

RESEARCH ARTICLES

Socioeconomic Disparities During In-Patient Pain Management After Total Knee Replacement

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ABSTRACT

Background

Knee osteoarthritis (OA) is one of the leading causes of disability in the U.S., leading to functional decline and worsening quality of life in patients. Total knee arthroplasty (TKA) has increased in popularity for knee OA, however the rehabilitation process after the procedure is associated with varying pain levels, including severe breakthrough pain, which may affect the outcomes in patients where pain is not adequately controlled. While socioeconomic disparities have been studied in TKA and pain management, there is limited data on the presence of disparities in post-operative pain management after TKA. Analysis of such data is important to reduce health care disparities and improve procedure outcomes in these subgroups.

Objective

To analyze socioeconomic disparities in post-operative pain management after total knee replacement

Method

This is a retrospective study from 2012-2022 across 10 facilities from a single statewide health network in Indiana looking at patients over 18 years old who underwent TKA secondary to osteoarthritis. Data on demographics, insurance, socioeconomic status, comorbidities, and postoperative stay including medication administration and pain scores was collected from the electronic medical record. ANOVA and Chi Square analyses were performed to examine the relationship between number of opioid administrations, number of analgesic administrations, length of admission, pre-operative pain score, postoperative pain score, and pain at initial follow-up across race, ethnicity, sex, insurance, and income categories. A 5% significance level was used for all analyses.

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Results

There was a difference in the preoperative, post-operative, and follow-up visit pain scores reported by patients after TKA. Black patients were found to have elevated pain scores in the preoperative, postoperative, and initial follow-up ($p < 0.001$). Similar findings were seen with uninsured patients, females, and patients in the lowest income category ($< \$50,496$). There was a significant difference in number of times opioids were administered for pain control after the procedure when analyzed by race ($p = 0.024$), sex ($p < 0.001$), and income ($p < 0.001$). There was a significant difference in the number of times analgesics were administered for pain control after the procedure when analyzed by insurance and income ($p < 0.001$).

Conclusion

Socioeconomic disparities are present in pain management after total knee arthroplasty, most noticed with preoperative, postoperative, and initial follow-up visit pain scores. Disparities in pain management can be seen in race, income, sex, and type of insurance.

Introduction

Knee osteoarthritis (OA) is one of the leading causes of disability in the U.S., leading to functional decline and worsening quality of life in patients. While many nonoperative treatment options exist, total knee arthroplasty (TKA) has increased in popularity due to the improved functional outcomes when compared to nonoperative management with physical therapy.¹ Given the positive outcomes associated with this procedure, TKA is one of most performed surgeries in the U.S., with expected increase of 139% by 2040 and 469% by 2060.^{2,3}

While the incidence of OA of the knee is higher in Black and Hispanic patients when compared to white patients, literature reports that the rate for TKA in these groups was less than white patients.⁴⁻⁷ Possible reasons for these disparities include less frequent offers of joint replacement to non-white individuals, less willingness to undergo total joint replacement, implicit bias, higher risk of adverse outcomes, and other factors.^{1,8,9}

One of the factors that may play into the discrepancy of TKA rates between Black and white patients is postoperative management. It is widely recognized in the literature that racial disparities exist in pain management, including pain in the postoperative setting.¹⁰⁻¹² According to Meghani et al, the risk for opioid undertreatment in Hispanic patients ranges from 7-35%, and 20%-38% in Black patients.^{13,14} Anderson et al also described disparities in pain management of minorities regardless of the setting (traumatic/surgical, non-surgical, arthritic, cancer) when compared to white Americans.¹⁵

Existent literature has reported that Black and Hispanic patients receive fewer opioids and analgesics than white Americans. Ng et al demonstrated that white patients consistently received higher doses of narcotics (10 oral narcotics/day, 22 mg/day) than Black (5.9 oral narcotics/day, 16 mg/day) or Hispanic patients (6.6 oral narcotics/day, 13 mg/day) ($p < .005$).¹⁶ More recent studies have no differences in the odds of Black (odds ratio 0.94 [95% CI 0.78 to 1.15]; $p = 0.68$), Hispanic or Latino (OR=0.75 [95% CI 0.47 to 1.2]; $p = 0.18$), Asian or PI (OR = 1.00 [95% CI 0.58 to 1.74]; $p = 0.96$), or other-race patients (OR= 1.33 [95% CI 0.72 to 2.47]; $p = 0.26$) receiving a postoperative opioid prescription compared with non-Hispanic white patients.¹⁷ Similarly, a study by Romanelli et al found no difference between rates of opioid prescription by race/ethnicity but the total morphine milligram equivalent units prescribed were 4.3%, 6.0%, and 8.1% less for Hispanics, Blacks, and Asians relative to non-Hispanic whites.^{18,19}

When it comes to postoperative pain, inadequate management of pain has been shown to increase rates of postoperative complications, prolonged recovery and hospitalization, and prolongs postoperative opioid use.²⁰⁻²⁴ According to Lewis et al, pain after TKA can be severe and can negatively affect movement, rehabilitation, length of stay, and ultimately increased hospital costs.²⁵ Several studies have used race as a proxy for socioeconomic status and similar results have been found for patients from lower socioeconomic standing.²⁶⁻²⁹

Given the increased rates of OA and decreased rates of TKA in minorities, determining the presence of disparities in postoperative pain management is important to reduce health care disparities and improve procedure outcomes in these subgroups. The goal of this project is to analyze socioeconomic disparities in postoperative pain management after total knee replacement.

Methods

This project was a retrospective chart review from a 10-year period (2012-2022) across 10 facilities from a single statewide health network in Indiana. Patients were identified using Current Procedural Terminology (CPT) and International Classification of Diseases, Tenth Revision (ICD10) codes. Codes for osteoarthritis (M17) and total knee arthroplasty (27447) were retrieved. Patients over 18 years of age who underwent total knee replacement secondary to osteoarthritis were included in the study. Exclusion criteria included patients who had incomplete data in the electronic medical record and patients with simultaneous bilateral TKA. This study was deemed exempt from institutional review board approval, as indicated by the Institutional Review Board at the institution associated with the health network.

Electronic medical records of eligible cases were reviewed. Data collected included baseline demographic information, zip code, insurance status and American Society of Anesthesiologists (ASA) classification, and body mass index. Presence of relevant medical diagnoses such as tobacco use and diabetes were collected using ICD10 codes. Perioperative information was collected including length of hospital stay, preoperative pain score, postoperative pain scores, pain score at first postoperative visit, number of opioid administrations and number of analgesic administrations, including time in the postanesthesia care unit.

Identification of race and ethnicity was obtained through patient self-identification collected via the electronic medical record. Ethnicity was classified as Hispanic/Latino or not Hispanic/Latino. Race was classified as white, Black/African American. Patients identifying as Asian, Pacific Islander, or Native were collectively grouped in the “other” category due to small numbers in our cohort. For the insurance category, patients with Medicare, Medicaid, or other government-sponsored insurance were grouped under government insurance; patients with workers comp, veterans’ insurance, and those insured through employers were grouped under the “other” category; patients with private insurance were classified under commercial insurance. Median household income was extrapolated based on zip code using data from the 2021 U.S. Census Bureau.

The primary outcomes evaluated in this study were differences in analgesic and opioid administration by race, income, insurance, and sex. Pain scores were measured using a 10-point Visual Analog Scale. Analgesics included nonsteroidal antiinflammatory drugs (NSAIDs) and acetaminophen. In cases where formulations of acetaminophen were combined with opiate, the medication was classified as opiates for the purposes of this study. While we did not analyze the specific timing between pain medication requests and administration, our methodology captured all medication events — including standing orders, PRN, and breakthrough doses — as “administered” events.

Descriptive statistics were generated to characterize the study population by race group. The number of patients included in each analysis varies due to multiple patients undergoing bilateral TKA, in which case each surgery was analyzed as a separate event. Race groups were compared for differences using Chi-Square tests or Fisher’s exact tests for categorical variables and ANOVA procedures for continuous variables. Admission-level continuous characteristics were compared for differences across race groups using general linear models while categorical characteristics were compared using logistic regression models.

General linear models were used to examine the relationship between number of opioid administrations, number of analgesic administrations, length of admission, preoperation pain score, pain score at first postoperative visit, average preoperative pain score, average postoperative pain score across race,

Table 1. Patient Characteristics (n=9,517)

Variable	Frequency (%) / Mean (SD)
Age (years)	65.6 (9.9)
Sex	
Female	6242 (65.6%)
Male	3260 (34.3%)
Race	
White	8450 (88.8%)
Black/African American	933 (9.8%)
Other	75 (0.8%)
Unknown/Refused	59 (0.6%)
Ethnicity	
Hispanic/Latino	123 (1.3%)
Not Hispanic/Latino	9322 (98.0%)
Unknown/Refused	72 (0.7%)
BMI	34.0 (7.7)
ASA	
1	72 (0.8%)
2	3638 (38.2%)
3	5563 (58.5%)
4	244 (2.5%)
Diabetes	2363(24.8%)
Tobacco use	852 (9.0%)
2021 Household income (USD)	64,474 (22,644)

ethnicity, sex, insurance, and income categories as established by sample quartiles. When permitted, logistic regression models were used to compare binary opioid use across race, ethnicity, sex, insurance, and income categories.

All admission-level models included random effects to account for patients with multiple admissions. Additionally, when applicable, log transformations were completed on skewed variables. A 5% significance level was used for all analyses. Statistical analyses were performed using SAS version 9.4 (SAS Institute, Inc., Cary, NC) and RStudio version 4.2.3 (RStudio, Boston, MA).

Results

The total number of TKA performed at the hospital system in this period was 9,517. The mean income of patients undergoing first TKA was 64,474 \pm 22,644. The majority of the population (88.8%, n=8450) of the patients identified as White, 9.8% (n=933) as Black or African American, and a total of 0.7% (n=75) identifying as “other” (Asian, Native American, Pacific Islander). A total of 1.3% (n=123) of the patients included in the study identified as Hispanic. The majority of the patients (65.6% ,n= 6242) in the cohort were females ([Table 1](#)).

Race

While there was no significant difference obtained in the administration of opioids after surgery or number of analgesics administered when looking at different race categories, there was a significant difference in number of times opioids were administered for pain control after the procedure with “other” individuals receiving a lower number opioid administration (M=14.12) than

Table 2. Pain Outcomes by Race

Variable	Black or African American (N=928)	Other (N=75)	White (N=8,379)	P value
Prescribed Opioid Post-Surgery (%)				
- No	2 (0.22%)	0 (0.00%)	67 (0.80%)	
- Yes	926 (99.78%)	75 (100.00%)	8312 (99.20%)	
Number of Opioid Prescriptions During Admission (Mean ±SD)	16.27 (10.86)	14.12 (9.95)	15.38 (10.59)	0.024
Number of Analgesic Prescriptions During Admission (Mean ±SD)	2.55 (3.74)	2.27 (3.23)	2.69 (3.55)	0.482
Length of Stay (hours) (Mean ±SD)	67.73 (43.08)	63.85 (31.72)	64.18 (34.91)	0.012
Average Pain Score Pre-Op (Mean ±SD)	4.18 (3.33)	3.00 (3.13)	3.05 (2.89)	< 0.001
Average Pain Score Post-Op (Mean ±SD)	3.86 (1.79)	3.38 (1.62)	3.24 (1.55)	< 0.001
Follow-Up Pain (Mean ±SD)	5.61 (2.94)	4.69 (2.75)	4.44 (2.86)	< 0.001

white (M= 15.38) and Black (M=16.27) patients (p=0.024) ([Table 2](#)). There were also significant differences regarding length of stay, average preoperative pain score, average postoperative pain score and pain score at initial follow-up visit. Black patients had a longer length of stay (M=67.73 hours) than others (M=63.85 hours) and white (M=64.18 hours) patients (p=0.012). Results also showed that Black patients had higher preoperative and postoperative pain scores (M=4.18 & 3.86, respectively) when compared with white patients (M=3.05 & 3.24, respectively) and others (M= 3.00 & 3.38, respectively) (p<0.001). Pain at initial follow-up visit was also found to be higher for Black patients (M=5.61) when compared to white counterparts (M=4.44) and other (M=4.69) (p<0.001).

Insurance

Although the uninsured group had higher means regarding number of times opioids were administered, there was no significant difference noted in the average preoperative pain score and postoperative with different insurance categories. There was a significant difference in the number of analgesics administered within the different groups in that those with government insurance were administered analgesics fewer times than those with other, commercial, or uninsured (M=2.56, 2.85, 3.12, 3.69, respectively) (p<0.001) ([Table 3](#)). Length of stay also was significantly different when comparing insurance categories. Patients with “other” insurance had a shorter length of stay (M=58.02 hours) when compared to those with commercial (M=64.58 hours), government (M=68.57 hours), or uninsured (M=74.69 hours) (p<0.001). Similar differences were found in pain at first follow-up visit, with those with “other” insurance having lower pain scores (M=3.96) than the other groups (p<0.001).

Ethnicity

No significant differences were found between Hispanics or non-Hispanics in any of the variables reported in this study ([Table 4](#)).

Table 3. Pain Outcomes by Insurance Category

Variable	Commercial(N=33)	Government(N=5,808)	None(N=13)	Other(N=3,577)	P-value
Prescribed Opioid Post-Surgery (%)					
- No	0 (0.00%)	50 (0.86%)	0 (0.00%)	19 (0.53%)	
- Yes	33 (100.00%)	5758 (99.14%)	13 (100.00%)	3558 (99.47%)	
Number of Opioid Prescriptions During Admission (Mean ±SD)	18.00 (10.31)	15.34 (10.81)	20.69 (14.03)	15.59 (10.26)	0.186
Number of Analgesic Prescriptions During Admission (Mean ±SD)	3.12 (3.78)	2.56 (3.73)	3.69 (3.68)	2.85 (3.27)	0.001
Length of Stay (hours) (Mean ±SD)	64.58 (22.23)	68.57 (40.55)	74.69 (48.24)	58.02 (25.44)	<0.001
Average Pain Score Pre-Op (Mean ±SD)	3.46 (3.19)	3.16 (3.06)	4.50 (4.59)	3.18 (2.79)	0.684
Average Pain Score Post-Op (Mean ±SD)	3.52 (1.73)	3.32 (1.64)	3.96 (1.40)	3.27 (1.50)	0.122
Follow-Up Pain (Mean ±SD)	5.50 (0.71)	5.14 (2.95)	6.00 (1.41)	3.96 (2.72)	< 0.001

Table 4. Pain Outcomes by Ethnicity

Variable	Hispanic or Latino (N=122)	Not Hispanic or Latino (N=9,245)	P-Value
Prescribed Opioid Post-Surgery (%)			
- No	0 (0.00%)	69 (0.75%)	
- Yes	122 (100.00%)	9176 (99.25%)	
Number of Opioid Prescriptions During Admission (Mean ±SD)	15.38 (10.05)	15.45 (10.62)	0.801
Number of Analgesic Prescriptions During Admission (Mean ±SD)	2.48 (3.99)	2.67 (3.56)	0.633
Length of Stay (hours) (Mean ±SD)	67.48 (42.64)	64.54 (35.88)	0.544
Average Pain Score Pre-Op (Mean ±SD)	3.71 (3.39)	3.16 (2.96)	0.108
Average Pain Score Post-Op (Mean ±SD)	3.33 (1.59)	3.30 (1.59)	0.873
Follow-up Pain	4.71 (2.20)	4.76 (2.94)	0.949

Sex

Significant differences in the number of times opioids were administered, length of stay, pre-operative pain score, post-operative pain score, and pain at initial follow-up were seen in analysis by sex. Females were administered a higher number of opioids when compared to men ($p < 0.001$) (**Table 5**). Females were also found to have higher average preoperative and postoperative pain scores ($M = 3.40$ and $M = 3.44$, respectively) and higher scores at the initial follow-up ($M = 4.98$) when compared to males ($M = 2.72, 3.04, 4.35$) ($p < 0.001$).

Income

There were no significant differences in whether opioids were administered between different income groups. However, significant differences were found in the other variables of the study (**Table 6**). Lower income patients (income $< \$50,496$) were prescribed opioids more times than higher income patients but were prescribed analgesics less than high-income patients ($p < 0.001$) and

Table 5. Pain Outcomes by Sex

Variable	Female (N=6,198)	Male (N=3,226)	P-value
Prescribed Opioid Post-Surgery (%)			
- No	38 (0.61%)	31 (0.96%)	0.082
- Yes	6160 (99.39%)	3195 (99.04%)	
Number of Opioid Prescriptions During Admission (Mean ±SD)	15.94 (10.47)	14.52 (10.81)	<0.001
Number of Analgesic Prescriptions During Admission (Mean ±SD)	2.71 (3.65)	2.59 (3.37)	0.204
Length of Stay (hours) (Mean ±SD)	65.58 (35.13)	62.59 (37.25)	<0.001
Average Pain Score Pre-Op (Mean ±SD)	3.40 (3.03)	2.72 (2.78)	<0.001
Average Pain Score Post-Op (Mean ±SD)	3.44 (1.58)	3.04 (1.56)	<0.001
Follow-Up Pain (Mean ±SD)	4.98 (2.91)	4.35 (2.90)	0.014

Table 6. Pain Outcomes by Income Category

Variable	< \$50,496 (N=1,997)	\$50,497-\$59,756 (N=1,850)	\$59,755-\$74,138 (N=1,945)	\$74,139+ (N=1,893)	P- Value
Prescribed Opioid Post-Surgery (%)					
- No	12 (0.60%)	11 (0.59%)	12 (0.62%)	17 (0.90%)	0.711
- Yes	1985 (99.40%)	1839 (99.41%)	1933 (99.38%)	1876 (99.10%)	
Number of Opioid Prescriptions During Admission (Mean ±SD)	16.12 (10.57)	15.29 (10.01)	15.65 (10.97)	14.80 (10.38)	0.005
Number of Analgesic Prescriptions During Admission (Mean ±SD)	2.21 (3.75)	2.68 (3.37)	2.39 (3.42)	3.14 (3.30)	<0.001
Length of Stay (hours) (Mean ±SD)	68.86 (40.28)	64.95 (33.44)	63.99 (29.37)	57.93 (31.03)	< 0.001
Average Pain Score Pre-Op (Mean ±SD)	3.38 (3.15)	3.08 (2.94)	3.15 (3.01)	3.12 (2.80)	0.026
Average Pain Score Post-Op (Mean ±SD)	3.63 (1.67)	3.33 (1.54)	3.35 (1.56)	3.09 (1.54)	< 0.001
Follow-Up Pain (Mean ±SD)	5.31 (2.86)	4.55 (2.98)	4.33 (3.01)	4.61 (2.88)	0.027

were also found to have a longer length of stay ($M=68.86$ hours) after the procedure than patients with higher income ($p<0.001$). Pain scores for patients with lower income were significantly higher than patients with higher income in the preoperative ($p<0.026$), postoperative ($p<0.001$) and initial follow-up visit setting ($p<0.027$).

Discussion

Socioeconomic disparities have been present in health care delivery and have affected outcomes and patient care. These have been prevalent when it comes to pain management, showing that racialized minorities and individuals of lower SES are more likely to experience more severe pain and inadequate pain management postoperatively.^{14,15,30}

The results from the present study support the previous findings by showing a difference in the preoperative pain scores and postoperative and follow-up visit pain scores reported by patients after TKA. Black patients were found to have elevated average pain scores in the preoperative setting, postoperative, and initial follow-up visit despite having higher instances of opioid

administration during their hospital stays. Similar findings were seen with uninsured patients, females, and patients in the lowest income category (< \$50,496).

These findings are consistent with literature suggesting that women and minority populations report higher levels of pain when compared with white Americans. Studies have reported higher pain scores in women compared to men after abdominal surgery, general surgery, groin hernia repair, total joint replacements, and total knee arthroplasty, and that women are more variable in their responses to pain than men reporting increased pain sensitivity.⁸ Also, a study by Allen et al showed that African Americans had higher (worse) mean AIMS2 pain scores than white patients (6.3 vs 5.6, $P=0.001$), but that these associations were lost in multivariate, suggesting other factors may have more influence in this relationship.³¹

Although previous studies report that Black and Hispanic patients receive fewer opioids and analgesics than white patients, our data analysis resulted in no significant difference when comparing the number of times analgesic medication was administered across race, ethnicity, and sex groups. However, there was a significant difference in the number of times opioid medications were administered with Black patients receiving opioid medications more times than white Americans.

The reduced disparities in opioid administration may reflect the adoption of standardized prescribing protocols aimed at minimizing bias and improving equity in pain management.³² However, despite receiving a greater number of opioid doses, patients from minoritized and lower-income groups continued to report significantly higher pain scores in the preoperative, postoperative, and follow-up settings. A possible explanation for these findings may be due to implicit provider bias in dosing of pain medications. While implicit bias has been historically implicated in the differential treatment of pain among minority patients,^{12,33} the standardized orders and protocols used in many hospital settings may limit the extent to which implicit bias alone could explain the findings.³² In fact, the use of these standardized protocols is designed to create consistency in opioid prescribing practices, reducing the influence of biases. Not to mention that the result showing the higher administration of medication suggests that the observed disparities in pain may not stem from under-treatment or provider bias in opioid administration, but rather from other factors not captured in this study.

Therefore, the disparities in pain control may reflect broader systemic issues rather than implicit bias alone. However, it is important to recognize that many systemic inequities—such as resource allocation, care delivery models, and provider responsiveness—are shaped by the accumulation of implicit biases at both individual and institutional levels. These overlapping influences may contribute to persistent disparities in pain control, even in settings with standardized protocols.³⁴ Minority patients are more likely to receive

care at low-volume hospitals, which are associated with worse outcomes after joint replacement procedures.^{35,36} Limited staffing and lower nurse-to-patient ratios in these settings may delay pain assessments and hinder follow-up, contributing to inadequate pain management even when opioids are administered.³⁷ While these were not directly assessed in this study, the 10 institutions included in this study ranged from large academic and high-volume centers to small community hospitals and could be a plausible reason for the results presented. Another reason could be due to the lower use of other pain control strategies in this population given mistrust in providers and insurance coverage. These findings highlight the ongoing challenge of achieving adequate pain control in at-risk populations while avoiding the risks associated with excessive opioid use. As this study did not assess the use of adjunct nonopioid medications or other multimodal pain management strategies, further research is needed to explore whether tailored, multimodal approaches could more effectively address persistent disparities in pain outcomes. Thus, disparities in pain control may reflect broader inequities in health care delivery, emphasizing the need for systemic improvements in hospital care and resource allocation.

The present study also found no differences between Hispanic and non-Hispanic groups. This finding is inconsistent with previous studies that indicate differences in opioid treatment. According to Meghani et al no disparities were found in the prescription of “any analgesia” for Hispanics/Latinos, but when the analysis was limited to prescription of “opioid analgesia,” Hispanics/Latinos were 22% less likely to receive treatment with opioids.¹³ Lack of differences in this aspect of the study may be due to the small number of Hispanic patients included in the study, which may be underpowered. However, another possibility exists in that previous efforts in health care disparities may be reflected in this population.

While there is consensus on using multimodal pain control strategies, the best combination of these interventions remains unclear. The lack of standardized recommendations and guidelines for use of postoperative pain medications can allow for discrepancies in pain management for ‘at risk’ groups. However, despite institutional protocols and ‘order sets,’ our study highlights a difference in administration of pain medicine, which can ultimately suggest that new protocols need to be developed to adequately address pain control in different patient groups.

Limitations

A limitation in this study is the retrospective nature of the study, which limits the study to data recorded on the electronic medical record and is predisposed to incorrect data entry. Due to this limitation, it is worth noting that only 15% (n=1427) of patients had information available on pain scores at initial postoperative visits. Another limitation in this study is the lack of inclusion of strength of dosing of analgesics and opioid medications. Furthermore, our

study did not consider alternate methods frequently used for pain control in TKA, such as peripheral nerve blocks or intraoperative medication strategies. In addition, our study only looked at the times a medication was given to the patient, regardless of mode of administration or if the medication was scheduled or on an as-needed basis. The distinction of such information may be beneficial in identifying differences in care.

It is also worth mentioning that patients who had bilateral TKA were also included. The authors believe that inclusion of this patient population is important as 18.6% of patients have bilateral knee OA and undergo bilateral knee replacement.³⁸ Of the patients included in this study, only 23.8% (n=1827) had bilateral TKAs, of which 60.2% (n=1082) had the second replacement after six months. While previous studies have shown no differences in postoperative pain scores for patients undergoing staged TKA after six months and the small number of these cases in the present study, there is a potential for greater pain medication use in these cases.³⁷ Thus, the authors believe this data would still be of value given that OA severity and pain tolerance may differ after the initial replacement.

While length of stay can sometimes be related to poor pain control, other barriers that also influence length of stay such as postoperative complications or discharge planning were not considered in this study and would be more likely than inadequate pain control. Lastly, this study only considered inpatient data and did not track the outpatient use and prescription of pain medications after the procedure. Moreover, the issue of pain control is multifactorial and many of its causes are beyond the scope of this study. This study was intended to assess if socioeconomic differences are present in pain management after TKA. Further research should be developed to assess other factors contributing to pain, such as concurrent medical diagnoses and genetics. Qualitative studies from patients' perspectives may also be of benefit to identify and address the most meaningful barriers for these groups.

Conclusion

Socioeconomic disparities are present in pain management after total knee arthroplasty, most noticed with preoperative, postoperative, and initial follow-up visit pain scores. Disparities in pain management can be seen in race, income, sex, and type of insurance. Given the higher incidence of knee osteoarthritis in minority populations and the low incidence of TKA, addressing these socioeconomic disparities is important to increase TKA utilization rates in minority populations. Further research is necessary to determine the root cause of the differences noted in this study.

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