Surgery Article

HAND
2022, Vol. 17(6) 1133–1138

DOI: 10.1177/1558944721998020
journals.sagepub.com/home/HAN

Sex, Race, Insurance, and Pain: Do Patient Sociodemographics Influence Postoperative Opioid Prescriptions Among Hand Surgeons?

Connor J. Peck[1], Martin Carney[1], Alexander Chiu[1], Kitae E. Park[1], Alexandre Prassinos[1], Omar Allam[1], J. Grant Thomson[1], and Adnan Prsic[1]

Abstract

Background: Social and demographic factors may influence patient treatment by physicians. This study analyzes the influence of patient sociodemographics on prescription practices among hand surgeons. **Methods:** We performed a retrospective analysis of all hand surgeries (N = 5278) at a single academic medical center from January 2016 to September 2018. The average morphine milligram equivalent (MME) prescribed following each surgery was calculated and then classified by age, race, sex, type of insurance, and history of substance use or chronic pain. Multivariate linear regression was used to compare MME among groups. **Results:** Overall, patients with a history of substance abuse were prescribed 31.2 MME more than those without ($P < .0001$), and patients with a history of chronic pain were prescribed 36.7 MME more than those without ($P < .0001$). After adjusting for these variables and the type of procedure performed, women were prescribed 11.2 MME less than men ($P = .0048$), and Hispanics were prescribed 16.6 MME more than whites ($P = .0091$) overall. Both Hispanic and black patients were also prescribed more than whites following carpal tunnel release (+19.0 and + 20.0 MME, respectively; $P < .001$). Patients with private insurance were prescribed 24.5 MME more than those with Medicare ($P < .0001$), but 25.0 MME less than those with Medicaid ($P < .0001$). There were no differences across age groups. **Conclusions:** Numerous sociodemographic factors influenced postoperative opioid prescription among hand surgeons at our institution. These findings highlight the importance of establishing more uniform, evidence-based guidelines for postoperative pain management, which may help minimize subjectivity and prevent the overtreatment or undertreatment of pain in certain patient populations.

Keywords: opioid, hand, anatomy, hand surgery, health disparity, racial disparity, opioid prescription, prescription

Introduction

Opioid-related deaths continue to rise in the United States, with US medical providers prescribing opioids at a higher rate than anywhere else in the world.[1,2] The prescription of opioid analgesics is especially prevalent among surgeons, who increasingly use opioids for perioperative pain control.[3-5] While opioid use plays an important role in managing acute pain, its overprescription by providers or overuse among patients can result in various adverse long-term effects, including opioid dependence.[3,6,7] Studies have shown that the initial quantity of opioids prescribed by hand surgeons directly correlates with eventual continued filling of opioid prescriptions, and that approximately 13% of opioid-naïve patients continue to fill opioid prescriptions at 90 days after hand surgery.[8,9]

Despite significant risks related to opioid use, there are few established guidelines for the management of pain following routine hand surgical procedures. Thus, surgeons are often forced to rely largely on past experiences, opinions, and values.[10] These subjective decisions may indirectly lead to the perpetuation of biases and stereotypes when prescribing opioids.[11,12] It has been shown that nonwhite patients being treated for chronic pain receive opioids at half the rate of white patients.[13,14] This discrepancy may

[1]Yale School of Medicine, New Haven, CT, USA

Corresponding Author:
Adnan Prsic, Division of Plastic and Reconstructive Surgery, Department of Surgery, Yale School of Medicine, PO Box 208041, New Haven, CT 06520-8041, USA.
Email: adnan.prsic@yale.edu

Table 1. CPT Codes Used for Patient Identification in Each Surgical Cohort.

Surgery type (subgroups)	CPT codes included in subgroup
Carpal tunnel syndrome	29848, 64721
Trigger finger	25000, 26040, 26045, 26055, 26121, 26123, 26125, 26525
Fracture stabilization	11730, 25607, 25608, 25609, 25628, 25645, 26600, 26605, 26607, 26608, 26615, 26645, 26650, 26665, 26720, 26725, 26727, 26735, 26742, 26746, 26756, 26765
Tendon repair	25260, 25270, 25295, 25310, 26350, 26356, 26357, 26358, 26370, 26410, 26412, 26418, 26426, 26432, 26433, 26437
Oncological reconstruction	104, 11755, 23077, 24073, 25076, 25077, 25110, 25111, 25112, 26034, 26115, 26116, 26118, 26160
Nerve repair	64713, 64719, 64831
Joint repair	25441, 25442, 25445, 25447, 25670, 25675, 25676, 25695, 26540, 26541, 26542, 26860
Amputation	26910, 26951, 26952
Other	20816, 20822, 25020, 25023, 25150, 25210, 25240, 25390, 26010, 26011, 26020, 26560, 26561, 26587, 29843, 29844, 29846, 29847

Note. CPT = Current Procedural Terminology.

be rooted, among other influences, in historical media portrayals related to the use of drugs among minority patients, as well as misconceptions about the bodies of nonwhite patients being different than those of white patients.[15,16]

Given the potential role of implicit biases on opioid prescriptive practices and the importance of optimizing pain management following hand surgery, this study aims to assess the impact of various patient sociodemographic factors on postoperative prescription practices among hand surgeons in our health system. Increased understanding and discussion of these factors is important for the mitigation of health disparity related to opioid prescriptive practices.

Methods

Identification of Hand Surgeries

A retrospective chart review was performed for all hand surgeries performed at a single academic medical center between January 2016 and September 2018. Hand procedures were identified by Current Procedural Terminology codes (Table 1). All these procedures were performed by the onsite orthopedic or plastic surgery fellowship-trained hand surgeons and their fellows and residents. Only patients discharged on postoperative day 0 (same-day surgery) or 1 (single overnight stay) were included; patients discharged after a longer hospital stay were excluded in order to limit confounders for morphine milligram equivalent (MME) prescriptions.

The indications for and type of procedures varied widely; however, procedures were divided into subgroups for improved comparative analysis. These groups included: carpal tunnel, trigger finger, fracture stabilization, tendon repair, oncologic biopsy/resection, nerve repair, joint repair, amputation, and other.

This study was approved by the Yale School of Medicine Human Investigations Committee (IRB #2000020376).

Patient Demographics and MME

Relevant patient demographics were collected for each patient, including sex, race/ethnicity, insurance type, and any medical history of substance abuse or pain disorders. A patient was noted to have a history of substance abuse or chronic pain if he or she had either diagnosis listed in their electronic medical record (EMR). As patients received a variety of narcotic medications, the average MME prescribed on discharge was abstracted and converted into MME to standardize comparisons. As a reference, 1 pill of 5 mg of oxycodone is equivalent to 7.5 MME, and 1 pill of 50 mg tramadol is equivalent to 5.0 MME.

Statistical Analysis

All statistical analyses were performed using SAS v 9.4. Multivariable linear regression analysis was performed to assess differences in mean MME based on each of the collected sociodemographic variables. Regression analyses were performed for all patients as a single cohort and in each of the various surgical subgroups.

Results

Patient Demographics

A total of 5278 patients who underwent hand surgery within the designated chart review period were identified (Table 2). Most patients receiving hand surgery were women (2986 of 5278 patients, 56.6%). White or Caucasian was the most common race/ethnicity (3703 of 5278 patients, 70.2%). Patients were more commonly treated by orthopedic surgeons than by plastic surgeons (2975 of 5278 patients, 56.4%). The most common hand procedure identified was carpal tunnel release (1967 of 5278, 38.2%), followed by fracture stabilization (991 of 5278, 19.3%). In all, 326

Table 2. Patient Demographics.

Index	No. (%)
Total hand surgery patients	5278
Sex (male)	2292 (43.4)
Age, y	52.5 (range: 1.0-98.0)
Ethnicity	
White or Caucasian	3703 (70.2)
Black of African American	729 (13.8)
Hispanic	601 (11.4)
Asian	97 (1.84)
American Indian or Alaska Native	12 (0.23)
Other/unknown	136 (2.37)
Surgeon department	
Plastics	2303 (43.6)
Orthopedics	2975 (56.4)
Medical history	
Chronic pain	326 (6.2)
Substance abuse	386 (7.3)
Surgery type	
Carpal tunnel syndrome	1967 (38.2)
Trigger finger	787 (15.3)
Fracture	991 (19.3)
Tendon repair	233 (4.5)
Oncological reconstruction	542 (10.5)
Nerve repair	88 (1.7)
Joint repair	211 (4.1)
Amputation	149 (2.9)
Other	181 (3.5)

patients (6.2%) had a documented history of chronic pain at the time of surgery, and 386 (7.3%) had a documented history of substance abuse.

MME Prescribed at Discharge

The average MME prescribed to patients across procedures was 112.8 (equivalent to a quantity of 15, 5 mg pills of oxycodone). The average MME prescription varied widely by procedure; the overall MME was the highest following amputation (191.3) and tendon repair (175.9) and the lowest following carpal tunnel (78.7) and trigger finger (78.3) release (Table 3).

After adjusting for medical history, multivariable linear regression analysis showed that patients reporting a history of chronic pain were prescribed 36.7 MME more than those without ($P < .0001$; confidence interval [CI], 19.8-53.5). Patients with a history of substance abuse were prescribed 31.2 MME more than those without ($P < .0001$; CI, 15.8-46.6). Female patients were prescribed 11.2 MME less than male patients ($P = .005$; CI, 3.42-19.0). Patients of Hispanic ethnicity were prescribed 16.6 MME more than white/Caucasian patients ($P = .009$; CI, 4.1-29.0). Patients with private insurance were prescribed 25.0 MME less than patients with Medicaid ($P < .0001$; CI, 14.7-35.4) and 24.5 MME more than patients with Medicare ($P < .0001$; CI, 13.0-36.0).

When examined by type of surgery, both Hispanic and black patients received 19.0 MME ($P = .001$; CI, 7.6-30.5) and 20.0 MME ($P = .0005$; CI, 8.7-31.3) more than white patients following carpal tunnel release. Black patients were prescribed 111.9 MME ($P = .04$; CI, 5.32-218.2) less than white patients following nerve surgery. Other surgery types exhibited trends identical to the analysis for all surgeries or no significant associations.

Discussion

The continued rise of opioid-related deaths in the United States has led to calls for increased accountability and responsibility among physician prescribers.[1,2] As one of the most common providers of ambulatory surgical procedures and thus short-term opioid prescriptions, hand surgeons maintain an important role in responsibly administering these medications. Although surgeons face an already difficult challenge of objectively balancing postoperative pain with the risks of opioid dependence, this challenge is often further compounded by individual patient factors that necessitate quick, subjective decision-making.[10] In our study of 5278 patients, we find that several of these patient demographic and history factors were associated with differences in prescriptive patterns.

Predictably, patients with an EMR-documented history of substance abuse and chronic pain were prescribed significantly larger amounts of opioids than those without. Although these patients are generally at increased risk of opioid misuse, they also often necessitate higher dosing for pain control due to their increased drug tolerance.[17] Although the balance of these factors presents a challenge for hand surgeons, our findings show an overall increase in opioid prescription among these patients in response to these factors.

Independent of patient history of substance abuse or chronic pain, the amount of opioid prescription was also found to vary in response to multiple demographic factors. In our study sample, female patients were prescribed significantly less opioids than male patients. Previous findings on the role of sex in opioid prescription and misuse have been inconclusive and often contradictory. For example, some studies found that female patients are more likely to be prescribed opioids than male patients, possibly related to a higher analgesic efficacy of opioids in female patients.[18-21] Female patients undergoing upper extremity surgery have also been found to use opioids more frequently and for a prolonged period of time compared with male patients.[9,22] In contrast, male patients undergoing repair of distal radius fractures were found to be more likely to receive a second prescription of opioids than female patients.[23] While our

Table 3. Multivariable Regression Comparing MME Use Across Each Indicated Sociodemographic Variable.

Parameter	*B* (difference in MME)	95% confidence limits		*P* value
		Minimum	Maximum	
Patient age	0.2	0.0	0.5	.09
Sex				
Female	−11.2	−19.0	−3.4	<.001
Male	(Constant)			
Race/ethnicity				
Asian	−8.3	−36.8	20.1	.56
Black or African American	5.4	−6.2	16.9	.36
Hispanic	16.6	4.1	29.0	.01
Other/unknown	1.1	−22.5	24.7	.93
White or Caucasian	(Constant)			
Insurance type				
Medicaid	25.0	14.7	35.4	<.0001
Medicare	−24.5	−36.0	−13.0	<.0001
Self-pay	−14.6	−29.0	−0.1	.05
Other	2.7	−17.8	23.2	.80
Private insurance	(Constant)			
History				
Substance abuse	31.2	15.8	46.6	<.0001
Chronic pain	36.7	19.9	53.5	<.0001
Type of surgery				
Trigger finger	−0.2	−11.5	11.2	.98
Fractures	93.8	82.7	105.0	<.0001
Tendon repair	81.0	61.8	100.1	<.0001
Oncologic reconstruction	18.0	4.7	31.3	.01
Nerve repair	60.8	31.2	90.4	<.0001
Joint Repair	72.4	52.8	92.0	<.0001
Amputation	112.7	89.4	135.9	<.0001
Other	38.8	17.2	60.4	.00
Carpal tunnel	(Constant)			

Note. MME = morphine milligram equivalent.

study reinforces these latter findings (male patients being prescribed more than female patients), the mixed and conflicting results in the literature suggest that there may be broad inconsistencies across different surgeons and institutions. Further studies are needed to investigate where and why these differences may exist and how subjective experiences and implicit bias by surgeons may contribute.

Our study also shows a significant difference in prescription patterns based on race/ethnicity. Specifically, our data suggest that Hispanic patients were prescribed more opioids than white patients, and that both black and Hispanic patients were prescribed more opioids following carpal tunnel release, the most common surgical indication (although notably black patients received fewer opioids in the subset of patients following repair of nerve injuries). Interestingly, these data contradict findings from other medical settings: child birth, dental surgery, and emergency department visits, among others.[24,25] Thus, although our data suggest a significant role of race/ethnicity in prescriptive practices, the directionality or impact of this role may be nuanced.

Finally, our patient cohort demonstrated that patients with Medicaid were prescribed more opioids than patients with Medicare or private insurance. Insurance-based prescribing differences may reflect, among other economic influences on care, the available or covered opioid formulations for Medicaid patients. It is worthwhile, however, to consider the potential consequences of these increased prescriptions. As studies have shown that patients with Medicaid are more likely to be using opioids and are at a greater risk of opioid overdose than patients of other insurance groups,[24,25] increased awareness and vigilance among hand surgeons may be needed when treating Medicaid patients.

Taken together, the findings of our study suggest a contributory but often unpredictable relationship between patient demographics, history, and the amount of opioid prescription given postoperatively by hand surgeons. This relationship may vary based on multiple factors such as extent of training, location of practice, the type of provider (ie, advanced practice registered nurses vs medical doctor), and implicit biases of individual providers.[26,27] While studies have shown that physicians subconsciously respond to biases (predominantly pro-white),[15,28] the extent to which bias exists and impacts pain management can vary widely.[29] Physician race, sex, education, and societal upbringing can frame subconscious biases, which then manifest in varying ways depending on the patient's own characteristics and clinical vignette.[12,28] Thus, as our cohort was treated at a single academic institution, our findings may reflect practices specific to a small subset of surgeons and patients.

This heterogeneity of prescription practices across providers and patients highlights the importance of continued research to establish objective, evidence-based guidelines for opioid prescriptive practices following hand surgery. As clinical ambiguity often leads to greater reliance on unconscious stereotypes,[29] better education among trainees and surgeons and efforts to standardize care may help mitigate potential biases.[27] Future studies should continue to assess the impact of implicit bias on hand surgeon pain management and identify avenues for overcoming disparities in care.

Limitations of this study include restricted data points available due to its retrospective nature. Recording of standardized pain measures may help elucidate the differences in opioid prescription patterns seen among surgical groups and demographic subgroups. Examination of nonopioid analgesic prescription patterns would also help clarify patterns in patients receiving lower amounts of opioid prescription. As most of the nonnarcotic medications are over the counter and not prescribed, we were unable to identify the number and characteristics of patients who were explicitly instructed to take a nonnarcotic medication at discharge. Also, despite offering a robust sample size, the findings within the single health system studied in this article may not reflect practices at other centers nationwide. Similar trials by other health organizations would be helpful in clarifying and expounding on our study conclusions.

Conclusion

In a retrospective analysis of 5728 hand surgery patients at 1 academic medical center, our study demonstrated differences in physician prescriptive practices following hand surgery based on patient factors such as sex, race, and insurance type. Given the demonstrated impact of these factors on prescriptive practices in our study and others, continued efforts should be made to increase education related to both pain management and implicit bias, and establish unbiased, evidence-based guidelines for postoperative care.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

No animals or human subjects were harmed or impacted by this study. No identifying patient information is included in this manuscript.

Statement of Informed Consent

A waiver of consent was approved for this study by the Yale School of Medicine Human Investigations Committee (IRB #2000020376).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Connor J. Peck https://orcid.org/0000-0002-4115-2938
Kitae E. Park https://orcid.org/0000-0003-3399-7268
Omar Allam https://orcid.org/0000-0002-7385-7959
J. Grant Thomson https://orcid.org/0000-0002-5995-5923

References

1. Manchikanti L, Singh A. Therapeutic opioids: a ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids. *Pain Physician*. 2008;11(suppl 2):S63-S88.
2. Calcaterra S, Glanz J, Binswanger IA. National trends in pharmaceutical opioid related overdose deaths compared to other substance related overdose deaths: 1999-2009. *Drug Alcohol Depend*. 2013;131(3):263-270.
3. Alam A, Gomes T, Zheng H, et al. Long-term analgesic use after low-risk surgery: a retrospective cohort study. *Arch Intern Med*. 2012;172(5):425-430.
4. Wunsch H, Wijeysundera DN, Passarella MA, et al. Opioids prescribed after low-risk surgical procedures in the United States,2004-2012. *JAMA*. 2016;315(15):1654-1657.
5. Waljee JF, Zhong L, Hou H, et al. The utilization of opioid analgesics following common upper extremity surgical procedures: a national, population-based study. *Plast Reconstr Surg*. 2016;137(2):355e-364e.
6. Wilson JL, Poulin PA, Sikorski R, et al. Opioid use among same-day surgery patients: prevalence, management and outcomes. *Pain Res Manag*. 2015;20(6):300-304.
7. Clarke H, Soneji N, Ko DT, et al. Rates and risk factors for prolonged opioid use after major surgery: population based cohort study. *BMJ*. 2014;348:g1251.

8. Gaddis A, Dowlati E, Apel PJ, et al. Effect of prescription size on opioid use and patient satisfaction after minor hand surgery: a randomized clinical trial. *Ann Surg*. 2019;270(6): 976-982.
9. Johnson SP, Chung KC, Zhong L, et al. Risk of prolonged opioid use among opioid-naïve patients following common hand surgery procedures. *J Hand Surg Am*. 2016;41(10):947-957.e943.
10. Olsen Y. The CDC guideline on opioid prescribing: rising to the challenge. *JAMA*. 2016;315(15):1577-1579.
11. Burgess DJ, van Ryn M, Crowley-Matoka M, et al. Understanding the provider contribution to race/ethnicity disparities in pain treatment: insights from dual process models of stereotyping. *Pain Med*. 2006;7(2):119-134.
12. Weisse CS, Sorum PC, Sanders KN, et al. Do gender and race affect decisions about pain management? *J Gen Intern Med*. 2001;16(4):211-217.
13. Mossey JM. Defining racial and ethnic disparities in pain management. *Clin Orthop Relat Res*. 2011;469(7):1859-1870.
14. Santoro TN, Santoro JD. Racial bias in the US opioid epidemic: a review of the history of systemic bias and implications for care. *Cureus*. 2018;10(12):e3733.
15. Hoffman KM, Trawalter S, Axt JR, et al. Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proc Natl Acad Sci USA*. 2016;113(16):4296-4301.
16. Netherland J, Hansen HB. The war on drugs that wasn't: wasted whiteness, "dirty doctors," and race in media coverage of prescription opioid misuse. *Cult Med Psychiatry*. 2016;40(4):664-686.
17. Ives TJ, Chelminski PR, Hammett-Stabler CA, et al. Predictors of opioid misuse in patients with chronic pain: a prospective cohort study. *BMC Health Serv Res*. 2006;6:46.
18. Serdarevic M, Striley CW, Cottler LB. Sex differences in prescription opioid use. *Curr Opin Psychiatry*. 2017;30(4): 238-246.
19. Simoni-Wastila L. The use of abusable prescription drugs: the role of gender. *J Womens Health Gend Based Med*. 2000; 9(3):289-297.
20. Darnall BD, Stacey BR, Chou R. Medical and psychological risks and consequences of long-term opioid therapy in women. *Pain Med*. 2012;13(9):1181-1211.
21. Miaskowski C, Levine JD. Does opioid analgesia show a gender preference for females? *Pain Forum*. 1999;8:34-44.
22. Chapman T, Kim N, Maltenfort M, et al. Prospective evaluation of opioid consumption following carpal tunnel release surgery. *Hand*. 2017;12(1):39-42.
23. Teunis T, Stoop N, Park CJ, et al. What factors are associated with a second opioid prescription after treatment of distal radius fractures with a volar locking plate? *Hand (N Y)*. 2015;10(4):639-648.
24. Tardelli VS, Fidalgo TM, Santaella J, et al. Medical use, nonmedical use and use disorders of benzodiazepines and prescription opioids in adults: differences by insurance status. *Drug Alcohol Depend*. 2019;204:107573.
25. Centers for Disease C, Prevention. Vital signs: overdoses of prescription opioid pain relievers—United States, 1999–2008. *MMWR Morb Mortal Wkly Rep*. 2011;60(43):1487-1492.
26. Grant DW, Power HA, Vuong LN, et al. Differences in opioid prescribing practices among plastic surgery trainees in the United States and Canada. *Plast Reconstr Surg*. 2019;144(1): 126e-136e.
27. Yorkgitis BK, Paffett C, Brat GA, et al. Effect of surgery-specific opioid-prescribing education in a safety-net hospital. *J Surg Res*. 2019;243:71-74.
28. Chapman EN, Kaatz A, Carnes M. Physicians and implicit bias: how doctors may unwittingly perpetuate health care disparities. *J Gen Intern Med*. 2013;28(11):1504-1510.
29. Hirsh AT, Hollingshead NA, Ashburn-Nardo L, et al. The interaction of patient race, provider bias, and clinical ambiguity on pain management decisions. *J Pain*. 2015;16(6): 558-568.