



# Trainees as Agents of Change in the Opioid Epidemic: Optimizing the Opioid Prescription Practices of Surgical Residents

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**OBJECTIVE:** Opioid abuse has become an epidemic in the United States, causing nearly 50,000 deaths a year. Postoperative pain is an unavoidable consequence of most surgery, and surgeons must balance the need for sufficient analgesia with the risks of overprescribing. Prescribing narcotics is often the responsibility of surgical residents, yet little is known about their opioid-prescribing habits, influences, and training experience.

**DESIGN:** Anonymous online survey that assessed the amounts of postoperative opioid prescribed by residents, including type of analgesia, dosage, and number of pills, for a series of common general surgery procedures. Additional questions investigated influences on opioid prescription, use of nonnarcotic analgesia, degree of engagement in patient education on opioids, and degree of training received on analgesia and opioid prescription.

**SETTING:** Accreditation Council for Graduate Medical Education accredited general surgery program at a university-based tertiary hospital.

**PARTICIPANTS:** Categorical and preliminary general surgery residents of all postgraduate years.

**RESULTS:** The percentage of residents prescribing opioids postprocedure ranged from 75.5% for incision and drainage to 100% for open hernia repair. Residents report prescribing 166.3 morphine milligram equivalents of opioid for a laparoscopic cholecystectomy, yet believe patients will only need an average of 113.9 morphine milligram equivalents. The most commonly reported influences on opioid-prescribing habits include attending preference (95.2%), concern for patient satisfaction (59.5%), and fear of

potential opioid abuse (59.5%). Only 35.8% of residents routinely perform a narcotic risk assessment before prescribing and 6.2% instruct patients how to properly dispose of excess opioids. More than 90% of residents have not had formal training in best practices of pain management or opioid prescription.

**CONCLUSION AND RELEVANCE:** Surgical trainees are relying almost exclusively on opioids for postoperative analgesia, often in excessive amounts. Residents are heavily influenced by their superiors, but are not receiving formal opioid-prescribing education, pointing to a great need for increased resident education on postoperative pain and opioid management to help change prescribing habits. (J Surg Ed 75:65-71. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** opioid prescribing, resident education, pain management

**COMPETENCIES:** Patient Care, Medical Knowledge

## INTRODUCTION

Opioid abuse has become an epidemic in the United States, creating devastating medical, social, and financial consequences.<sup>1,2</sup> As of 2014, the number of opioid-related deaths in the United States had risen to nearly 50,000 a year, a number now greater than the annual deaths from motor vehicle accidents.<sup>3</sup> Physicians have played a role in this epidemic by continuing to rely on and overprescribing narcotic analgesia. It is now estimated that a quarter billion opioid prescriptions are written in the United States each year,<sup>4</sup> which has created an excess supply of narcotics that has fueled the rise in overdoses, long-term addiction, and diversion for illicit use.<sup>5,6</sup>

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Prescribing postoperative analgesia presents a challenge for surgeons. Postoperative pain is an unavoidable consequence of most surgery, and surgeons must balance the need for sufficient analgesia with the risks of overprescribing. In recent years, an emphasis on patient satisfaction has focused attention on improving pain control, causing many physicians to err toward overprescribing.<sup>7</sup> With this focus on patient comfort, opioids have become the first-line analgesic postoperatively, and now more than a third of all prescriptions written by surgeons are for narcotics.<sup>8</sup>

The balance between patient need and proper dosing is particularly difficult for surgical trainees. Postoperative discharge prescriptions and instructions are commonly the responsibility of residents, and oftentimes left to junior residents who have the least amount of training and experience. Furthermore, although there are national guidelines for management of immediate perioperative<sup>9</sup> and chronic pain,<sup>4</sup> there are no widely established national surgical guidelines for management of postoperative pain for residents to reference. It therefore becomes the task of the resident to determine the dose and duration of analgesia with little guidance beyond their own limited anecdotal experience.

Although residents are given the responsibility of prescribing postoperative analgesia, their practice patterns and the influences on their prescribing habits remain ill-defined. To study this question, a questionnaire was administered to all general surgery residents at a large university-based hospital, asking about postoperative prescribing habits, prescribing influences, knowledge of narcotics, and education received on analgesia prescription.

## METHODS

An anonymous, deidentified survey was sent to all 101 residents at an Accreditation Council for Graduate Medical Education accredited General Surgery training program. Residents of postgraduate years (PGY) 1 through 5 were included. All designated and nondesignated preliminary residents and categorical residents were surveyed. Surveys were sent via e-mail in the fall of 2016 and administered using the online Qualtrics survey tool. Participation was optional.

The survey presented to residents a number of clinical scenarios and asked them to describe their typical analgesic regimen for an opioid-naïve patient, including type of analgesia, dosage, and number of pills prescribed. The chosen procedures included laparoscopic cholecystectomy, laparoscopic inguinal hernia repair, open inguinal hernia repair, laparoscopic hemicolectomy, and bedside buttock abscess incision and drainage (I&D). Cholecystectomy and hernia repair were presented as outpatient surgeries, whereas hemicolectomy was presented as an uncomplicated case being discharged on postoperative day 4. The I&D was

presented as a procedure performed in the emergency department with the patient to be discharged home. The survey questions are presented in total in [Supplementary Table A1](#).

The amounts of opioid-reported prescription were converted into morphine milligram equivalents (MME) based on the type of opioid, the dose, and the number of pills prescribed, to compare narcotic dosing across different medications.<sup>4</sup> To further investigate the residents who prescribed the most narcotic, residents were stratified into terciles based on the average amount of narcotic prescribed over the 5 queried procedures.

Residents were further asked to choose the most common influences on their narcotic-prescribing habits. Additional questions were administered regarding resident use of non-narcotic analgesia, interaction with pain services, degree of engagement in patient analgesia education, and level of resident education on analgesia and opioid prescription. Questions were structured as a 5-point Likert response scale.

Descriptive statistics were performed for survey questions. Student's *t*-tests were used to evaluate differences between continuous variables and chi-squared analyses for categorical variables. Differences between means were calculated using analysis of variance. All analysis was conducted using SAS 9.4 (SAS Institute, Cary, NC).

## RESULTS

### Demographics

A total of 82 of 101 residents responded for an 81.2% response rate. The demographics of the cohort are presented in [Table 1](#). There were responses from residents of all PGY levels, with the most being junior residents (PGY 1 and 2), reflecting the composition of a program that includes a large number of preliminary residents. Of the responding residents, 59 were categorical and 23 were preliminary, composed of both designated specialty and nondesignated preliminary residents. Most surveyed residents attended US medical schools (78.1%).

### Opioid-Prescribing Habits

The vast majority of postoperative analgesic prescriptions were narcotics ([Table 2](#)). Bedside I&D had the lowest percentage of reported postprocedure opioid prescription at 75.5%, whereas open hernia had the highest at 100%. The highest average amount of opioid prescribed was for laparoscopic colectomy (194.3 MME, standard deviation [SD] = 62.5), and the lowest was for bedside I&D (99.4 MME, SD = 82.2). For reference, 194.3 and 99.4 MME represent 26 and 13 tablets of 5 mg oxycodone, respectively. Residents reported prescribing higher amounts of opioids for open inguinal hernia repairs (175.3 MME, SD = 67.5) than for laparoscopic hernia repairs (159.5 MME, SD = 64.7).

**TABLE 1.** Demographics of Survey Respondents

| Characteristic            | N     | %   |
|---------------------------|-------|-----|
| Gender                    |       |     |
| Male                      | 54    | 66  |
| Female                    | 28    | 34  |
| Race                      |       |     |
| White                     | 50    | 61  |
| Hispanic                  | 3     | 4   |
| Black                     | 2     | 2   |
| Asian                     | 19    | 23  |
| Other                     | 8     | 10  |
| Resident level            |       |     |
| Junior (PGY 1-3)          | 54    | 66  |
| Senior (PGY 4-5)          | 28    | 34  |
| Medical school            |       |     |
| US                        | 64    | 78  |
| Foreign                   | 18    | 22  |
| Age (mean, SD)            | 29.97 | 2.9 |
| Resident type             |       |     |
| Categorical               | 59    | 72  |
| Preliminary nondesignated | 13    | 16  |
| Preliminary designated    | 10    | 12  |

If a patient has an established pain management specialist, most of the residents (53.7%) will contact them for guidance after inpatient procedures, whereas only 15.9% will contact them for outpatient procedures.

### Identifying High and Low Prescribers

Residents were categorized into high-, intermediate-, and low-prescribing groups based on the average amount of narcotic prescribed among the 5 surgeries (Supplemental Table A2). On an average, high prescribers prescribed 214.8 MME (SD = 27.7) compared to 160.5 MME (SD = 16.2) by intermediate prescribers and 107.1 (SD 27.6) by low prescribers. The demographics of the different prescriber levels were generally similar; however, a significantly higher percentage of senior residents (PGY 3-5) were high prescribers (35.7%) compared to junior residents (29.6%,  $p = 0.016$ ). Of the residents who had education on postoperative pain control practices, only 14.3% were high

prescribers, compared to 32.4% of those without such training ( $p = 0.249$ ). Similarly, none of the residents who had received specific training in opioid prescription were among the high prescribers compared to 33.8% of those without training ( $p = 0.249$ ).

### Influences on Opioid-Prescribing Patterns

The most commonly reported influence on resident opioid prescription is the preference of senior residents and attendings (95.2%) (Fig. 1). Having a standard opioid-prescribing habit for all patients of a certain operation was the second most common influence on prescribing (84.5%) followed by concern for potential opioid abuse (59.5%) and concern for patient dissatisfaction (59.5%). Least common influences on prescribing included patient preference (19.0%) and patient history of prescription narcotic use (23.8%).

### Residents' Nonnarcotic Analgesia—Prescribing Habits

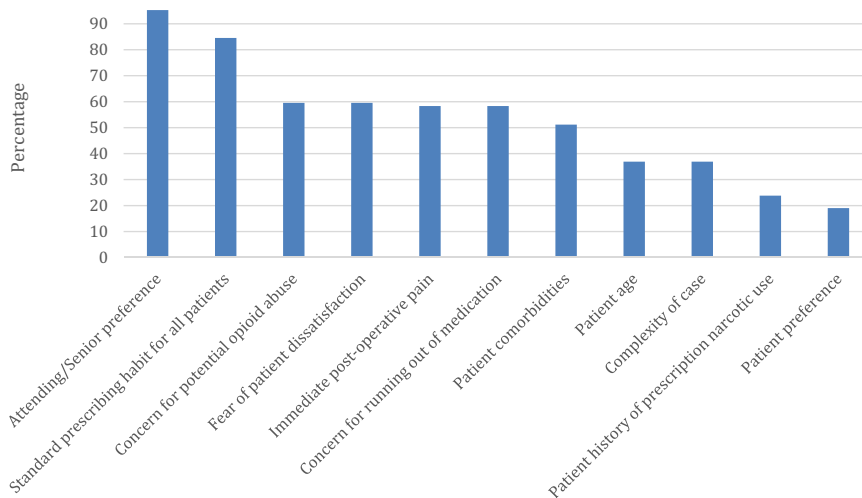
Most of the trainees (60.5%) reported promoting nonnarcotic methods for pain control in postoperative patients (Fig. 2). Among nonnarcotic methods, 28.9% of residents stated that they promote the use of herbal analgesia, 12.1% encourage the use of ice or heat packs, and 12.4% engage complementary pain services (e.g., massage or reiki therapy). Slightly more than half of residents feel comfortable prescribing nonnarcotic analgesia (60.2%).

### Resident-Provided Patient Education

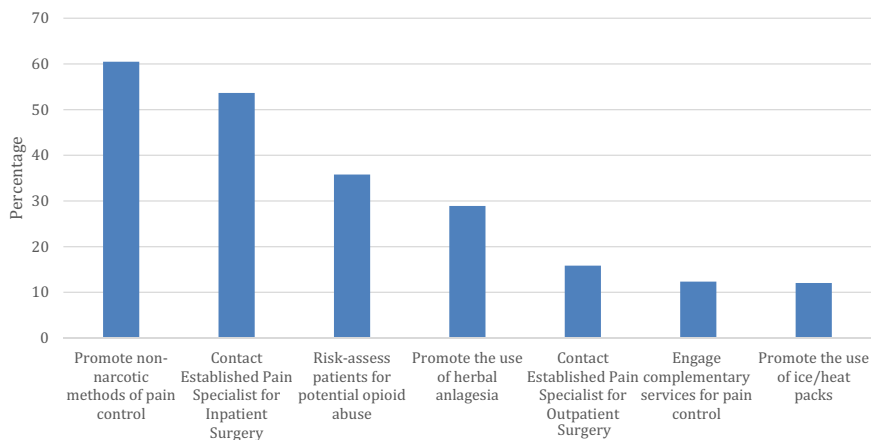
Almost all residents (95.2%) educate patients on the constipating side effects of narcotics, but only 12.1% of residents educate patients on what to do in case of opioid overdose (Fig. 3). For Tylenol, 72.3% of residents educate on the maximum daily dose, but less than half of residents (42.2%) warn patients on what the risks of Tylenol overdose are. Finally, only 6.2% of residents routinely instruct patients on how to properly dispose of their excess narcotic medication.

**TABLE 2.** Percentage of Residents Prescribing Opioids and Average Amount of Narcotic Prescribed by Type of Surgery

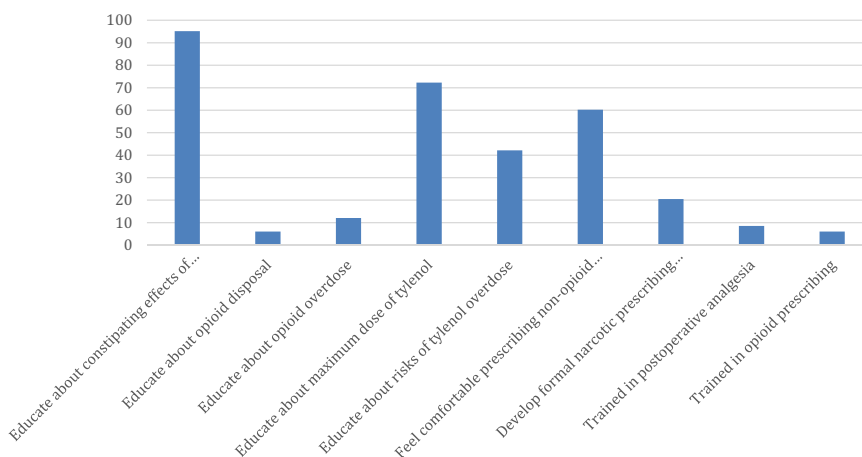
| Surgery                      | Percentage of Residents Prescribing Opioids | Mean Morphine Milligram Equivalent (MME) Prescribed | Standard Deviation | Max MME | p Value |
|------------------------------|---------------------------------------------|-----------------------------------------------------|--------------------|---------|---------|
| Laparoscopic cholecystectomy | 98.7                                        | 166.3                                               | 64.4               | 375     | <0.001  |
| Laparoscopic inguinal hernia | 97.6                                        | 159.5                                               | 64.7               | 375     |         |
| Open inguinal hernia         | 100.0                                       | 175.3                                               | 67.5               | 375     |         |
| Laparoscopic colectomy       | 97.6                                        | 194.3                                               | 62.5               | 375     |         |
| Bedside I&D                  | 75.5                                        | 99.4                                                | 82.2               | 337.5   |         |



**FIGURE 1.** Resident-reported influences on postoperative opioid prescription. Bar graph of percentage of residents affirming different influences on opioid-prescribing habits.



**FIGURE 2.** Resident-reported frequency in engaging in postoperative analgesic-prescribing habits. Bar graph of responses to questions pertaining to postoperative analgesic-prescribing practices.



**FIGURE 3.** Resident-reported habits on patient education regarding postoperative analgesia and education received on pain management and opioid prescription. Bar graph of responses to questions pertaining to patient opioid education practices and education residents have received on postoperative analgesia and opioid prescription.

## Residents' Education and Beliefs

Only 8.5% of residents reported receiving formal training in best practices of pain management, and 6.0% reported receiving formal training in opioid prescription (Fig. 3). Part of proper opioid management is assessing for risk of abuse, and only 35.8% of residents routinely perform a narcotic risk assessment. When asked about the analgesic needs of an average opioid-naïve patient after a laparoscopic cholecystectomy, residents believe patients would need an average of 15 pills (SD = 7.8) of 5 mg oxycodone over an average of 4.8 days (SD = 2.8) (Supplemental Table A2).

## DISCUSSION

Residents rely almost exclusively on opioids for postoperative pain management. Even for a simple bedside (I&D), residents are prescribing narcotics 75% of the time. There is evidence that analgesic regimens that avoid opioids can be sufficient for small procedures,<sup>10-12</sup> and nonopioid regimens have been established for some common surgeries,<sup>13,14</sup> yet it has become reflex to rely on opioids for postoperative analgesia. This phenomenon is not unique to trainees, but rather indicative of general practices around the United States, where it has become routine to prescribe narcotics for nearly all invasive procedures.<sup>15,16</sup> Part of this is owing to the current culture of medicine where pain control has become an essential metric of patient satisfaction.<sup>17</sup> Although there is movement away from using pain as a "5th Vital Sign,"<sup>18</sup> the primacy of pain control has pervaded medical culture, and the unintended consequences are now apparent.<sup>7,19</sup> Our survey demonstrates that trainees are adopting and furthering these practices, as most of the residents stated that the fear of patient dissatisfaction influences their prescribing habits.

Beyond relying on opioids for pain management, trainees are prescribing them in large, and likely excess quantities. For laparoscopic cholecystectomy, residents reported providing an average of 166.3 MME of narcotics (22 pills of 5 mg oxycodone), with a high of 375.0 MME (50 pills), yet when asked the number of 5 mg oxycodone tablets an average patient would typically use, residents reported an average of 113.9 MME (15 pills). This demonstrates that residents are prescribing more than they believe patients need, and are doing so by almost 50%. Additionally, evidence has shown that the vast majority of patients will use fewer than 15 pills. A study by Hill et al.<sup>16</sup> showed that after a laparoscopic cholecystectomy, patients used fewer than 10 narcotic pills on average, and a significant proportion never used any at all. Why residents overprescribe is multifactorial; however, the overwhelming majority of residents (95%) cite following the preferences of their senior residents and attendings as influencing their prescribing habits. It appears then that a major factor in resident

overprescribing is a learned practice that again points to a medical culture of narcotic overprescription.

The dangers of excess prescribing are exacerbated by the fact that trainees are not evaluating the clinical context when prescribing opioids. The vast majority of residents state that they have developed a standard practice of prescribing opioids postoperatively, and most were not influenced by a patient's age or comorbidities. Furthermore, only 35.8% of residents routinely risk assess patients for potential opioid abuse. These practices go against the plethora of evidence showing the need for careful titration of opioids based on a patient's individual risk based on factors such as age,<sup>20</sup> risk of abuse,<sup>4</sup> and weight.<sup>21</sup>

Finally, there is a missed opportunity in patient education on opioid safety. Trainees are commonly the physician most closely involved with postoperative patient discharge instructions, and this is a critical time to educate patients and families on narcotic safety, including appropriate usage, warning signs of overdose, and proper methods of excess narcotic disposal. This last point is particularly important, as excess prescription of opioids present a hazard to both the patient and those around them. Studies have shown that most abused opioids are obtained from friends and family with legitimate prescriptions,<sup>22</sup> and the easy availability of excess narcotics has been demonstrated to be a contributor to the national resurgence of heroin abuse.<sup>23,24</sup> Safety is also a concern, as improperly secured excess opioids have been implicated in the doubling of accidental pediatric opioid overdoses seen in the past 20 years.<sup>25</sup>

Together, these findings expose the need for formal education on pain management among surgical trainees. Fewer than 10% of trainees reported receiving any formal training in analgesic prescribing and 40% of residents do not feel knowledgeable about proper ways to prescribe nonnarcotic pain medications. This is not necessarily a program-specific issue, as training included medical school education, and the residents represented medical schools from around the country and world. Additionally, studies have shown similar low rates of pain management education among residents of other specialties, including internal medicine<sup>26</sup> and pediatrics.<sup>27</sup> Educational programs on pain management for trainees can be quite effective,<sup>28-30</sup> and our data demonstrated that those who received formal opioid training were significantly less likely to be a high prescriber than those without. Postoperative analgesia and opioid management should be core element of surgical education, and our study demonstrates that key areas for curriculum development for surgical trainees must encompass: (1) general opioid-prescribing strategies, including what is appropriate for different operations; (2) nonnarcotic methods of supplementing analgesia; (3) proper ways to individualize opioid prescribing and screen high-risk patients; and (4) patient education on opioid safety and narcotic disposal.

Our study has a number of limitations. First, this was a single institutional study, and the results are neither applicable

to the rest of the country nor to residents of other disciplines. Although the residents rotated through 4 different hospitals, there may be institutional or regional practices that do not translate broadly. Larger, more nationally representative surveys could help obtain a truer sense of resident prescribing across the country. Finally, this was a self-reported survey, and did not look at actual prescribing patterns, which introduces the possibility of reporting and recall bias.

## CONCLUSION

Surgical residents, like most physicians, are relying on opioids for postoperative analgesia, oftentimes in excessive amounts, and are missing opportunities to provide meaningful patient education on opioid safety and disposal. This points to a need for increased trainee education on narcotic prescription, something that is currently lacking. Surgeons and surgical residents can play a significant role in helping stem the opioid epidemic, and changing resident-prescribing habits can be an effective first step.

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## SUPPORTING INFORMATION

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.jsurg.2017.06.020>.