

**Preoperative versus Perioperative Risk Factors for Delayed Pain and Opioid
Cessation After Total Joint Arthroplasty-
A Prospective Cohort Study**

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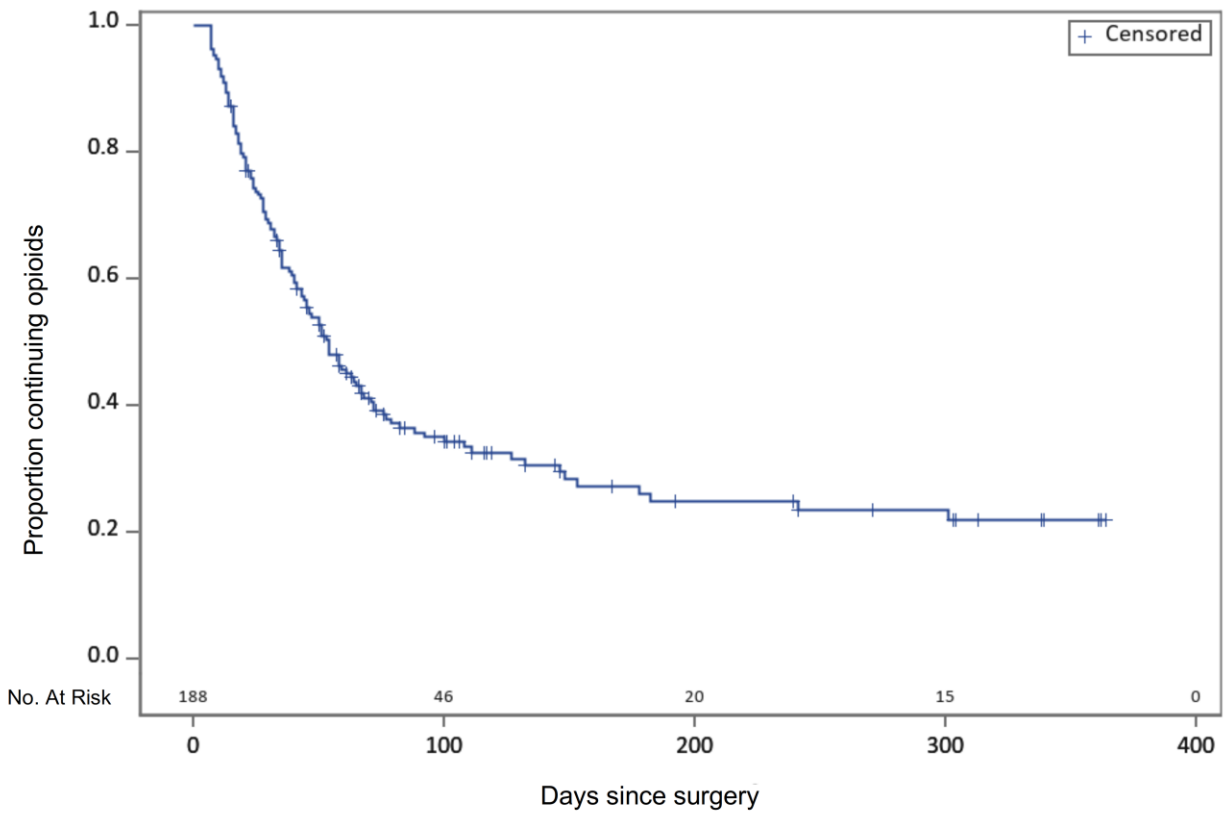
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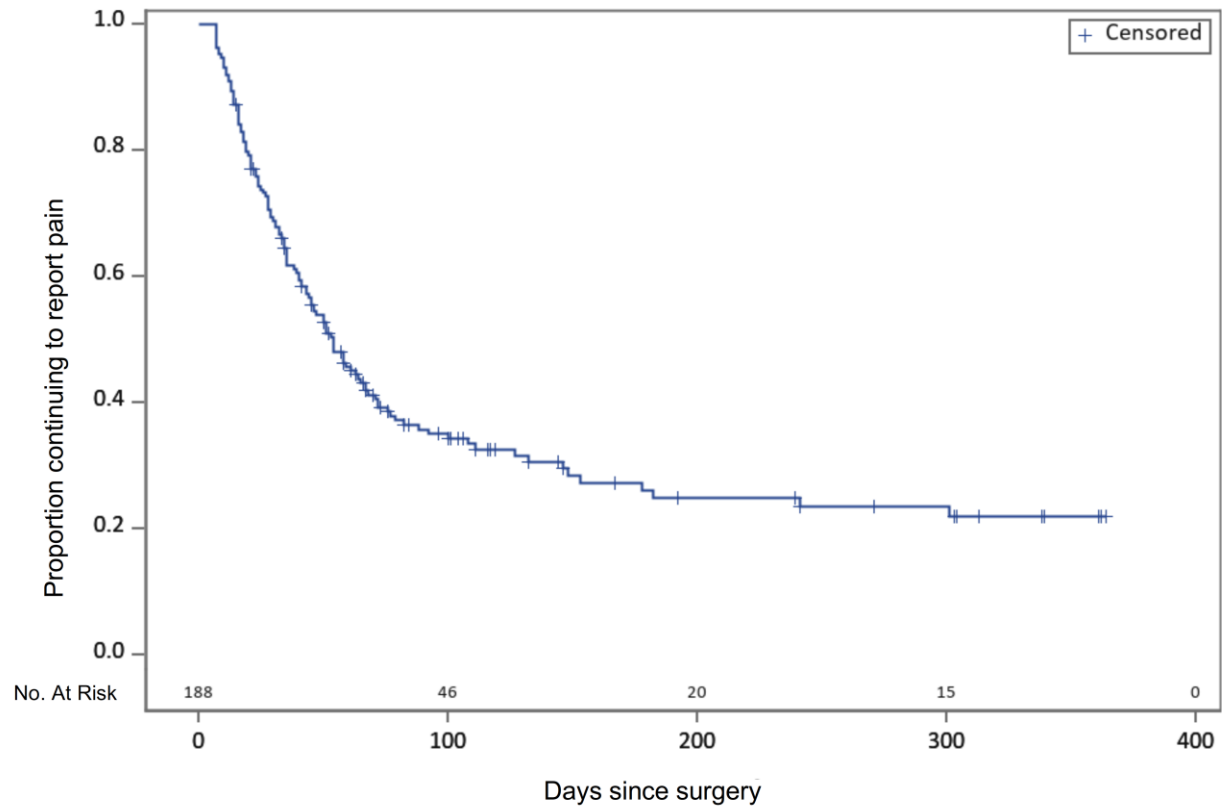
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Supplementary Figure 1 Kaplan-Meier Plot for Time to Opioid Cessation, in days. The number of patients at risk (have not yet discontinued postoperative opioid use) is given above the bottom axis.



Supplementary Figure 2 Kaplan-Meier Plot for Time to Pain Cessation, in days. The number of patients at risk (have not yet reached postoperative pain cessation) is given above the bottom axis.



Supplementary Table 1 Mood Assessments

Mood Assessment	Description
NIH PROMIS Measures (Depression, Anger, Anxiety)	Instruments utilize item response theory yielding standardized T-scores (mean=50, SD=10) ¹ ; these scores are normed on a large sample of the US population. ² The item bank for depression measures negative mood, negative views of self (worthlessness, self-criticism), social cognition (loneliness), and decreased positive affect and engagement (loss of interest, meaning, and purpose). ³ The items bank for anger includes affective and cognitive items along with indicators of behavioral activation and anger expression. ⁴ The item bank for anxiety focus on fear, anxious misery, hyperarousal, and somatic symptoms related to arousal. ⁴
Beck Depression Inventory-II (BDI-II)	21-item self-report measure of depression severity. Depressive symptoms are measured on a 4-point scale, with a score range of 0 to 63 (0-13 indicating minimal depression, 14-19 indicating mild depression, 20-28 indicating moderate depression, and 29-63 indicating severe depression).
Positive and Negative Affect Schedule (PANAS)	20 items measuring positive and negative affect on a 5-point scale. ⁵⁻⁹ Scores range from 10-50 for both affect scales. Higher scores for either positive or negative affect represent higher levels of positive or negative affect respectively
Pain Catastrophizing Scale	Measures maladaptive cognitive and emotional processing of pain and consists of 13 items rated on a 5-point scale, with a score range of 0 to 52. Higher scores indicate greater catastrophic thinking and emotional responses to pain.

Supplementary Table 2 Missing Data for Time-Varying Covariates (Total Number of Assessments =1780)

Postoperative Time-Varying Covariate	No. of Missing Assessments (%)
Beck Depression Inventory-II Score	25 (1.4)
NIH PROMIS Depression T-Score	4 (0.2)
NIH PROMIS Anxiety T-Score	3 (0.2)
NIH PROMIS Anger T-Score	5 (0.3)
Positive Affect Score	19 (1.1)
Negative Affect Score	23 (1.3)
Pain Catastrophizing Scale Score	21 (1.2)

Supplementary Table 3 Sensitivity Analysis for Determinants of Opioid Cessation
among Preoperative Opioid Naïve

Characteristics	Hazard Ratio	Hazard Ratio (95% Confidence Interval)	p-value
Time-varying Postoperative average pain score in the past 24 hours ^a	0.75	(0.63-0.89)	<0.001
Time-varying Beck Depression Inventory-II score ^a	1.03	(0.96-1.10)	0.37
Time-varying NIH PROMIS Depression T-score ^a	0.99	(0.95-1.04)	0.76

Abbreviations: NIH PROMIS, National Institutes of Health Patient-Reported Outcomes Measurement Information System.

^aTime-dependent covariate. For postoperative average pain score values were reported daily. For Beck-Depression Inventory II scores and NIH PROMIS Depression T-scores, values were assessed weekly.

Post-Hoc Analysis of Postoperative Long-Acting vs. Short-Acting Opioid Use

Post-hoc we conducted additional analyses to determine the association of use of long-acting vs. short-acting postoperative opioids on time to opioid and pain cessation. 34.6% (n=65) of patients were prescribed a long-acting opioid at some time after surgery. The median time to opioid cessation comparing any postoperative long-acting opioid use to non-users was 61 (IQR 34-.) days vs. 45 (IQR 20-146) days. The log-rank test comparing these two groups and time to opioid cessation was non-significant ($p=0.07$). On univariate analysis, there was no significant association between any postoperative long-acting opioid use and time to opioid cessation (HR 0.81, 95%CI 0.49-1.04, p -value=0.08). Similarly, the median time to pain cessation comparing any postoperative long-acting opioid use to non-users was 228 (IQR 90-.) days vs. 133 (IQR 62-.) days. The log-rank test comparing these two groups and time to pain cessation was non-significant ($p=0.32$). On univariate analysis, there was no significant association between any postoperative long-acting opioid use and time to pain cessation (HR 1.24, 95% CI 0.52-1.23, p -value=0.33).

Supplement References

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