Racial and Ethnic Disparities in Opioid Prescribing for Medicare Beneficiaries Following Joint Replacement Surgeries

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INTRODUCTION: Disparities in use and outcomes of total joint replacements (TJR) are well-established. However, it is unknown whether disparities extend to post-TJR pain management. Our objective was to examine racial and ethnic disparities in opioid prescribing at hospital discharge and in the 90-day post-operative period for non-Hispanic White, non-Hispanic Black, and Hispanic Medicare beneficiaries who underwent elective primary total hip and knee replacements (THRs and TKRs).

METHODS: We used the 2018 Medicare enrollment, inpatient claims, and prescription drug files for our study. We identified prescription fills in the 90 days pre-admission and 90 days post-discharge from the inpatient THR/TKR stay. We used multivariable generalized linear mixed models (separate for THRs and TKRs) to examine the association of race/ethnicity (White, Black, or Hispanic) with likelihood of opioid fills in the 7-,30-, and 90-days following discharge. Secondary outcomes were oral morphine milligram equivalents per day (MME/day), number of opioid fills, and prescriptions for non-opioid analgesics for which we estimated two-part models. All multivariable models controlled for patient- and hospital-level covariates, and state-level random effects.

RESULTS: The cohort included 86,377 patients, 40.54% of whom underwent TKRs in 2,488 hospitals. 90.44% were White, 4.58% were Black, and 0.98% were Hispanic. On descriptive analysis and compared to White patients, Black patients had higher mean number of comorbidities (2.61 versus 2.25, p<0.001) and higher proportion of patients who were dual-eligible (24.29% versus 5.25%, p<0.001), female (77.89% versus 66.60%, p<0.001), filled opioid prescriptions in the pre-operative period (32.73% versus 25.63%, p<0.001), and had a tobacco use disorder (9.11% versus 6.25%, p<0.001).

On multivariable analysis and for THRs, the adjusted percentage of filling at least one opioid script in the 7-day postoperative period for White, Black, and Hispanic patients was 77.43%, 72.12%, and 82.20%, respectively (Figure 1, Exhibit A). Compared to White patients, Black patients had 22% lower odds of filling an opioid script in the 7-day postoperative period (Odds ratio [OR]: 0.78, 95% Confidence Interval [CI]: 0.69 to 0.88, p<0.001), 50% higher odds in the 8 to 30-day period (OR: 1.50, 95% CI: 1.33 to 1.70, p<0.001), and 49% higher odds in the 31 to 90-day period (OR: 1.49, 95% CI: 1.29 to 1.71, p<0.001) (Table 1). In the 7-day postoperative period, Black patients had 0.09 fewer opioid fills (0.65 versus 0.74, p<0.001), and -3.79 MME/day lesser opioids (27.16 versus 30.96, p<0.001) compared to White patients (Figures 2 and 3). No significant difference in non-opioid analgesic use was identified.

The race/ethnicity-based patterns for TKRs were generally consistent for those noted in THRs. The adjusted percentages of filling at least one opioid script in the perioperative period were 77.35%, 70.19%, 77%, respectively (Figure 1, Exhibit C). Compared to White patients, Black patients had 30% lower odds of filling an opioid script in the 7-day postoperative period (Odds ratio [OR]: 0.70, 95% CI: 0.64 to 0.76, p<0.001), 12% higher odds in the 8 to 30-day period (OR: 1.12, 95% CI: 1.03 to 1.22, p<0.001), and 44% higher odds in the 31 to 90-day period (OR: 1.44, 95% CI: 1.32 to 1.58, p<0.001) (Table 1). In the 0 to 7-day postoperative period, Black patients had 0.15 fewer opioid fills (0.70 versus 0.85, p<0.001), -3.23 MME/day lesser opioids (30.82 versus 34.05, p<0.001), and 11% lower likelihood of non-opioid analgesic fills compared to White patients (Figures 2 and 3).

DISCUSSION AND CONCLUSION: Important racial/ethnic disparities exist in opioid prescriptions in the early post-TJR period with Black patients having lesser opioid use. Following this early period, Black patients are more likely to obtain opioid fills through the emergency room or outpatient settings. These disparities in pain management may be potentially mediating disparities in post-TJR outcomes. Our work is essential for understanding baseline disparities and informing the design of interventions to promote equity in TJR care.

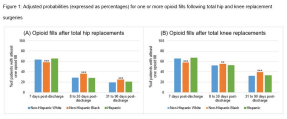

Figure 1: Adjusted probabilities (expressed as percentages) for one or more opioid fills following total hip and knee replacement surgeries

* p<.05, ** p<.01, *** p<0.001. Asterisks for tests of linear combinations comparing opioid fills for Black patients compared to White patients.

Notes: Adjusted percentages from multivariable hierarchical logistic regression models controlling for patient- and hospital-level covariates, and state-level random effects. Key odds ratios are presented in Table 1.

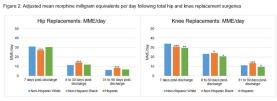

Figure 2: Adjusted mean morphine milligram equivalents per day following total hip and knee replacement surgeries

* p<.05, ** p<.01, *** p<0.001. Asterisks for tests of linear combinations comparing mean morphine milligram equivalents per day for patients of the relevant race/ethnicity group compared to White patients.

Abbreviations: MME/day: Morphine milligram equivalents per day

Notes: Graphical representation of the adjusted means from multivariable two-part regression models controlling for patient- and hospital-level covariates, and standard errors clustered at the state-level. The first part modeled the probability of an opioid script using logistic regression, and the second part modeled the MME per day conditional on the first part probability using linear regression.

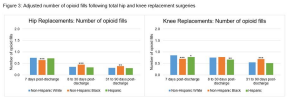

Figure 3: Adjusted number of opioid fills following total hip and knee replacement surgeries

* p<.05, ** p<.01, *** p<.001. Asterisks for tests of linear combinations comparing number of opioid fills for Black patients compared to White patients.

Notes: Graphical representation of the adjusted means from multivariable two-part regression models controlling for patient- and hospital-level covariates, and standard errors clustered at the state-level. The first part modeled the probability of an opioid script using logistic regression, and the second part modeled the number of opioid fills conditional on the first part probability using linear regression.

Table 1: Key odds ratios from multivariable hierarchical logistic regression models examining the association between race and the likelihood of filling at least one opioid script following total joint replacements

	Hip Replacement	Knee Replacement
	Odds Ratio [95% CI]	Odds Ratio [95% CI]
At least one opioid fill		
7 days post-discharge		
Non-Hispanic White	Ref	Ref
Non-Hispanic Black	0.78*** [0.69,0.88]	0.70*** [0.64,0.76]
Hispanic	1.10 [0.77,1.58]	1.06 [0.89,1.26]
N	33,010	51,336
8 to 30 days post-discharge		
Non-Hispanic White	Ref	Ref
Non-Hispanic Black	1.50*** [1.33,1.70]	1.12** [1.03,1.22]
Hispanic	0.99 [0.68,1.43]	1.00 [0.85,1.18]
N	33,010	51,341
31 to 90 days post-discharge		
Non-Hispanic White	Ref	Ref
Non-Hispanic Black	1.49*** [1.29,1.71]	1.44*** [1.32,1.58]
Hispanic	1.13 [0.75,1.69]	1.06 [0.89,1.26]
N	33,002	51,341

Abbreviations: N: Number, Ref: Reference

Notes: Odds ratios from multivariable hierarchical logistic regression models controlling for patient- and hospital-level covariates and state-level random effects.