



# Prevalence and Impact of Unused Opioids Among THA and TKA Patients: Pain Management and Satisfaction Insights

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# Introduction

In response to the opioid epidemic, providers have been altering their prescribing practices to reduce patient exposure to opioids. Despite downward pressure on opioid prescriptions, recent medication-tracking studies have identified that postoperative unused opioids are still a prevalent issue among orthopedic patients. Previous research from Force demonstrated that effective pain management through any method—including non-opioid alternatives—is the highest priority for patients. Expanding on this research, exploring unused opioid pills in the same patient population provides further insight into how physicians can alter their protocols to meet patient needs while reducing the burden of unused or unnecessary opioids.

## Motivation & Relevance

Postoperative opioid prescriptions are common in orthopedics, but how many patients are actually using the medications prescribed to them? New studies suggest that a majority of patients undergoing surgical procedures have unused opioid pills. Wisdom tooth extractions alone account for 100 million unused prescription opioid pills per year.<sup>1</sup> Not only do patients have to pay for medications that are ultimately unnecessary, but they also run the risk of keeping heavily controlled substances in their homes that they do not know how to dispose of. Organizations that track medications and ask patients to report unused pills can monitor whether overprescription of opioids is an issue for their patients. This opens up the possibility of refining prescription protocols to reduce the burden of unused opioids and the risks associated with them. Tracking unused opioid pills allows providers on the Force platform to determine if there are opportunities for altering prescribing practices, identify patient needs surrounding their pain medications, and consider implementing education about proper opioid disposal.

## Literature Review

The rate and magnitude of unused opioids during the postoperative period have been increasingly researched in light of the opioid epidemic. Recently, Penn Medicine implemented a text message program to track patient pain and opioid utilization after orthopedic and urological procedures.<sup>2</sup> The emerging study from the program found that 60 percent of opioid pills went unused after common surgical procedures.<sup>3</sup> Another systematic review found that the rate of unused pills was between 42 and 71 percent, with 16 to 29 percent of patients ceasing use due to side effects.<sup>4</sup> Further examining opioid storage and disposal, the review also found that 73 to 77 percent of patients did not use locks when storing their opioids and FDA-approved disposal methods were used by less than 10 percent of patients in only one study. Discontinuation of opioids also occurred very early in the postoperative period, with one prospective study finding that opioids are used for a median of five days and 85 percent of patients were unsure about how to dispose of leftover opioids.<sup>5</sup> In light of this evidence, it is imperative to examine how, despite new protocols putting downward pressure on opioid prescriptions, the opioids that are still being prescribed may be going unused and might not have a significant impact on pain management or satisfaction.

# Methods

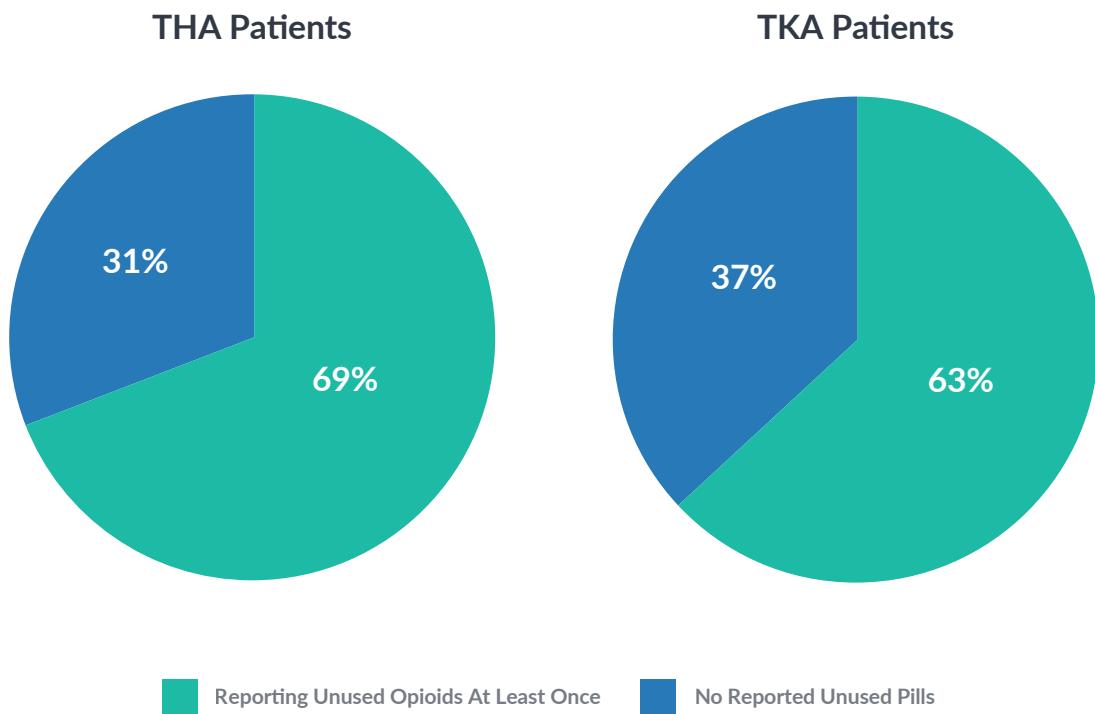
This analysis focused on patient-reported number of daily unused opioid pills, outcome scores (HOOS Jr., KOOS Jr.), pain levels, and procedure satisfaction. Self-reported unused opioid data was cleaned to reflect reasonable daily prescription pill amounts according to clinical guidelines. The effect of unused pills on satisfaction, outcomes, and pain was measured while controlling for age and gender.

	THA	TKA	THA	TKA
	Reporting Unused Opioids		No Reports of Unused Opioids	
Sample Size	86	339	37	171
Gender				
Female	67.4%	63.1%	75.7%	62.7%
Male	32.6%	36.9%	24.3%	37.3%
Age				
Mean	61.98	66.09	63.27	67.24
SD	10.35	7.52	11.18	8.40

\*among people reporting opioid use

**Among people who utilize opioids during their post-op period, over 60% of them reported at least one instance of unused opioids. THA patients report a higher percentage of unused opioids than TKA patients.**

Consistent with prior findings about pain differences in THA and TKA patients, THA patients have a higher rate of unused opioid pills. THA patients on average have lower pain than TKA patients, and it is therefore unsurprising that this is reflected in lower opioid utilization and higher rates of unused pills compared to TKA patients. Even with this reported difference, a majority of both THA and TKA patients report unused opioids.



### The average number of unused pills differs among THA and TKA patients.

Overall, patients reported an average of 4 unused pills per day. THA patients reported a higher number of daily unused opioid pills, with 6.65 pills going unused on average per day. TKA patients reported lower average unused pills at 3.67 pills per day. This finding is once again consistent with previous research about lower average pain levels and opioid utilization in THA patients.

### The impact of pain on the average number of unused opioids is only significant in THA patients.

Pain is a significant predictor of unused opioid pill number in THA patients, but not TKA patients. The effect of pain on unused pills is negative, with higher pain resulting in lower average unused pills. This trend is not reflected in TKA patients, with pain being an insignificant predictor of unused pill count.

Estimated Impact of Pain on Unused Pills*	Intercept	P-Value	Adjusted R <sup>2</sup>
THA -0.36189	10.03750	0.01286	0.01106
TKA -0.0784993	3.9050397	0.108	0.0005712

\*controlling for age and gender.

**Patient-reported pre-operative HOOS Jr. and KOOS Jr. scores are significant predictors of daily unused opioid pills in the first two weeks post-op for TKA but not THA patients.**

Pre-operative outcome measures have a differing impact on postoperative opioid utilization for THA and TKA patients. Among THA patients, the impact of preoperative HOOS Jr. scores was not significant. TKA patients, however, demonstrated that their pre-operative KOOS Jr. scores are significant predictors of two week postoperative opioid utilization. For every unit increase in pre-operative KOOS Jr. scores, there is an expected increase of 0.05 unused daily pills. Since higher HOOS and KOOS Jr. scores are indicative of better pain, higher quality of life, and overall function of the joint of interest, this is an expected trend. TKA patients with better pre-operative function as defined through KOOS Jr. scores have higher numbers of unused pills in the first two weeks after their surgeries.

Estimated Impact of Pre-Op HOOS/KOOS Jr. on Unused Pills in First Two Weeks Post-Op*		Intercept	P-Value	Adjusted R <sup>2</sup>
THA	0.01670	3.25887	0.0884	0.003723
TKA	0.05698	1.98676	0.000429	0.01599

\*controlling for age and gender.

**Daily unused opioid pills up to 6 weeks post-op are significant indicators of KOOS Jr. scores but not HOOS Jr. scores among TKA and THA patients respectively.**

For THA patients, higher numbers of unused pills were associated with higher HOOS Jr. scores but the relationship was statistically insignificant. For TKA patients, however, higher numbers of unused pills were associated with lower KOOS Jr. scores. This is potentially due to the role of pain in patient-reported outcomes and overall lower average outcome scores in TKA patients compared to THA patients.

Estimated Impact of Unused Pills on 6-Week HOOS/KOOS Jr. Scores*		Intercept	P-Value	Adjusted R <sup>2</sup>
THA	0.44510	67.16305	0.192	0.1782
TKA	-0.07039	57.33263	0.00618	0.003825

\*controlling for age and gender.

## Pain and unused opioid count have differing impacts on satisfaction in THA and TKA patients.

In THA patients, pain rather than unused opioid pills is a significant predictor of satisfaction scores. As pain increased, satisfaction among THA patients decreased. As with KOOS Jr. scores, satisfaction among TKA patients is influenced differently. For TKA patients, both unused opioid pill count and pain scores impact patient satisfaction. As the number of unused pills and pain increase, both have a statistically significant downward impact on patient satisfaction. This relationship is not straightforward, since it is expected that higher numbers of unused pills is typically indicative of pain needs being met. This trend may be explained by inaccurate self-reporting of unused pills or that opioid pills are going unused due to side effects.

	THA	TKA
Pain	-0.058004	-0.079497
P-Value	0.00344	<2e-16
Unused Opioid Count	0.007339	-0.008244
P-Value	0.17404	3.45e-07
Adjusted R <sup>2</sup>	0.01466	0.05765

## Results & Discussion

Among patients who reported opioid use, the rate of having unused pills and the unused pill count added dimension to previous research about the relationship between pain, satisfaction, patient outcomes, and opioid use. While THA and TKA patients have differing pain levels, previous research demonstrated that daily opioid dosage was impacted by pain. On the flip side of this analysis, unused opioid pills have the potential to demonstrate whether the number of pills being prescribed but not taken have an impact on patient outcomes. THA patients reported higher rates of unused opioid pills than TKA patients, but over 60% of both patient populations reported unused pills at least once during their post-op period. The magnitude of unused opioid pills differed as well, with THA patients reporting almost twice as many unused opioid pills per day compared to TKA patients. This is consistent with previous findings of TKA patients utilizing higher daily doses of opioids. This may also be further impacted by differing prescribing practices through which TKA patients are prescribed more opioids due to their higher pain levels. While higher pain resulted in more opioid utilization among THA patients, this trend was not repeated in TKA patients. Additionally, pain was the only significant driver of satisfaction scores among THA patients while higher pain and unused opioid pills both had a negative impact on satisfaction in TKA patients. Inconsistent reporting of unused pills may be contributing to the differing significance of these results, and more data is needed to solidify knowledge of these relationships. Nonetheless, opioid underutilization among patients is a prevalent issue that warrants attention.

## Conclusions & Future Directions

Due to the nature of self-reported data, more data is needed to confirm the relationship between pain, unused opioids, satisfaction, and outcome measures. Even without that additional information, it is evident that many patients are reporting unused opioids. Without proper education about opioid disposal, this has implications for the number of controlled substances that remain in homes and could potentially lead to misuse. In order to address this issue, there are two approaches prescribing providers can take: prescribing fewer opioids in the first place and/or connecting patients with resources to properly dispose of opioids after their recovery.<sup>6</sup> The Force platform's capabilities allow for opioid disposal education to be integrated into patient care plans to ensure that unused opioids do not add to the existing burden of opioid misuse.

# 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://www.pennmedicine.org/news/news-releases/2016/september/100-million-prescription-opioid-tablets-unused-after-common-procedures>
- 2 <https://www.pennmedicine.org/news/news-releases/2021/march/text-message-program-shows-60-percent-of-opioid-tablets-unused-after-common-procedures>
- 3 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5701659/>
- 4 [https://www.jpain.org/article/S1526-5900\(17\)30157-8/pdf](https://www.jpain.org/article/S1526-5900(17)30157-8/pdf)
- 5 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5972255/>

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