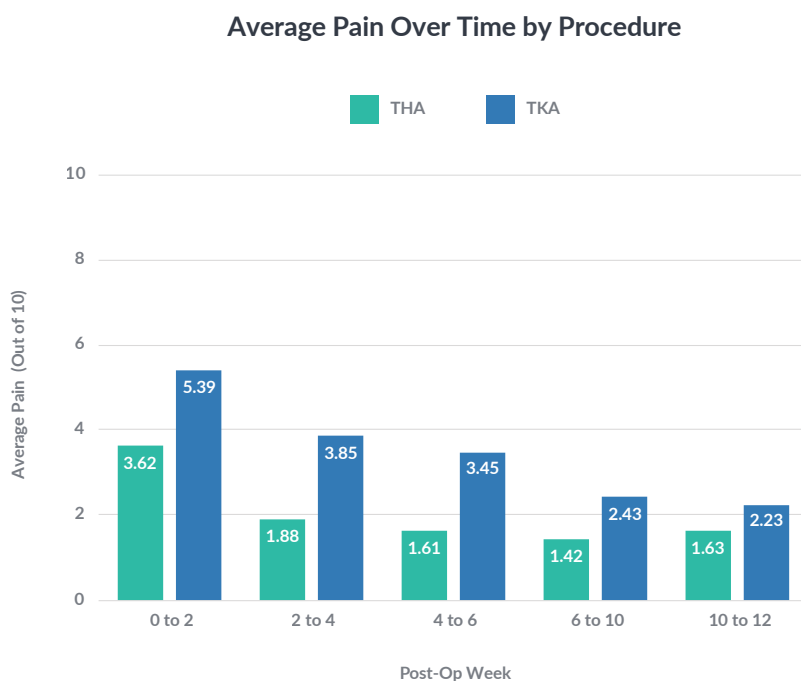
Data from two organizations who track patient outcomes on Force was merged to create a data set of 663 TKA patients and 188 THA patients who reported post-op medication usage. Variables of interest for this analysis included: post-op time period, patient-reported pain scores, opioid medication name, opioid dose, opioid pill count, and patient-reported procedure satisfaction scores. These variables were cleaned to ensure consistency with clinical guidance, such as setting maximum limits for self-reported daily dosage based on the recommended dosage for each medication. Patients reporting multiple opioids or an uncommon opioid were excluded from this analysis. The overall average age of patients in this analysis was 67.48 years, with THA patients having a lower average age of 65.92 compared to 67.93 for TKA patients. Gender distribution among THA and TKA patients also differed, but both had a higher proportion of females than males:

	THA	TKA
Female	65.4%	63.3%
Male	34.6%	36.7%

Gender and age were controlled throughout the analysis, and analysis was segmented by procedure to account for differences in prescribing practices for each procedure.

## Increased pain has a positive effect on daily MME consumption in both total hip and total knee patients, with varying degrees of magnitude.

Patients enrolled on the Force platform submitted daily NRS pain scores. Average pain differed among total hip and total knee patients across various post-op intervals, with total knee patients having higher reported pain levels than total hip patients consistently, which is consistent with literature review.



This is further demonstrated through the larger effect of pain on average daily MME among TKA patients compared to that of THA patients when controlling for age and gender.

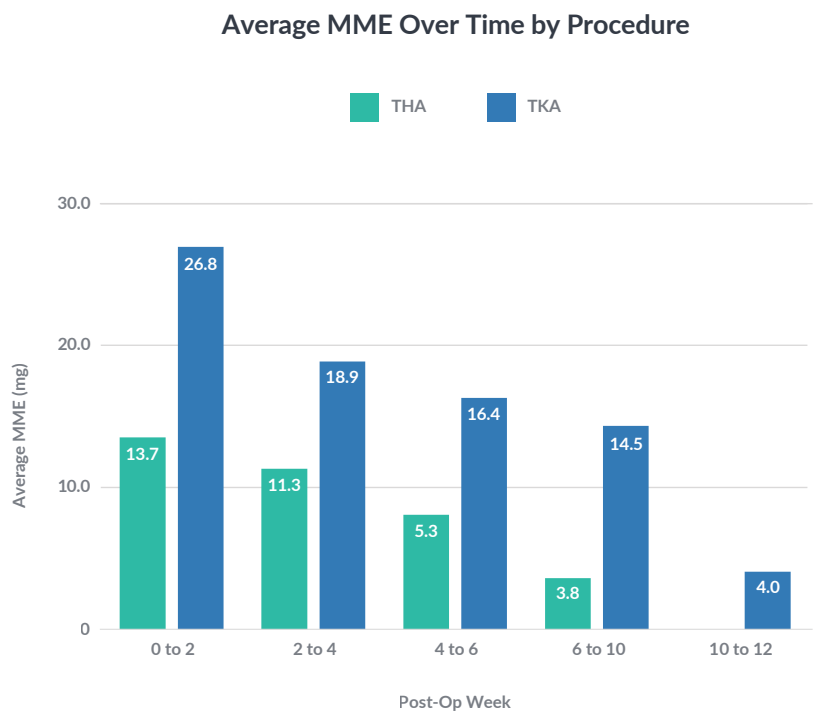
	Estimated Impact of Pain on MME*	Intercept	P-Value	Adjusted R <sup>2</sup>
THA	2.13440	9.51	<2e-16	0.181
TKA	2.81988	18.77	<2e-16	0.1403

\*controlling for age and gender.

TKA patients on average have higher pain levels which subsequently impacts their daily morphine equivalent usage. In both THA and TKA patients, increases in reported pain drive increases in MME, with every unit increase in pain increasing daily MME by 2.13 in THA patients and 2.82 in TKA patients.

**Average MME in TKA and THA patients differs noticeably, with TKA patients having higher MME and utilizing opioids for longer during their recovery.**

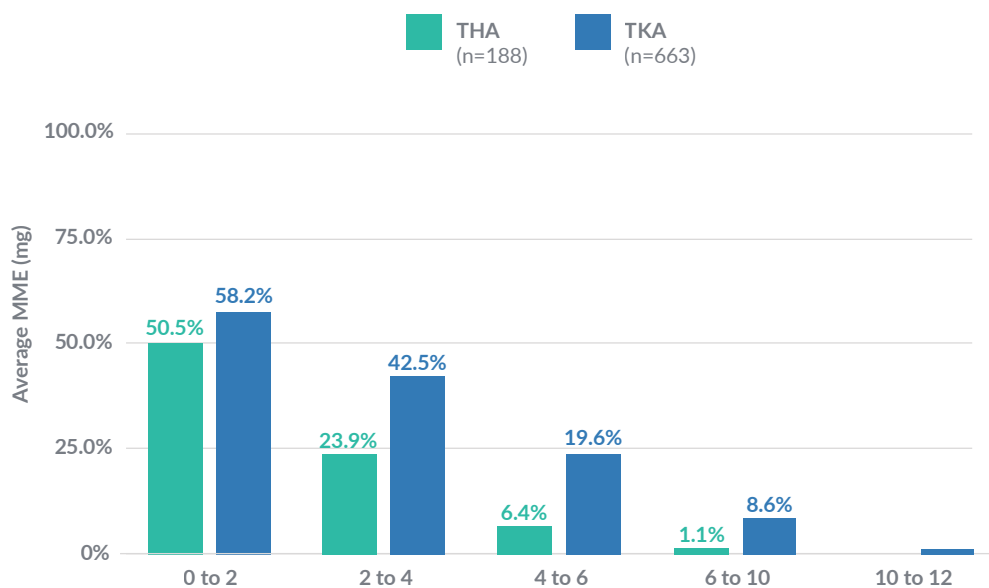
Due to the aforementioned increase in pain and subsequent pain management needs in TKA patients, there is an unsurprising increase in average MME in TKA patients when compared to THA patients. While TKA patients consume an average of 26.8 mg of morphine equivalents in the first two weeks post-op, THA patients utilize almost half that at 13.7 MME during the same time frame. After the first month post-op, MME decreases in both patient populations, with THA patients having an average MME of 5.3 in the second month while TKA patients have an average MME of 16.4.



## TKA patients discontinue opioid use at a slower rate than THA patients.

Discontinuation of opioids occurs at different rates for both patient populations. In the first two weeks post-op, 50.5 percent of THA patients report opioid use compared to 58.2 percent of TKA patients. In post-op weeks 2 to 4, the proportion of THA patients using opioids decreases by more than half, with a reported 23.9 percent still relying on opioids for pain management. For TKA patients, the biggest drop in percentage of patients using opioids occurs after the first month, with 19.6 percent of patients relying on opioids during weeks 4 to 6.

### Percentage of Patients Using Opioids Over Post-Op Intervals



## In both THA and TKA patients, pain – not MME – is a significant driver of patient satisfaction scores.

When controlling for age and gender, MME was not a significant indicator of patient satisfaction. Instead, pain is the greatest driver of patient satisfaction, with every unit increase in pain decreasing satisfaction scores by 0.05 out of 5 in THA patients and 0.09 in TKA patients. Overall, average patient satisfaction scores are high in both THA and TKA patients, who report scores of 4.68 and 4.48 out of 5 respectively. Giving patients opioids for pain management does not have a significant impact on this score when controlling for gender and age.

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	THA	TKA
<b>Pain</b>	-0.053242	-0.0949472
<i>P-Value</i>	0.00681	<2e-16
<b>MME</b>	0.003231	0.0003807
<i>P-Value</i>	0.38175	0.6302
<i>Adjusted R<sup>2</sup></i>	0.006115	0.05297

## Results & Discussion

Among patients who self-report their medication and pain usage on the Force platform, there are a few key differences in pain management needs and opioid utilization between procedures. There is a demonstrated difference in pain levels between THA and TKA patients, and this is reflected in opioid-taking behaviors. THA patients, who have lower self-reported pain levels than TKA patients during all postoperative intervals, have lower average daily MME and taper off opioids faster than those undergoing TKA. The comparison of THA versus TKA pain and opioid usage is consistent with existing literature regarding average pain levels. Pairing this pain data with opioid utilization data demonstrates that pain level trends, amount of opioid use, and length of opioid use all follow an expected downward trend as time passes. For both procedures, opioid use and daily MME do not have a significant impact on patient satisfaction scores, with pain being a more accurate predictor for how patients perceive their experience and MME not being significantly impactful.

## Conclusion & Future Directions

The role of opioids in postoperative pain management is highly dependent on procedure type and pain levels, but pain management through opioids alone may not impact patient satisfaction with their overall care journeys. This data suggests that pain relief, regardless of the delivery method, is a priority. In the wake of the opioid epidemic, this provides insight into how prescribing protocols can be altered to meet patient needs without adding to the existing burden of opioid overprescription. Non-opioid alternatives may be a viable option for meeting patient pain needs, and the Force platform provides an opportunity for testing new medications and protocols in real-time to assess their effectiveness in patients. Utilizing Force capabilities to monitor data around medications, pain, satisfaction, and other outcomes also creates value for patients who may be apprehensive about utilizing opioids or have unwelcome side effects that impact their satisfaction with their care plans.

# About Force

Force Therapeutics was founded in 2010 as an episode-based digital care platform and research network designed to help clinicians intelligently extend their reach. Our platform leverages video and digital connections to directly engage patients at every step of the care journey – from the point of surgery scheduling, to post-op recovery and beyond. Backed by the insights of more than 60 leading healthcare centers across the country, Force is proven to drive more effective recovery, lower costs, and achieve better patient outcomes.

## References

- 1 [https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2768844#:~:text=From%202014%20to%202017%2C%20the,%25%20after%20THA%20\(Figure\)](https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2768844#:~:text=From%202014%20to%202017%2C%20the,%25%20after%20THA%20(Figure))
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- 4 [https://www.jpain.org/article/S1526-5900\(17\)30157-8/pdf](https://www.jpain.org/article/S1526-5900(17)30157-8/pdf)
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