

# Association of New York’s opioid prescribing restrictions with opioid fills following total hip and knee arthroplasty

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## Introduction

Opioids are an important component of pain management following total hip and knee arthroplasty (“total joint arthroplasty” [TJA]). However, variability in opioid prescription amounts and duration, and evidence that unused opioids that are prescribed for post-operative pain are often misused has motivated more than 30 states to adopt legislation that restricts the amount or duration of opioids prescribed for acute pain. New York State (NY) implemented its opioid restriction legislation (“Section 3331”) in July 2016, which restricts the prescription of opioids for acute pain to 7 days. Whether this legislation changed prescribing patterns for acute post-operative pain following TJAs is unknown. We address this gap by using analytic approaches that leverage the ‘natural experiment’ setting that results from the implementation of Section 3331 in NY (‘treatment group’) and the absence of similar legislation in other states such as California (CA – ‘control group’).

The objective of our work is to examine the association of NY’s Section 3331 with the likelihood of one or more opioid fills in the 15 days before admission to 7 days after discharge (“7-day”), 8 to 30-days after discharge, and 31 to 90-days after discharge for Medicare beneficiaries undergoing TJAs.

## Methods

We used the 2014-2019 Medicare enrollment, encounter claims, and prescription claims data to identify Medicare beneficiaries who underwent TJAs in NY (treatment group) and CA (control group) hospitals. The key outcomes were binary indicators for one or more opioid fills in the 7-, 8 to 30-, and 31 to 90-day period following TJA discharge. The key independent variables were the state (NY or CA), the phase (before [2014-2015] or after [2017-2019] the implementation of the legislation; 2016 was excluded due to Section 3331 implementation), and an interaction between these two variables. We estimated separate multivariable hierarchical linear probability models with difference-in-differences (DID) estimation to address the objective. DID is an econometric method that is commonly used for policy evaluation that leverages the ‘natural experiment’ setting introduced by Section 3331. DID examines the change in the treatment group (NY) after accounting for the changes in the control group (CA), thereby determining the independent association of Section 3331 with the likelihood of one or more opioid fills in the post-TJA period. All multivariable models controlled for patient- (e.g., demographics, pre-operative opioid use, comorbidities, hip/knee arthroplasty) and facility-level (e.g., ownership, number of beds) covariates, and accounted for facility-level clustering using random effects.

## Results

For the 71,565 encounters (26,066 from NY and 45,499 from CA) in the cohort from 2014-2019, the mean age (standard deviation) was 73.77 (5.56) years, 61.55% were female, 94.50% were White, and 8.15% were dually-eligible for both Medicare and Medicaid. On multivariable analysis and before Section 3331 implementation, the rates of opioid fills in the 7-, 8 to 30- and 31 to 90-day post-TJA periods were 88.68%, 38.01%, and 29.10% in NY (Column D of Table 1). With Section 3331 implementation, the rate of opioid fills in the 7-day period increased by 2.74%-points in NY compared to before Section 3331 implementation (95% Confidence Interval [CI]: 1.29% to 4.18%, p<0.001) (Column F of Table 1) whereas the rate decreased by 6.47%-points in CA (95% CI: -7.55% to -5.39%, p<0.001) (Column C of Table 1) during the same period. Thus, the Section 3331-associated increase in the likelihood of opioid fills in NY was 9.21%-points higher than that in CA (95% CI: 7.50 to 10.91, p<0.001) (Column G of Table 1, “Policy Effect”). In the 8 to 30-day, and the 31 to 90-day period, although the rates of opioid fills declined in both NY and CA (columns F and C of Table 1), the declines in NY were not different from the changes in CA (Column G of Table 1).

## Discussion

NY’s Section 3331 was associated with a significant increase in opioid fills in the immediate post-TJA period relative to trends in CA, but not during the later post-TJA period. Because Section 3331 restricts opioid prescribing to 7 days, it is likely that higher-than-average opioid prescriptions are being filled during this period, potentially, to avoid not having access to these medications later in the post-TJA period.

## Significance/clinical relevance

The higher-than-average opioid fills in the 7-day period is likely an unintended consequence of Section 3331. The effects need to be carefully examined and monitored to prevent unnecessary fills that can potentially be used for non-medical purposes.

**Table 1: Adjusted opioid fill rates (%) in California and New York before and after Section 3331 implementation**

Time period	California			New York			Policy effect (G=F-C)
	Rates as % (95% Confidence Interval)			Rates as % (95% Confidence Interval)			
	Before (A)	After (B)	Difference (C=A-B)	Before (D)	After (E)	Difference (F=E-D)	
15 days before admission to 7 days after	94.45 (93.40, 95.51)	87.98 (87.16, 88.81)	-6.47*** (-7.55, -5.39)	88.68 (87.16, 90.20)	91.42 (90.20, 92.64)	2.74*** (1.29, 4.18)	9.21*** (7.50, 10.91)
8 to 30 days after discharge	47.19 (45.56, 48.82)	41.12 (39.78, 42.47)	-6.07*** (-7.55, -4.58)	38.00 (35.72, 40.28)	32.01 (30.02, 34.00)	-6.00*** (-7.73, -4.26)	0.07 (-1.48, 1.62)
31 to 90 days after discharge	37.24 (35.96, 38.52)	25.86 (24.87, 26.84)	-11.38*** (-12.72, -10.04)	29.10 (27.35, 30.85)	18.32 (16.88, 19.76)	-10.77*** (-12.33, -9.21)	0.61 (-0.78, 2.00)

\*\*\*p<0.001