

Association of New York's Opioid Prescribing Restrictions with Racial/Ethnic Differences in 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 the amount and duration of opioid prescriptions, and evidence that unused opioids that are prescribed for postoperative pain are often misused, has motivated more than thirty states to adopt legislation that restricts the duration and/or quantity of opioids prescribed for acute pain. Whether such legislation may differentially affect pain relief access for White patients compared to racial/ethnic minority patients has not yet been tested. New York State (NY) implemented its opioid restriction legislation (Section 3331) in July 2016, which restricts the prescription of opioids for acute pain for 7 days. Whether Section 3331 influenced opioid use for patients of any race/ethnicity similarly or whether it disproportionately limited opioid access for racial/ethnic minority patients, is an open question. 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 Section 3331 with racial/ethnic differences in opioid fills in the 15 days before admission to 7 days after discharge (7-days), 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), patient race/ethnicity (non-Hispanic White [White], non-Hispanic Black [Black], Hispanic), and interactions between these variables. We estimated separate multivariable hierarchical linear probability models with triple differences (DDD) estimation to address the objective. DDD is an econometric method that is commonly used for policy evaluation that leverages the “natural experiment” setting introduced by Section 3331. DDD examines the change in the treatment group (NY) after accounting for the changes in the control group (CA), and determines whether these changes were different for Black and Hispanic patients compared to White patients. All multivariable models controlled for patient- (e.g., demographics, preoperative 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 [SD]) 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 (Table 1). On multivariable analysis and before Section 3331 implementation, the rates of opioid fills in the 7-day post-TJA period were 88.84%, 87.92%, and 74.93% for White, Black, and Hispanic patients in NY (Column D of Table 2). With Section 3331 implementation in NY, the rate of opioid fills in the 7-day period increased by 2.57%-points for White patients (95% Confidence Interval [CI]: 1.10 to 4.04, $p < 0.001$) and by 19.78%-points for Hispanic patients (95% CI: 4.07 to 35.48, $p = 0.01$) compared to before Section 3331 implementation (Column F of Table 2). Thus, the Section 3331-associated increase in the likelihood of opioid fills in NY (Policy Effect) was 9.24%-points higher for White patients (95% CI: 7.49 to 10.99, $p < 0.001$) and 25.79%-points higher for Hispanic patients (9% CI: 9.14 to 42.44, $p = 0.002$) compared to patients in CA (Column G of Table 2). However, these Section 3331-associated increases were not significantly different between patient groups, highlighting that the law did not differentially influence opioid access for Black or Hispanic patients compared to White patients (Column H of Table 2).

DISCUSSION AND CONCLUSION:

NY's Section 3331 was associated with a significant increase in the likelihood of opioid fills in the immediate post-TJA period for White and Hispanic patients relative to trends in CA, but not during the later post-TJA period. Because Section 3331 restricts opioids to 7 days, higher-than-average opioid prescriptions are filled during this period, which is likely an unintended consequence of the legislation. However, these changes did not significantly differ between racial/ethnic patient groups, indicating that Section 3331 did not differentially disadvantage racial/ethnic minority patients compared to White patients. A continual monitoring of Section 3331 and other similar state-level legislations is essential to ensure that excess opioids are not being filled and there is equitable opioid access.

	California (Control)	New York (Treatment)	Total	p-value
Encounters: N	45,499	26,066	71,565	
Patient characteristics				
Age: Mean (SD)	73.75 (5.58)	73.79 (5.52)	73.77 (5.56)	0.13
Female: N (%)	27,721 (60.93)	16,324 (62.63)	44,045 (61.55)	<0.001
Race: N (%)				<0.001
<i>Non-Hispanic White</i>	42,929 (94.35)	24,701 (94.76)	67,630 (94.50)	
<i>Non-Hispanic Black</i>	988 (2.17)	1140 (4.37)	2,128 (2.97)	
<i>Hispanic</i>	1582 (3.48)	225 (0.86)	1,807 (2.52)	
Dual-eligibility for Medicare and Medicaid: N (%)	4,320 (9.49)	1,510 (5.79)	5,830 (8.15)	<0.001
Surgery: N (%)				
<i>Hip replacement</i>	18,391 (40.42)	11,751 (45.08)	30,142 (42.12)	<0.001
<i>Knee replacement</i>	27,108 (59.58)	14,315 (54.92)	41,423 (57.88)	<0.001
Discharge destination: N (%)				<0.001
<i>Home with self-care</i>	13,847 (30.43)	6,276 (24.08)	20,123 (28.12)	
<i>Home with home health</i>	31,652 (69.57)	19,790 (75.92)	51,442 (71.88)	
Preoperative drug use: N (%)				
3+ opioid fills in the 16 to 90 day pre-op period (does not include the 15 days immediately before admission)	2,717 (5.97)	838 (3.21)	3,555 (4.97)	<0.001
1+ benzodiazepine fill in the 16 to 90 day pre-op period (does not include the 15 days immediately before admission)	4,302 (9.46)	2,122 (8.14)	6,424 (8.98)	<0.001
Elixhauser's comorbidities: Mean	1.33 (1.47)	1.70 (1.57)	1.46 (1.52)	<0.001
Other comorbidities: N (%)				
<i>Mental health conditions</i>	13,243 (29.11)	7,743 (29.71)	20,986 (29.32)	0.09
<i>Alcohol use disorder</i>	736 (1.62)	356 (1.37)	1,092 (1.53)	0.01
<i>Tobacco use disorder</i>	2067 (4.54)	1456 (5.59)	3,523 (4.92)	<0.001

Time period/Race/ethnicity group	California			New York			Policy Effect (G=F-C)	Race/ethnicity-based differences (H=Rates for Black/Hispanic patients-Rates for White patients)
	Before (A)	After (B)	Difference (C=A-B)	Before (D)	After (E)	Difference (F=E-D)		
15 days before admission to 7 days after discharge								
White	94.61 (93.54, 95.69)	87.94 (87.11, 88.76)	-6.67*** (-7.78, -5.57)	88.84 (87.31, 90.39)	91.41 (90.19, 92.64)	2.57*** (1.10, 4.04)	9.24*** (7.49, 10.99)	Ref
Black	88.66 (83.77, 93.55)	90.20 (87.26, 93.15)	1.54 (-5.07, 8.15)	87.92 (82.10, 93.74)	91.02 (88.13, 93.91)	3.10 (-4.36, 10.55)	1.55 (-8.38, 11.49)	-7.69 (-17.77, 2.40)
Hispanic	93.90 (89.73, 98.07)	87.88 (85.36, 90.41)	-6.01* (-11.58, -0.45)	74.93 (63.22, 86.65)	94.71 (88.47, 100.95)	19.78* (4.07, 35.48)	25.79** (9.14, 42.44)	16.55 (-0.19, 33.28)
8 to 30 days after discharge								
White	47.18 (45.55, 48.82)	41.19 (39.83, 42.55)	-6.00*** (-7.49, -4.50)	37.83 (35.54, 40.12)	31.86 (29.86, 33.86)	-5.97*** (-7.72, -4.22)	0.02 (-1.57, 1.61)	Ref
Black	50.00 (44.73, 55.27)	42.88 (39.18, 46.59)	-7.12* (-13.35, -0.89)	43.77 (37.90, 49.63)	36.13 (32.53, 39.73)	-7.64* (-14.02, -1.25)	-0.52 (-9.26, 8.22)	-0.54 (-9.42, 8.33)
Hispanic	44.91 (40.42, 49.39)	37.33 (34.17, 40.50)	-7.57*** (-12.61, -2.53)	37.01 (26.05, 47.97)	34.58 (27.15, 42.00)	-2.43 (-15.37, 10.50)	5.14 (-8.63, 18.90)	5.12 (-8.73, 18.97)
31 to 90 days after discharge								
White	36.84 (35.55, 38.12)	25.64 (24.65, 26.62)	-11.20*** (-12.55, -9.85)	28.64 (26.89, 30.40)	18.16 (16.72, 19.60)	-10.48*** (-12.06, -8.91)	0.72 (-0.71, 2.15)	Ref
Black	47.37 (42.68, 52.07)	34.15 (30.89, 37.40)	-13.23*** (-18.83, -7.62)	40.97 (35.80, 46.14)	23.39 (20.33, 26.45)	-17.58*** (-23.33, -11.83)	4.35 (-12.23, 3.52)	-5.07 (-13.07, 2.92)
Hispanic	41.40 (37.43, 45.37)	24.90 (22.14, 27.65)	-16.50*** (-21.04, -11.96)	34.29 (24.47, 44.11)	19.70 (13.10, 26.30)	-14.60*** (-26.25, -2.94)	1.91 (-10.50, 14.31)	1.19 (-11.29, 13.67)

***p<0.001, **p<0.01, *p<0.05; Ref: Reference