Receipt of opioids and patient care experiences among nonsurgical hospitalized adults

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Abstract

Objective: To examine the association between receipt of opioids and patient care experiences among nonsurgical hospitalized adults.

Data Sources: A total of 17 691 patient-level responses to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient care experience survey linked to medical records from nonsurgical hospitalizations in an 11-hospital health care system in a Midwestern state, years 2011-2016.

Study Design: We conducted a pooled cross-sectional study that used propensity score matching analyses and logistic regression to estimate the relationship between patients' care experience measures (overall and pain-specific) and their receipt of opioids while hospitalized. In supplementary analyses, we used the same propensity score matching methods to estimate the relationship between patient care experience measures and receipt of opioids in four patient subgroups based on average patient-reported pain during hospitalization (no pain; mild pain; moderate pain; and severe pain).

Principal Findings: Receipt of opioids was not associated with patient care experience measures in our main analysis. In our supplementary analysis, we found lower ratings for pain control among hospitalizations for patients who reported moderate pain (Marginal Effects = -4.5 percent; *P* value = .015).

Conclusions: Counter to some previous studies, we observed that receipt of opioids was not associated with patient care experience measures for nonsurgical hospitalized adults. These findings may be due to different pain experiences of adults hospitalized for nonsurgical versus surgical reasons.

KEYWORDS

hospital, nonsurgical inpatients, patient care experience, receipt of opioids

1 | INTRODUCTION

Providing patient-centered care, defined as care that is respectful of and responsive to individual patient preferences, needs, and values, is a priority of the US health care system.^{1,2} Thus, hospitals are required to publicly report patient-centered assessments,

including results from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient care experience surveys.³ In addition to public reporting, hospital performance on HCAHPS surveys is used to calculate value-based incentive payments in the Centers for Medicare and Medicaid Services (CMS) Hospital Value-Based Purchasing (VBP) program.³ Consequently,

hospitals and clinicians may be incentivized to improve patient care experience scores at the expense of other outcomes.⁴ Paradoxically, then, the pursuit of patient-centered care may lead clinicians to fulfill patient requests for unnecessary and potentially harmful treatments.⁵ Receipt of opioids for pain during hospitalizations may be particularly susceptible to the tension between patient-centered and safe care.^{5,6}

Patient experience with pain care is a significant predictor of overall patient care experiences,^{7,8} and clinicians report increased pressure to fulfill patient requests for immediate pain relief.⁹⁻¹¹ Moreover, policymakers, legislators, and clinicians have expressed concern that clinicians may order opioids to meet these requests for immediate pain relief and to improve HCAHPS scores.^{12,13} Indeed, to reduce the financial incentive to prescribe opioids inappropriately, CMS temporarily removed questions related to patient experiences with pain care from hospital reimbursement formulas in 2018.¹⁴

Despite these policy changes, the assumption that receipt of opioids during hospitalization improves patient care experiences has not been thoroughly tested. First, studies focusing on surgical inpatients reported inconsistent findings between receipt of opioids and patient experiences of care.¹⁵⁻¹⁹ For instance, some of the studies found that higher HCAHPS scores (ie, better patient experiences) were associated with less, not more, opioid use.^{18,19} Other studies reported a lack of association between receipt of opioids and surgical patients' experiences with care.^{15,17,20} Second, prior studies focused on surgical inpatients failed to account for potential bias resulting from confounding by indication, which is the possibility that individuals receiving opioids differ meaningfully from patients who do not. For example, inpatients with specific primary diagnoses or comorbidities may be more likely to receive opioids. If such characteristics are correlated with both the receipt of opioids and patient care experiences, they may lead to spurious associations between opioid prescribing and patient care experiences. Third, reviews of the literature found no published study showing that providers obtain higher HCAHPS scores by providing inappropriate care, such as overprescribing opioids to hospitalized inpatients.^{21,22} Finally, prior studies^{17,19-21} have not examined the association between receipt of opioids and patient care experiences among nonsurgical inpatients, who account for almost half of all US hospitalizations.²³ Importantly, unlike for surgical inpatients, clinical practice guidelines offer little guidance on how to prescribe opioids for nonsurgical inpatients. Therefore, physicians may use more clinical judgment in nonsurgical inpatients leading to more variability in opioid prescribing in this setting.

The purpose of this study was to examine the association between receipt of opioids and patient care experiences captured by HCAHPS survey in a five-year, longitudinal group of adults hospitalized for nonsurgical diagnoses in an 11-hospital health care system in a Midwestern state. If surgical teams (or surgeons) adhere to a pain care guideline, opioid prescribing may be less variable. While those surgical teams (or surgeons) not under a pain care guideline may show greater variability in opioid prescribing. Generally, surgical pain care guidelines often use opioid "order sets" that require

What This Study Adds

- The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) surveys are used to assess patient care experiences and to calculate value-based incentive payments in the Centers for Medicare and Medicaid Services (CMS) Hospital Value-Based Purchasing (VBP) program.
- Experts have expressed concern that clinicians may order opioids not only to meet patients' requests for better pain care but also to improve HCAHPS scores.
- We examined the association between receipt of opioids and patient care experiences among nonsurgical hospitalized adults.
- We found that the receipt of opioids was not associated with patient care experience measures for nonsurgical hospitalized adults.

less clinical judgment when it comes to opioid prescribing decisions. In this context, we expect concerns about HCAHPS scores to have little or no influence on opioid prescribing decisions for surgical inpatients. Therefore, this study focused on opioid prescribing and HCAHPS scores among nonsurgical inpatients only. The findings of the current study will be of interest to hospital managers and clinicians who are involved in care delivery for nonsurgical inpatients. Also, our findings may inform policymakers who develop and revise hospital reimbursement policies related to pain care delivery.

2 | METHODS

We conducted a pooled cross-sectional study of nonsurgical inpatients using data from electronic medical records linked to HCAHPS patient care experience responses from 2011 to 2016. Hospitals administer HCAHPS to a random sample of all hospital discharges annually. A small fraction of patients appeared multiple times in the analysis corresponding to distinct hospitalizations and HCAHPS survey responses. As a result of the pooled cross-sectional study design, our unit of analysis is nonsurgical hospitalization.

We linked patient-specific data from two sources: patient-level responses to HCAHPS patient care experience surveys and patient medical records associated with those responses. HCAHPS is a national, standardized, publicly reported survey of patient perspectives on hospital care.²⁴ The survey contains 18 core questions about critical aspects of patients' hospital experiences, including communication with nurses and doctors, the responsiveness of hospital staff, pain management, discharge information, overall rating of hospital, and likelihood of recommending the hospital to others. It is administered to a random sample of adult inpatients between 48 hours and 6 weeks after discharge. By CMS requirements, these surveys are the only assessment of inpatient stay experiences of care.³

In this study, medical record data came from adults (18 years and older) with nonsurgical hospitalizations within a multi-hospital health care system spanning 11 hospitals in a Midwestern state from 2011 to 2016. We identified nonsurgical hospitalizations by the absence of an assigned and completed internal surgical procedure code used by the health care system. Next, we verified that our cohort of nonsurgical hospitalizations had no surgical procedures by assessing the presence of any ICD-9/ICD-10 surgical codes (see Table S1 in Appendix S1). We used patient- and hospitalization-level clinical data, including opioid and nonopioid medications received, diagnoses, length of stay, and patient demographics extracted from the electronic medical record. The HCAHPS responses and electronic records data were linked by an external research institution and deidentified for our analysis. The average HCAHPS response rate for the 11 hospitals represented in the sample was 29 percent (range: 20-40 percent), similar to the national HCAHPS response rate (30-35 percent) over the study years. The Institutional Review Board of Indiana University deemed this study as exempt.

2.1 | Dependent variables

The dependent variables in each of our models were responses to four questions in the standard HCAHPS survey used nationwide.²⁴ Two of these questions assessed pain care-specific aspects of patient experiences of care: (a) "During this hospital stay, how often was your pain well controlled?" (**Pain control**); and (b) "During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?" (**Pain help**), with 4-point Likert scale response options ("never," "sometimes," "usually," and "always"). The pain care-specific questions were asked only if the patient reported having pain during hospitalization. Two other questions measured overall hospital rating and willingness to recommend a hospital. Overall rating of a hospital (**Rating**) was assessed with the following question: "Using any number from 0 to 10, where 0 is the worst hospital possible, and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?" Willingness to recommend the hospital (**Recommend**) was measured with the following question: "Would you recommend this hospital to your friends and family?" on a 4-point scale (response options: "definitely yes," "probably yes," "probably no," and "definitely no"). We dichotomized each of these questions following previously published approaches⁷ and CMS methodology.³ We compared "always" versus all other responses, a "10" rating versus all other numerical ratings, and "definitely recommend" versus other responses.

2.2 | Independent variables

The independent variable in our model was a dichotomous indicator (yes/no) of whether a patient received one or more opioid medications during a nonsurgical hospitalization. We derived a list

of currently available opioid medications based on the CMS guidelines,²⁵ previous literature,^{16,18,19,26-28} and consultations with several inpatient clinicians and pain specialists (see Table S2 in Appendix S1). We excluded hospitalizations with missing information on receipt of opioid medication during hospitalization.

2.3 | Covariates

We used a propensity score matching approach to account for variables potentially correlated with patients' receipt of opioids and with patient care experience. Propensity score approaches attempt to reduce confounding by indication based on the fact that physicians may factor in patient characteristics when ordering opioids for nonsurgical inpatients.²⁹ The use of electronic health records enables measurement of many variables associated with the receipt or absence of opioids, and thus, we have approximately unbiased estimates of the treatment effect of opioids on patient care experiences.³⁰

As a first step, we estimated a propensity score based on the receipt of any opioid medication during hospitalization. For the propensity score, we used logistic regression that regressed the opioid receipt variable on patient, hospitalization, and facility characteristics. Patient-level characteristics included gender (male/female), age (18-24; 25-34; 35-44; 45-54; 55-64; 65-74; 75-84; 85; and older), race (White; Black; and other), ethnicity (non-Hispanic; Hispanic), and residential location (urban/rural). Hospitalization-level characteristics included admission type (emergency; elective, other), length of stay (measured in days), discharge diagnosis, secondary diagnosis of mental health disorder, number of hospitalizations to any of the 11-hospitals in our sample period, Charlson comorbidity index, discharge type (home; skilled nursing facility; critical care; rehabilitation facility; against medical advice), maximum pain score, minimum pain score, and average pain score during hospitalization, year (2011-2016), and presence of an opioid-related adverse drug event (ORADE; yes/no). We calculated maximum pain score by identifying the highest recorded pain score during an entire hospitalization. We calculated minimum pain score by identifying the lowest recorded pain score during an entire hospitalization. Finally, the average pain score was defined as the average of all recorded pain scores during an entire hospitalization.

Facility-level dummy variables were used to capture time-invariant characteristics of each of the 11 facilities within the health system. We calculated Charlson comorbidity index based on the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9/ICD-10) secondary diagnosis codes and Diagnosis Related Groups using Healthcare Cost and Utilization Project Comorbidity Software, version 3.7.³¹ We grouped the ICD-9/ICD-10 discharge diagnosis codes using the Clinical Classification Software single-level definitions.

To construct a group of patients receiving opioids matched to those who did not based on the calculated propensity score, we used the nearest neighbor matching technique with a caliper of 0.2 standard deviation of the propensity score.³² We used a standardized

FIGURE 1 Sample construction

difference threshold of <10 to assess balance between the matched groups, because this is a measure of effect independent of sample size. Finally, we ran four separate logistic regressions to estimate the relationship between receipt of opioids and each patient care experience measure. We estimated marginal effects calculated at the mean level of all other variables. We defined marginal effects as the percentage point change in the probability of the outcome attributable to receipt of opioids, or the likelihood that patient care experience measures increased as a result of receipt of opioids.

Due to the likely relationship between receipt of opioids and reported pain during hospitalization, we conducted a supplementary analysis by examining the potential difference in pain care-specific and overall patient care experience measures by receipt of opioids in four propensity score-matched groups based on the pain numeric rating scale (NRS) cut-points. First, we calculated four additional propensity scores based on the average pain score during hospitalization using NRS cut-points: (a) no pain (average score = 0); (b) mild pain (average pain score = 1-3); (c) moderate pain (average pain score = 4-6); and (d)

severe pain (average pain score = 7-10).³³ Next, we utilized the nearest neighbor matching technique with a caliper of 0.2 standard deviation of the propensity score to create four unique propensity score-matched groups.³² Similar to our main analysis, we used a standardized difference threshold of <10 to assess balance between the matched groups. Finally, we ran four logistic regressions to estimate the relationship between receipt of opioids and patient care experience measures within the four matched groups created based on the NRS cut-points. We considered statistical significance at the conventional $\alpha = 0.05$ level. All analyses were performed in Stata 14.0 analytical software.

3 | RESULTS

3.1 | Analytical sample

Our analytical sample consisted of 17,691 unique nonsurgical hospitalizations involving patients who reported being in pain during

TABLE 1 Comparison of selected patient, hospitalization, and care experience measures of the propensity score–matched study population by receipt of opioids (n = 10 282)

	Receipt of opioids during hospitalization, (%)		
Measure	Yes (n = 5141)	No (n = 5141)	Total
Patient-level measures			
Female	2881 (56)	2877 (56)	5758 (56)
Average age (mean; SD)	64.6 (14.6)	64.6 (14.6)	—
White	4590 (89)	4580 (89)	9160 (89)
Black	461 (8.9)	464 (9)	925 (9)
Asian	29 (0.5)	27 (0.5)	56 (0.5)
Other race	61 (1.6)	70 (1.6)	131 (1.5)
Non-Hispanic	5094 (99)	5099 (99)	10 193 (99)
Urban resident	3889 (75.6)	3875 (75.3)	7764 (75.5)
Hospitalization-level measures			
Emergency admission	3826 (74.4)	3747 (72.8)	7573 (73.6)
Elective admission	626 (12.1)	654 (12.7)	1280 (12.4)
Other admission types	689 (13.5)	740 (14.5)	1429 (14)
Circulatory diagnosis	1522 (29.6)	1452 (28.2)	2974 (28.9)
Respiratory diagnosis	725 (14.1)	730 (14.2)	1455 (14.1)
Digestive diagnosis	683 (13.3)	660 (12.8)	1343 (13)
Other diagnoses	2211 (43)	2299 (44.8)	4599 (44)
Secondary diagnosis: mental health disorder	3064 (59.6)	3014 (58.6)	6078 (59.1)
Charlson comorbidity index (no comorbidities)	1819 (35.2)	1751 (34.1)	3570 (34.7)
Charlson comorbidity index (1-2 comorbidities)	1648 (32.2)	1689 (32.8)	3337 (32.5)
Charlson comorbidity index (3+ comorbidities)	1674 (32.6)	1701 (33.1)	3375 (32.8)
ORADE (yes)	87 (1.7)	82 (1.6)	169 (1.6)
Receipt of nonopioid pain medications (yes)	4260 (82.6)	4279 (83.2)	8539 (83.1)
Discharge to home	4752 (92.4)	4767 (92.7)	9519 (92.5)
Length of stay (1-3 days)	2538 (49.4)	2419 (47.2)	4957 (48.3)
Length of stay (4-7 days)	1991 (38.8)	2035 (39.6)	4026 (39.2)
Length of stay (>7 days)	601 (11.8)	676 (13.2)	1277 (12.5)
Average pain score during hospitalization (mean, SD)	2.6 (1.8)	2.6 (1.9)	—
Maximum pain score during hospitalization (mean, SD)	7.1 (2.6)	7 (2.6)	—
Minimum pain score during hospitalization (mean, SD)	0.2 (0.7)	0.2 (0.8)	—
Patient care experience measures			
Pain help	3855 (74.9)	3884 (75.5)	7739 (75.2)
Pain control	2799 (54.4)	2821 (54.8)	5620 (54.6)
Rating	2408 (47.4)	2466 (47.9)	4874 (47.4)
Recommend	3666 (71.3)	3632 (70.6)	7298 (70.9)

Note: Pain help: patient always received help to address the pain as soon as wanted; Pain control: patient's pain was always well controlled; Rating: patient rated hospital as 10 overall; and Recommend: patient would definitely recommend the hospital.

Abbreviation: SD, standard deviation.

their hospitalization by answering “yes” to the HCAHPS gate question about pain. Figure 1 illustrates the sample construction process after meeting our inclusion criteria (Figure 1). After removing observations with missing data and lack of a comparator for propensity score matching, our final sample included 10 282

hospitalizations. Applying the propensity score matching approach reduced standardized differences for patients with hospitalizations receiving opioids versus not below an absolute value of 10 on all patient, hospitalization, and patient care experience measures (See Table S3 in Appendix S1). We also observed an

TABLE 2 Results from logistic regressions estimating relationship between patient care experience measures and receipt of opioids while hospitalized for propensity score-matched hospitalizations (overall sample) and by numeric rating scale (NRS) cut-points groups

Patient care experience measures	Receipt of opioids (Overall Sample) (n = 10 282)						No pain group (n = 1236)			Mild pain group (n = 5598)			Moderate pain group (n = 2854)			Severe pain group (n = 268)				
	β		P value	ME (%)	β		P value	ME (%)	β		P value	ME (%)	β		P value	ME (%)	β		P value	ME (%)
	β	P value	ME (%)	β	P value	ME (%)	β	P value	ME (%)	β	P value	ME (%)	β	P value	ME (%)	β	P value	ME (%)		
Pain help	-0.03	.51	-0.5	0.10	.42	1.6	0.06	.33	1	-0.12	.11	-2.7	-0.03	.92	-0.0.7	-0.03	.35	-0.03	.90	-0.07
Pain control	-0.02	.66	-0.4	0.23	.06	5.1	-0.01	.78	-0.3	-0.18*	.01	-4.5	0.24	.35	5.2	0.02	.73	0.6	.90	-0.07
Rating	-0.04	.25	-1.1	0.01	.77	0.4	-0.07	.15	-1.8	0.02	.73	0.6	-0.03	.90	-0.07	0.02	.78	0.4	.90	0.07
Recommend	0.03	.46	0.6	0.11	.31	2.1	0.07	.22	1.4	0.02	.78	0.4	0.02	.90	0.07	0.02	.78	0.4	.90	0.07

Note: Coefficients and risk differences shown for binary outcomes are modeled with logistic regressions clustered at facility level.

ME: marginal effects. We defined marginal effects as the percentage point change in the probability of the outcome attributable to receipt of opioids. That is, the likelihood that patient care experience measures increased as a result of receipt of opioids.

Numeric rating scale (NRS) cut-points were calculated based on an average pain score during hospitalization: no pain (average score = 0); mild pain (average pain score = 1-3); moderate pain (average pain score = 4-6); and severe pain (average pain score = 7-10). Negative relationships indicate lower patient experience measures when receiving opioids during hospitalization.

Pain help: Patient always received help to address the pain as soon as wanted; Pain control: Patient's pain was always well controlled; Rating: Patient rated hospital as 10 overall; Recommend: Patient would definitely recommend the hospital.

* $P < .05$; ** $P < .01$; *** $P < .001$.

acceptable overlap between the groups that satisfied the overlap assumption (See Figure S1 in Appendix S1).

3.2 | Sample characteristics

Table 1 shows the descriptive statistics of the matched sample. Among the matched sample ($n = 10\,282$), the average age was 65 years (range: 18-90), 56 percent were female, and 89 percent were White. Roughly 29 percent percent of hospitalizations had a circulatory diagnosis, and the average pain score during an entire hospitalization was 2.6 (range: 0-10). Half of the matched sample ($n = 5141$) received opioids during hospitalization. Seventy-five percent of the patients reported that hospital staff always did everything they could to help with patient's pain. Approximately half of the patients in the sample reported that their pain was always well controlled during hospitalization and gave a "10" rating to the hospital. Finally, seventy percent of patients in the matched sample reported that they would definitely recommend the hospital to their family and friends.

3.3 | Associations between receipt of opioids and patient care experience measures

Table 2 presents results of the logistic regressions estimated on the propensity score-matched sample to assess the relationship between each of the four patient care experience measures and (a) the receipt of opioids; and (b) each of the four NRS pain score groups. None of the four logistic regressions (Table 2) showed statistically significant associations between receipt of opioids and patient care experience measures using a conventional level of significance ($P < .05$). We performed several sensitivity analyses using different cutoff points for the patient experience measures (such as combining "9" and "10" responses for rating, "definitely yes" and "probably yes" for recommend; "always" and "usually" for pain help/pain control against the rest of responses) and similarly observed associations that were not statistically significant (See Table S4 in Appendix S1).

Additionally, none of the supplementary analyses performed on four propensity score-matched groups by NRS cut-points yielded statistically significant associations. One exception was a statistically significant negative relationship between receipt of opioids and ratings of pain control (ME = 4.5 percent; P value = .015) among patients with moderate levels of pain during their hospitalization. Specifically, patients that had a moderate level of pain during hospitalization had a 4.5 reduced likelihood of reporting that their pain was always well controlled.

4 | DISCUSSION

The main finding of our study is that receipt of opioids during nonsurgical hospitalization is not associated with patient care experience

measures related to pain care and overall care experience. To our knowledge, this study is the first to use a propensity score matching approach in an attempt to address the potential bias resulting from confounding by indication when examining the association between receipt of opioids and patient care experience measures among nonsurgical inpatients. Our findings are consistent with prior research that showed no association between receipt of opioids and patient care experience among surgical inpatients.^{17,18,26} Overall, our findings do not support concerns from policymakers and legislators^{12,13} that influenced the CMS decision to remove HCAHPS measures of patient experience with pain care from the hospital reimbursement formula in 2018.

Several possible reasons may explain the difference between our findings and the inconclusive evidence from studies focusing on surgical inpatients. First, our study focused on nonsurgical inpatients, who are markedly different from surgical inpatients. Surgical inpatients are more likely to experience pain during hospitalization from the procedures performed, and thus, receipt of opioids may be a more important factor driving experience with care compared to nonsurgical inpatients. Given that an average pain score during hospitalization in our sample was relatively low (2.6), it may be that pain care was not especially relevant or a factor driving patient experience with pain care and overall care experience. Second, it is plausible that other pain care treatments such as nonopioid medications and nonpharmacological approaches (eg, repositioning, cold packs) were used to address relatively mild levels of pain among nonsurgical inpatients in our sample and adequately controlled the pain.

Third, clinicians may be successfully addressing the pain care needs of nonsurgical inpatients with diagnosis-specific care (eg, promptly starting antibiotics for pneumonia, resulting in less inflammation and subsequent chest pain), thus minimizing the importance of receiving opioids during hospitalization. Thus, despite concerns raised by legislators, clinician lobbying groups, and senior health officials,^{12,13} our findings indicate that receiving opioids may not be a major determinant of patient experience with pain care and overall experience among nonsurgical inpatients, who represent almost half of all hospitalizations in the United States.

In our supplementary analysis, we found that receipt of opioids was associated with lower ratings for pain control among hospitalized patients with moderate levels of pain (average pain score during hospitalization = 4-6). This finding is in line with results from other studies indicating that receipt of opioids was associated with lower patient experience among surgical inpatients.^{23,24} It is plausible that care teams may not be recognizing moderate levels of pain appropriately and not addressing pain needs as well as for patients having severe pain. As a result, patients with moderate pain receive opioids, but the dose/frequency may not be sufficient to manage their pain, leading to poor experiences with pain control. Furthermore, patients may expect to be "pain free" as a result of receiving opioids, and if these expectations are not met, patients may report poorer experiences with their care. Finally, opioid-related adverse side effects (eg, constipation) may

also outweigh the potential benefits of opioids, thus negatively affecting patient care experiences. Additional research is needed to examine further why nonsurgical inpatients experiencing moderate pain had poorer experiences with their pain control, despite receiving opioids.

Our study has several strengths. By using a propensity score matching approach, we were able to address the potential bias resulting from confounding by indication. Furthermore, our sample is unique in the inclusion of nonsurgical inpatients over five years in a multi-hospital health care system in the Midwestern state. Of note, previous studies that examined this topic on surgical patients had smaller sample sizes, used data from one hospital, and had fewer years of data.^{18,26,27}

Nevertheless, our study is not without limitations. First, we used data from one Midwestern state. Thus, our findings may not be generalizable to other nonsurgical patients in the United States. Second, even though propensity score matching is a robust empirical tool for reducing potential bias resulting from confounding by indication, some residual confounding may remain, which could arise from differential response to the HCAHPS survey (ie, those in more pain may be more or less likely to complete the survey). Nevertheless, the HCAHPS survey methodology is nationally used to assist with CMS hospital reimbursement decisions. Future studies should account for the potential bias resulting from confounding by indication and omitted variable bias. On a similar note, we acknowledge that CMS uses HCAHPS in assessing hospital-level performance. Therefore, a hospital-level analysis (eg, looking at hospital propensities to administer opioids vs. hospital-level HCAHPS performance) would be a more policy-congruent study design. Unfortunately, our sample is not large enough to perform an informative hospital-level analysis.

Third, our data lacked information on the dose of opioids received during hospitalizations. Thus, we were unable to estimate whether patient care experiences varied with the dose of opioids received. Fourth, we were not able to obtain information about prior opioid exposure or opioids taken outside of the hospital setting, which could affect patient experiences with pain care (eg, the relationship between receipt of opioids and experiences of care may be different for patients on long-term opioid therapy versus those who are opioid naïve). Fifth, responses to patient experience measures used in our analyses were correlated; Pearson's r was $\geq .31$ and $P < .001$ for all measures. Thus, the results of our analyses are also likely correlated and may not be generalizable to populations with more heterogeneity in the responses. However, it is generally well known that patient experiences have a high degree of correlation in national populations.³⁴ Finally, we used HCAHPS measures, which on average had only a 30 percent response rate. However, extensive testing of the measures suggests that the results are not substantially affected by nonresponse bias, especially when factors such as response mode are taken into account. In fact, CMS has enough confidence in these measures to include scores on them in its VBP program.

In conclusion, we found that receipt of opioids was generally not associated with patient care experiences for nonsurgical inpatients.

Future research should examine whether the revised pain care-specific patient care experience questions that CMS plans to introduce in 2019 will be associated with opioid prescribing among hospitalized patients.

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CONFLICT OF INTEREST

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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