## Title

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# Assessing for differences in opioid administration during inpatient end-of-life care for patients with limited English proficiency

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## Abstract

**Background:** Patients with limited English proficiency (LEP) may have worse health outcomes and differences in processes of care. Language status may particularly affect situations that depend on communication, such as symptom management or end-of-life (EOL) care.

**Objective:** The objective of this study was to assess whether opioid prescribing and administration differs by English proficiency (EP) status among hospitalized patients receiving EOL care.

**Methods:** This single-center retrospective study identified all adult patients receiving "comfort care" on the general medicine service from January 2013 to September 2021. We assessed for differences in the quantity of opioids administered (measured by oral morphine equivalents [OME]) by patient LEP status using multivariable linear regression, controlling for other patient and medical factors.

**Results:** We identified 2652 patients receiving comfort care at our institution during the time period, of whom 1813 (68%) died during the hospitalization. There were no significant differences by LEP status in terms of mean OME per day (LEP received 30.8 fewer OME compared to EP, $p = .91$) or in the final 24 h before discharge (LEP received 61.7 more OME compared to EP, $p = .80$).

**Conclusion:** LEP was not associated with differences in the amount of opioids received for patients whose EOL management involved standardized order sets for symptom management at our hospital.



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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

## INTRODUCTION

High-quality symptom management is an important component of end-of-life (EOL) care. Opioids serve as one of the mainstays of palliative therapy for individuals with serious illness approaching EOL, treating pain, dyspnea, and other signs of distress.[1] As symptom management is often based on provider and nursing assessment as well as patient or caregiver report, good communication is crucial for optimal treatment. Thus, the EOL period represents a particularly vulnerable time for patients with limited English proficiency (LEP) who may not receive optimal symptom management due to language barriers and other factors.

In general, patients with LEP experience worse health outcomes due to language barriers.[2] In the inpatient setting, LEP status is associated with higher rates of harmful adverse events[3] and readmissions,[4] longer hospital length of stay,[5–7] and increased mortality in sepsis.[8] In pediatric and OB-GYN patient populations, studies have shown patients with LEP experience insufficient pain assessment and treatment—including longer time to analgesia administration—which can be mitigated by increased use of language interpreters.[9–13] Recent studies of adult trauma patients within the University of California, San Francisco (UCSF), health system found that patients with LEP receive fewer pain assessments during hospitalization are less likely to receive opioid prescriptions on discharge and receive smaller quantities when prescribed as compared to English-proficient (EP) patients, consistent with other recent studies in surgical patients.[14–16]

In the palliative care setting, patients with LEP and their families receive inferior care and perceive worse symptom management when professional interpreters are not used according to a 2016 systematic review.[17] In critical care settings, families of patients with LEP are at risk of receiving inferior communication and support from clinicians in interpreted EOL conversations,[18] which may partially account for the significant differences in EOL decision-making between patients with EP and LEP.[7]

Additional scholarship is needed to continue identifying inequities in EOL care for patients with LEP and to advance our knowledge on how to rectify them. Specifically, there are limited data on inequities in provider practices around opioid administration based on patient LEP status on general medicine inpatient services. At our medical center, the standard practice on the hospital medicine service is to enter a “comfort care” order set for all patients at EOL. Studies have shown that standardized order sets at EOL can help enhance symptom management but do not evaluate outcomes for patients with LEP receiving these order sets.[19,20] Thus, based on existing literature, we hypothesized that patients with LEP receive fewer opioids for pain, dyspnea, and distress during EOL symptom management. This study seeks to retrospectively examine the association between LEP status and the quantity of opioids administered at EOL to hospitalized adult patients to further explore potential care inequities in this patient population.

## METHODS

We designed a retrospective cohort study identifying all adult patients (age ≥18) who received inpatient EOL care and were discharged from the inpatient hospital medicine service between January 2013 and September 2021 at the UCSF, a 785-bed academic teaching hospital. We extracted data from Clarity, the database that stores inpatient data from our hospital's electronic health record (EHR), Epic (Epic Systems Corporation). All patients who had an active "comfort care" order set at time of discharge were considered to be receiving EOL care and were included in our cohort.[1]

Our inpatient adult "comfort care" order set is designed for patients with serious illness for whom goals of care have shifted to intensive comfort-focused measures and are expected to die during their hospitalization or be discharged on hospice. It is the only order set that designates in the chart a patient is receiving "comfort care." This order set includes nursing orders for symptom evaluation, spiritual care consult, and options for multiple pharmacologic interventions to treat symptoms. Specifically, the order set includes several nursing orders for frequent assessment of symptom burden, including hourly assessment of pain, dyspnea, respiratory rate, anxiety, agitation, and secretions until these are well controlled, at which point assessment is spaced to 2-h intervals. In addition, the order set includes a nursing order to notify a provider if symptoms remain unrelieved or if there is a change in a patient's medication needs or medical condition. The order set also includes liberalizing parameters for the presence of patient's loved ones and routine consult to Spiritual Care. Finally, the order set includes options for generous administration of several opioids, including continuous and as-needed orders for morphine, fentanyl, and/or hydromorphone. Prescribers have the ability to adjust dosages and frequency of medications based on their assessment of the patient. This order set was designed and implemented with significant leadership from the inpatient UCSF Palliative Care Service. Our data set does not distinguish which reason (e.g., pain vs. dyspnea) an opioid was received.

### Primary outcome

Our study looked at the primary outcome of opioid administration measured in two different ways: (1) the average daily oral morphine equivalents (OME) received during admission and (2) the OME received during the last 24 h of admission. For each patient, all opioid medications received during admission were converted to daily OME (a calculation built into our institution's EHR). For example, if a patient received three doses of oxycodone 5 mg over a 24-h period, this would generate a total OME of 22.5 mg for that day of admission. These daily OMEs were then averaged over the entire length of stay to create a daily mean OME (mg/day). The OME received in the last 24 h of admission was also collected for each patient.

### Primary predictor

The primary predictor was the patient's LEP status. LEP status was defined as (1) having a designated primary language other than English (self-reported "preferred language" linked to a patient's hospitalization) and (2) having documentation of needing an interpreter during hospitalization based on nursing intake. In other studies at our institution, this definition was

found to have a high level of accuracy for predicting LEP through validation with intensive chart review.[8]

## Covariate data collection

Data were also collected on patient demographics, hospitalization factors, medical diagnoses, and medication history. Demographic variables included age, sex, last recorded inpatient weight, and race/ethnicity. Race/ethnicity was self-reported by patients to the hospital registrar on admission and categorized in line with US Census Bureau definitions: White, Black, LatinX, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native, and other/unknown. Patients identified as other/unknown were marked by the registrar as other, declined to state, or otherwise unspecified. We recognize these definitions are socially defined categorizations.[19,20] Hospitalization factors included length of stay, whether patients had an intensive care unit (ICU) stay, palliative care consult, or were on a teaching or direct-care hospitalist service, and year of admission. Year of admission was included as a covariate to attempt to control for temporal trends in opioid prescribing. Previous analyses of institutional data have demonstrated that opioid prescribing has decreased between the years 2013 and 2021, consistent with a nationwide focus on limiting opioid prescriptions.[21] Other medical factors included having cancer-related pain diagnosis, history of substance use disorder, Elixhauser Comorbidity Index[22] based on the *International Classification of Diseases, Tenth Revision* (ICD-10) codes, and whether the patient had an existing outpatient opioid prescription on admission.

## Statistical analysis

All statistical analyses were performed with Stata software version 16 (StatCorp LP). Baseline demographic, hospitalization, and medical characteristics were stratified by LEP status. These were compared using analysis of variance or Pearson's chi-square tests of significance. Two-sample *t*-tests were used to compare the two primary OME outcomes for LEP versus EP patients in our cohort. We then fit a multivariable linear regression to examine the two primary outcomes by LEP status after adjusting for the covariates listed above. Given known racial and ethnic disparities in pain management and recently identified opioid prescribing inequities in our own inpatient population, we also included the interaction between LEP status and race/ethnicity in our regression model.[21,23]

## Additional analyses

(1) To capture and examine the subgroup of patients whose immediate EOL period was in the hospital, we fit the multivariable linear regression for the subset of our cohort who were discharged as deceased. (2) We also performed a subgroup analysis of patients with a cancer pain ICD code (associated with their hospitalization) fitting the same regression. (3) We ran a stratified analysis by palliative care consult assessing the same OME outcomes for patients with LEP. (4) Given some patients received zero opioids during hospitalization (Table 1), we also ran a subgroup analysis only looking at the subset of patients who received greater than zero opioids during admission. (5) As an exploratory analysis, we then fit a logistic regression for the binary outcome of receiving any opioids during admission by LEP status. (6) Due to the large variance in our outcome variables, as a robustness test, we fit a negative binomial regression for our cohort with the same OME outcomes, as our data distribution

may not have fit the assumptions of a linear model. (7) Finally, we conducted a sensitivity analysis using a broader definition of LEP (all patients with primary language other than English). This study was approved by the UCSF Institutional Review Board for Human Subjects Research with a waiver of informed consent.

## RESULTS

### Unadjusted results

Out of 61,836 patients discharged from the hospital medicine service between January 2013 and September 2021, we identified 2652 patients receiving EOL care with an active comfort care order set on discharge. Of these patients, 701 (26.4%) were considered to have LEP and 1951 (73.6%) were considered EP (Table 1). Patients in the LEP group were significantly older and had significantly fewer ICU stays, cancer pain diagnoses, and substance use disorder history when compared to those in the EP group. A significantly larger proportion of patients with LEP received zero opioids during their entire admission when compared to the EP group (10.4% vs. 7.2%, $p = .02$). There were also significant differences in race/ethnicity, with the majority of patients with EP identifying as White (52%) and the majority of patients with LEP identifying as Asian (69%).

In unadjusted analysis, patients with LEP received 176.8 fewer average OME per day ($p = .04$) (Table 2) and 321.2 fewer OME in the last 24 h of admission ($p < .001$) (Table 3). For the primary outcome of average OME per day, patients with an opioid prescription before admission, cancer pain diagnosis, or palliative care consult during admission received higher average OME per day. For the outcome of OME in the last 24 h of admission, patients with an opioid prescription before admission, cancer pain diagnosis, palliative care consult, and ICU admission received higher OME in the last 24 h.

### Adjusted results

After fitting a multivariable linear regression controlling for covariates, there was no significant difference in OME received between the EP and LEP groups for both outcomes (Tables 2 and 3). Patients with LEP received an adjusted 30.8 (−535.7 to 474.2) fewer OME per day ($p = .91$) and 61.7 (−415.2 to 538.6) more OME in the last 24 h of admission ($p = .80$) as compared to EP patients. For the outcome of average OME per day, having a cancer pain diagnosis remained a significant predictor of receiving more opioids ($p = .03$). For the outcome of OME in the last 24 h of admission, ICU admission was still significantly associated with receiving more OME ($p < .001$). Older age was significantly associated with receiving fewer opioids for both outcomes ($p < .001$). There were also two significant differences by race/ethnicity, with Native Hawaiian/Other Pacific Islander ($n = 54$) associated with more average OME/day, and multirace/ethnicity ($n = 39$) associated with more OME in the last 24 h of admissions. Having an opioid prescription before admission or a history of substance use disorder was not associated with any significant difference in OME for both outcomes.

### Additional analyses

Out of the 2652 patients in the cohort, 1813 (68%) were discharged from the hospital as deceased. For this subgroup, the results were similar. LEP status was not associated with differential opioid administration as compared to patients with EP, with adjusted average daily OME of −37.1 (−77.7 to 681.4) ($p$ = .92) and OME per last 24 h of 95.5 (−573.5 to 764.6) ($p$ = .78) (Supporting Information S1: Table 1). For the subgroup analysis of patients with an active cancer pain ICD ($n$ = 388), there was no difference in opioid outcomes for patients with LEP [adjusted average daily OME of 204.2 (−5543.0 to 5951.4) ($p$ = .94) and OME per last 24 h of −59.7 (−3254.8 to 3135.4) ($p$ = .97)] (Supporting Information S1: Table 1). For the stratified analysis by palliative care consult, in both the group with a palliative care consult and the group without a consult, patients with LEP again received no significant difference in either OME outcome as compared to EP patients (Supporting Information S1: Table 2).

Our unadjusted results demonstrated that a larger proportion of the LEP group received zero opioids during admission as compared to the EP group (Table 1). We therefore ran a logistic regression looking at the receipt of opioids as a binary outcome (yes/no). We found there was no difference in likelihood of receiving opioids by LEP status when fit to a multivariable logistic regression [for LEP group, OR 2.31 (0.78–6.91)]. Then in subgroup analysis, among the patients who received some amount of opioid during admission ($n$ = 2455), there was no significant difference in OME outcomes by LEP status.

Due to the large variance in our outcome variables (Table 2), we also ran a negative binomial regression for the primary OME outcomes, and the main results were unchanged (no difference in opioid administration by LEP status). Finally, we conducted a sensitivity analysis with a broader definition of LEP and found that there was still no difference in OME outcomes by LEP status.

## DISCUSSION

In this single-center retrospective study, we found no significant difference in opioid administration based on EP for patients receiving EOL care on a general medicine service after adjustment for additional demographic and clinical characteristics. Instead, older age was found to be associated with receiving fewer opioids, while ICU admission and active cancer-related pain diagnosis were associated with receiving more opioids, which likely explains the unadjusted results given the differences between the LEP and EP groups (the LEP group being significantly older and EP group having significantly more cancer pain diagnoses and ICU stays). We ran several secondary analyses to enhance the statistical rigor of our study, which continued to support our negative results, repeatedly finding no difference in OME between patients with LEP and EP.

To our knowledge, this is the first study looking specifically at EOL opioid administration for adults with LEP on a hospital medicine service. Given the established inequities in care for patients with LEP, our negative results were unexpected and intriguing. In particular, previous studies of our own hospital medicine service have described racial, ethnic, and language-based inequities in opioid prescriptions with the same patient population.[21,23]

However, opioids are a mainstay of treatment for a wide variety of symptoms at the EOL.[1] The administration of opioids to inpatients at the EOL may be approached differently than for patients being discharged from the hospital with the expectation of full recovery. Administration of opioids for actively dying patients may not carry the same stigma or be subjected to the same degree of (un)conscious bias as prescribing opioids for patients who are not at EOL. Pain and symptom assessment also depend less on verbal communication in the immediate EOL period and more on providers' and nurses' assessments of a patient's nonverbal behaviors, including grimacing, restlessness, and vocalization. Thus, our negative results beg the question of whether inequities in pain and symptom management are minimized in the EOL period due to the ability of clinicians to assess potentially more objective, nonverbal indicators as opposed to communicate across a language barrier (with or without an interpreter).[24] Our hypothesis that certain care inequities may narrow in the EOL period merits further inquiry.

Recognizing this is a single-center study, opioid administration may not represent a significant EOL inequity for our study population, which could be due to our established care delivery systems that lower barriers to patient–provider communication and clinical assessment. Having a robust "comfort care" order set designed by our specialty Palliative Care Service, for example, may serve as a mechanism to enhance equity in symptom management in EOL care, making patients more likely to receive appropriate symptom-targeted opioid administration.[25,26] In addition, many patients receiving comfort care at our institution are relocated to comfort care suites where they receive care from nurses with expertise in managing pain and other symptoms at EOL, which may mitigate inequities in care for LEP populations. In our analyses, we controlled for palliative care consult as a covariate and performed an additional stratified analysis, which again revealed negative results, further raising the question of the impact of the order set. Additionally, we have robust access to interpreters (phone, video, and in-person) at our hospital as well as a strong institutional focus on equity initiatives. Our institution is also comprised of diverse staff members that may afford increased opportunities for language-concordant and ethnic-concordant care.[27–29] It would be important to identify other risk factors in EOL, which may be exaggerated for patients with LEP. For example, we found age was associated with receiving fewer opioids, which may reflect physiologic changes with age or a care inequity, as older adults may be at risk for undertreatment of pain.[30]

This retrospective, EHR-based study has some intrinsic limitations that may not capture other factors contributing to opioid administration, including broader cultural differences in medication preference and individual-level variation in response to pain medication.[31,32] In this analysis, we did have access to data regarding the severity of patients' pain via pain assessment scores. However, as discussed previously, opioids address more than just pain in EOL. Pain assessment tools have their own inherent limitations, may be subject to inequitable application,[33] and may have lower utility for patients at EOL for whom verbal communication is more limited; thus, they were not incorporated into our analyses. Our OME variables were collected for the entire hospitalization and not just the time the "comfort care" order set began. We did our best to account for this by also analyzing the final 24 h of hospitalization. We were unable to fully evaluate the effect of our comfort care order set as we did not have data before the implementation of the order set as a control.

Finally, we recognize many diagnoses and conditions (e.g., respiratory illness, delirium, and renal function) can impact providers' decisions around opioid administration. Given this was an all-encompassing EOL study, we did not exclude or further stratify patients by additional diagnoses to avoid inappropriately excluding certain patients.

Only additional research, ideally prospective, multicenter studies, will help elucidate nuances of care for patients with LEP in EOL. Future studies could incorporate pain and symptom assessment, timing of symptom-targeted medications, frequency of interpreter use, quality of interpreted conversations, patient/caregiver perspectives, and interpreter perspectives.[34–36] Additionally, our ongoing work can seek to control for the impact of our robust comfort care order set on the care for our patients with LEP. Given that it is hard to capture the complexity and vulnerability of EOL care in numbers and regressions, a mixed-methodology might best encapsulate the bedside phenomena that characterize our patients' final days. Our results will be used to inform ongoing work in pain and symptom assessment and care inequities for patients on our hospital medicine services.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**TABLE 1**

Baseline patient characteristics of comfort care cohort ($n = 2652$) by LEP status.

| | LEP ($n = 701$) | EP ($n = 1951$) | $p$ Value[a] |
|---|---|---|---|
| Age (mean (SD) years) | 77.82 (14.73) | 67.71 (16.69) | <.001 |
| Sex (% male) | 51.07 | 51.46 | .86 |
| Race/ethnicity (%) | | | .001 |
| White | 11.13 | 52.33 | |
| Black or African American | 0.29 | 10.46 | |
| Latinx | 10.98 | 9.38 | |
| Asian | 69.33 | 18.86 | |
| Native Hawaiian/Other Pacific Islander | 3.42 | 1.54 | |
| American Indian or Alaska Native | 0.14 | 0.21 | |
| Other | 3.85 | 5.54 | |
| Multirace/ethnicity | 0.86 | 1.69 | |
| Opioid prescription before admission (% yes) | 37.09 | 52.59 | <.001 |
| Length of stay (mean (SD) days) | 9.07 (12.83) | 11.35 (15.39) | .70 |
| ICU admission (% yes) | 35.52 | 45.00 | <.001 |
| Cancer pain diagnosis (% yes) | 11.13 | 17.27 | <.001 |
| Comorbidity Index (mean (SD) score) | 19.65 (11.8) | 20.41 (12.95) | .41 |
| Palliative care consult (% yes) | 47.93 | 51.56 | .10 |
| Type of hospitalist service (%) | | | .16 |
| Direct care service | 16.55 | 18.96 | |
| Teaching service | 81.04 | 83.45 | |
| History of substance use disorder (% yes) | 2.71 | 8.05 | <.001 |
| Range of OME per day (mg/day) | 0.00–3896.19 | 0.00–90,069.20 | |

| | LEP (*n* = 701) | EP (*n* = 1951) | *p* Value[a] |
|---|---|---|---|
| Patients receiving 0 opioids, *n* (%) | 66 (10.4) | 131 (7.2) | .02 |

*Note*: Comorbidity Index used was Van Walraven adjusted Elixhauser Score.

Abbreviations: CMO, comfort measures only; EP, English proficiency; ICU, intensive care unit; LEP, limited English proficiency; OME, oral morphine equivalents; SD, standard deviation.

[a] *p* Values were calculated using ANOVA or Pearson's chi-square tests.

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## TABLE 2

Multivariable linear regression results for differences in mean OME per day.

| Covariate | Sample size | Unadjusted mean OME/day (SD) | *p* Value | Adjusted mean OME/day (95% CI) | *p* Value |
|---|---|---|---|---|---|
| Overall | 2652 | 220.6 (1923.2) | | | |
| LEP | 701 | 90.6 (241.6)[a] | .04 | −30.8 (−535.7 to 474.2) | .91 |
| EP | 1951 | 267.4 (2235.9)[a] | | Ref | Ref |
| Age (for every additional year in age) | | | | −14.4 (−20.3 to −8.6) | <.001 |
| Race/ethnicity | | | | | |
| White | 1099 | 275.3 (2778.8) | .39 | Ref | Ref |
| Black | 206 | 149.6 (328.5) | | −193.1 (−515.7 to 129.6) | .24 |
| Latinx | 260 | 250.6 (767.4) | | −156.4 (−494.0 to 181.2) | .36 |
| Asian | 854 | 114.3 (334.4) | | −162.2 (−425.6 to 101.2) | .23 |
| Native Hawaiian/Other Pacific Islander | 54 | 604.6 (3406.9) | | 816.5 (38.9 to 1594.2) | .04 |
| American Indian or Alaska Native | 5 | 181.1 (199.3) | | −223.7 (−2213.2 to 1765.7) | .83 |
| Other | 135 | 242.2 (569.9) | | −39.7 (−486.1 to 406.7) | .86 |
| Multirace/ethnicity | 39 | 583.1 (3122.7) | | 287.0 (−431.6 to 1005.6) | .43 |
| Last inpatient weight (each additional kg heavier) | | | | −2.1 (−4.2 to −0.1) | .05 |
| Opioid prescription before admission | | | | | |
| Yes | 1286 | 344.8 (2731.6) | .001 | 26.9 (−158.7 to 212.4) | .78 |
| No | 1366 | 103.7 (361.7) | | Ref | Ref |
| ICU admission | | | | | |
| Yes | 1127 | 201.7 (500.3) | .66 | 51.1 (−138.5 to 240.6) | .60 |
| No | 1525 | 234.6 (2499.7) | | Ref | Ref |
| Cancer pain diagnosis | | | | | |
| Yes | 415 | 647.9 (4592.2) | <.001 | 280.8 (25.5 to 536.1) | .03 |
| No | 2237 | 141.4 (663.6) | | Ref | Ref |
| Comorbidity index (each additional point on the Elixhauser scale) | | | | −5.9 (−12.9 to 1.0) | .10 |
| Palliative care consult | | | | | |
| Yes | 1342 | 326.5 (2686.3) | .004 | 45.5 (−140.9 to 231.9) | .60 |
| No | 1310 | 112.2 (273.4) | | Ref | Ref |
| Year of admission | | | | 7.8 (−30.4 to 45.9) | .69 |
| Type of hospitalist service | | | | | |
| Direct care service | 479 | 370.9 (4236.4) | .06 | Ref | Ref |
| Teaching service | 2135 | 188.6 (753.5) | | −169.5 (−403.9 to 65.0) | .16 |

| Covariate | Sample size | Unadjusted mean OME/day (SD) | *p* Value | Adjusted mean OME/day (95% CI) | *p* Value |
|---|---|---|---|---|---|
| History of substance use disorder | | | | | |
| Yes | 176 | 148.6 (247.8) | .61 | −214.2 (−540.7 to 112.3) | .20 |
| No | 2476 | 225.8 (1989.2) | | Ref | Ref |

*Note*: Comorbidity Index used was Van Walraven adjusted Elixhauser Score.

Abbreviations: CI, confidence interval; EP, English proficiency; ICU, intensive care unit; LEP, limited English proficiency; OME, oral morphine equivalents; SD, standard deviation.

[a]LEP variance 58,383; EP variance 4,999,048.

## TABLE 3

Multivariable linear regression results for differences in mean OME in the last 24 h of admission.

| Covariate | Sample size | Unadjusted mean OME/last 24 h (SD) | *p* Value | Adjusted mean OME/last 24 h (95% CI) | *p* Value |
|---|---|---|---|---|---|
| Overall | 2652 | | | | |
| LEP | 701 | 210.3 (582.7) | <.001 | 61.7 (−415.2 to 538.6) | .80 |
| EP | 1951 | 531.6 (2164.3) | | Ref | Ref |
| Age | | | | −21.0 (−26.5 to −15.5) | <.001 |
| Race/ethnicity | | | | | |
| White | 1099 | 463.8 (1907.7) | <.001 | Ref | Ref |
| Black | 206 | 490.1 (1780.0) | | −60.4 (−365.1 to 244.4) | .70 |
| Latinx | 260 | 752.2 (2736.0) | | 115.7 (−203.2 to 434.6) | .48 |
| Asian | 854 | 252.6 (857.4) | | −57.0 (−305.7 to 191.8) | .65 |
| Native Hawaiian/Other Pacific Islander | 54 | 585.3 (2874.1) | | 701.4 (−33.1 to 1435.8) | .06 |
| American Indian or Alaska Native | 5 | 975.0 (1576.5) | | 423.3 (−1455.6 to 2302.2) | .66 |
| Other | 135 | 572.1 (1149.2) | | 91.6 (−330.0 to 513.2) | .67 |
| Multirace/ethnicity | 39 | 1248.5 (6286.8) | | 986.5 (307.9 to 1665.1) | .00 |
| Last inpatient weight | | | | −0.5 (−2.5 to 1.5) | .62 |
| Opioid prescription before admission | | | | | |
| Yes | 1286 | 551.4 (2067.0) | | −74.2 (−249.4 to 101.1) | .41 |
| No | 1366 | 347.9 (1691.8) | .01 | Ref | Ref |
| ICU admission | | | | | |
| Yes | 1127 | 661.6 (2077.3) | <.001 | 382.0 (203.0 to 561.1) | <.001 |
| No | 1525 | 287.7 (1713.6) | | Ref | Ref |
| Cancer pain diagnosis | | | | | |
| Yes | 415 | 788.8 (2632.6) | <.001 | 183.0 (−58.1 to 424.1) | .14 |
| No | 2237 | 388.0 (1719.3) | | Ref | Ref |
| Comorbidity index | | | | −8.9 (−15.4 to −2.34) | .01 |
| Palliative care consult | | | | | |
| Yes | 1342 | 591.3 (2448.1) | <.001 | 141.9 (−34.1 to 317.9) | .11 |
| No | 1310 | 298.4 (1008.5) | | Ref | Ref |
| Year of admission | | | | 2.0 (−34.1 to 38.0) | .92 |
| Type of hospitalist service | | | | | |
| Direct care service | 479 | 441.6 (3036.8) | .89 | Ref | Ref |
| Teaching service | 2135 | 455.0 (1532.2) | | −161.0 (−382.4 to 60.4) | .15 |

| Covariate | Sample size | Unadjusted mean OME/last 24 h (SD) | *p* Value | Adjusted mean OME/last 24 h (95% CI) | *p* Value |
|---|---|---|---|---|---|
| History of substance use disorder | | | | | |
| Yes | 176 | 544.7 (936.3) | .48 | −260.1 (−568.5 to 48.3) | .10 |
| No | 2476 | 439.6 (1935.3) | | Ref | Ref |

*Note*: Comorbidity Index used was Van Walraven adjusted Elixhauser Score.

Abbreviations: CI, confidence interval; EP, English proficiency; ICU, intensive care unit; LEP, limited English proficiency; OME, oral morphine equivalents; SD, standard deviation.