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ORIGINAL ARTICLE SPECIAL TOPICS

Opioid-Prescribing Practices in Plastic Surgery: A Juxtaposition of Attendings and Trainees

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Abstract

Background The rates of opioid abuse and overdose in America have risen in parallel with the rates of opioid prescribing by physicians. As such, we sought to examine the prescribing practices among plastic surgery attendings and trainees to determine the need for more thorough education.

Methods A survey was distributed to all ACGME-accredited plastic surgery residency programs and included questions regarding opioid-prescribing practices and self-rated ability pertaining to opioid management. Trends in prescribing practices based on prescriber position were analyzed using cumulative odds ordinal logistic regression with proportional odds and Chi-squared tests for ordinal and nominal variables, respectively.

Results We received 78 responses with a wide geographical representation from plastic surgery residency programs: 59% of respondents were male and 39.7% female, 29.5% were attendings, 26.9% senior residents, 29.5% junior residents, and 14.1% interns. Compared with attendings, interns prescribe fewer pills ($p < 0.05$) and were significantly more likely to prescribe oxycodone ($p < 0.03$). Junior residents were 4.49 times more likely ($p = 0.012$) and senior residents 3.65 times more likely ($p = 0.029$) to prescribe additional opioids to avoid phone calls and follow-up visits. Interns and senior residents were significantly less comfortable than attendings in managing patients requesting additional opioids ($p < 0.02$).

Conclusions The results of this survey demonstrate that knowledge deficits do exist among trainees, and that trainees are significantly less comfortable than their attending counterparts with opioid prescribing and patient management. Therefore, the implementation of a thorough postoperative pain management education in residency may be a cogent strategy in mitigating the opioid crisis.

Level of Evidence III This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Opioids · Prescribing · Residency · Plastic surgery

Introduction

Over the past two decades, liberalization of laws regulating the use of opioids for the treatment of chronic non-cancer pain has led to significant increases in opioid prescriptions [1]. Deaths related to opioid analgesics have risen in parallel with sales, and for the first time since 1980, prescription drug overdoses have surpassed motor vehicle collisions as the leading cause of death from injury in the USA [2, 3].

Previous studies have evaluated opioid-prescribing practices so as to identify and curtail physician contribution to the opioid epidemic. This is especially true within the

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surgical subspecialties, as 9.8% of all opioid prescriptions are written by surgeons [4]. These studies demonstrate that over-prescription in the postoperative period is especially common, with patients receiving as many as three times the number of opioid pills as required [5]. Importantly, this trend in over-prescription is paralleled by increasing diversion of opioid medications [5–12].

Given that residency training represents a potentially long-lasting point of intervention in the improvement of opioid prescribing, there is growing interest in understanding precisely how trainees fit into this paradigm. Previous studies have demonstrated that residents are more likely than attendings to deviate from practice guidelines, often through over-prescription, excessive early refills, and prescribing opioids for longer durations [13–15]. Residents also report infrequent use of opioid contracts and routinely neglect to perform opioid risk assessments [13, 15–17]. This may explain why patients receiving opioids from trainees are more likely to show signs of aberrant use (i.e., reporting medications lost or stolen, asking for early refills) compared to those managed by attending physicians [13, 14].

Despite the expanding body of literature on opioid prescribing and consumption in the postoperative period, the implementation of practice guidelines in plastic surgery has yet to come to fruition. Further exploration into the current state of education, comfort level, and prescribing patterns among the next generation of plastic surgeons is warranted in order to ensure the creation and importantly, the longevity of opioid-prescribing guidelines. To our knowledge, this is the first study to assess opioid-prescribing practices, patient management strategies, and self-rated comfort level among plastic surgery attendings and trainees.

Methods

Data Collection

A voluntary survey was distributed to all ACGME-accredited plastic surgery residency programs. Respondents were asked to identify themselves by position [attending physician, senior resident (4th year or higher), junior resident (2nd or 3rd year), intern (1st year)], and gender. Opioid-prescribing practices were queried by asking respondents about the percentage of patients prescribed opioids, number of opioid prescriptions provided in a week, their most prescribed opioid, quantity of a single opioid prescription, inclusion of stop dates and durations on opioid prescriptions, whether additional opioids were provided to avoid potential phone calls and follow-up visits, and whether emergency opioids were provided. Respondents were also asked how they managed additional requests for opioids at follow-up visits including whether additional opioids were prescribed, whether prescribers refused to provide additional opioids, and whether the prescriber referred patients with additional requests to another provider such as a primary care physician or pain specialist. Practices regarding the use of screening tools to determine risk factors for abuse were also gleaned from the survey. Finally, respondents were asked to rate their perceived ability to manage patients requesting more than appropriate levels of narcotics postoperatively.

Statistical Analysis

Following tabulation and calculation of survey results, respondents were stratified by provider level. Median self-rated ability levels were calculated by provider position, and cumulative odds ordinal logistic regression with proportional odds was utilized to calculate trainee comfort level with opioid prescribing relative to that of attending physicians. Cumulative odds ordinal logistic regression is a form of binomial logistic regression that can be applied for the prediction of ordinal variables with results reported as an odds ratio relative to a reference group, in this case attending physicians. Lower odds ratios indicate that individuals in the response group are more likely to rate themselves lower on the ordinal scale relative to the reference group and vice versa. Additional analyses were performed based on provider position and responses to the remainder of the survey items with cumulative odds ordinal logistic regression or Chi-square analyses for ordinal and categorical variables, respectively. Statistical significance was defined as $p < 0.05$. All analyses were performed using SPSS Version 22 (IBM Corp, Armonk, NY).

Results

A total of 24 programs participated in the study and 78 unique responses were recorded. The approximate response rate within this subset was 19%. Respondents represented a wide geographical representation from plastic surgery residency programs and spanned all levels of training and practice: 29.5% of respondents identified themselves as attendings, 26.9% as senior residents, 29.5% as junior residents, and 14.1% as interns (Fig. 1). There was a slight male predominance, with 59% of respondents identifying as male and 39.7% as female (Fig. 1).

When queried about individual prescribing patterns (Table 1), the majority (64.1%) of all respondents reported writing opioid prescriptions for $> 75\%$ of surgical patients, with similar distributions noted across all training levels ($p > 0.05$). Prescription of combination medications, such

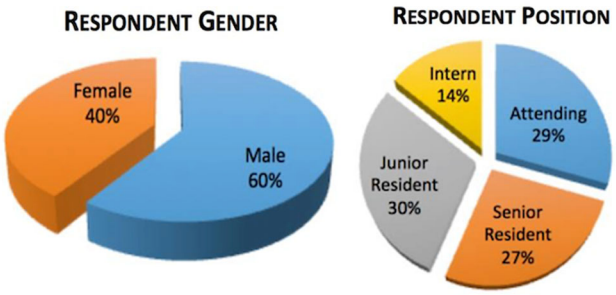

Fig. 1 Survey respondents by gender and position

as hydrocodone or oxycodone with acetaminophen, was more common overall when compared with hydrocodone or oxycodone alone (62.8% versus 35.9%). When stratified by training level, interns were noted to have the highest rate of oxycodone prescriptions (81.8%), whereas a substantial portion of attendings (78.3%) made use of combination analgesics ($p = 0.029$).

Among all participants, 64.1% reportedly prescribe less than 30 opioid pills in a given prescription, and the majority (55.1%) do not include a stop date for the medication. In comparison to attendings, interns were significantly less likely to prescribe large quantities of opioids (OR 0.25, 95% CI 0.06–0.97, $p = 0.044$). Provision of additional opioids to avoid phone calls and follow-up visits was reported by 58.9% of respondents, although with varying frequency. As shown in Fig. 2, junior and senior residents were 4.49 and 3.65 times more likely, respectively, than their attending counterparts to engage in this practice ($p = 0.012$ and $p = 0.029$, respectively) (Table 2).

Fewer than 50% of all participants reported routine query of prescription monitoring program database, and less than 25% acknowledged use of preoperative drug screening as part of their practice. Similar distributions in these responses were noted across all training levels ($p > 0.05$).

Regarding management of patients requesting additional opioids, 72.2% of residents and 59% of attendings opt for referral to the patient's primary care physician. In particular, interns were 3.99 times more likely than attendings to employ this strategy ($p = 0.048$) (Fig. 3). In the same scenario, referral to a pain specialist was a more common approach, reported by 84.6% of all participants. Senior residents, however, were significantly less likely to make use of pain specialist referrals (OR 0.27, 95% CI 0.08–0.93, $p = 0.038$) (Fig. 4). Self-rated ability (1–10) in managing patient requests for additional opioids identified lower median scores for interns (4/10, $p = 0.02$), junior residents (5/10, $p = 0.052$), and senior residents (5/10, $p = 0.016$) when compared to attendings (7/10) (Fig. 5).

Discussion

In the past 20 years, the USA has witnessed an unprecedented increase in prescriptions of opioid analgesics, a trend that was likely propagated by the loosening of state and federal regulations governing their use [1]. At present, Americans consume roughly two-thirds of the world's opioid supply despite accounting for less than 5% of the world's population [18, 19]. An estimated 1% of the American public is addicted to opioids, and the rate of opioid overdoses has increased more than three-fold over the past 10 years [20, 21]. With opioid-related deaths reaching an all-time high in the USA, the relationship between opioid sales and deaths has become impossible to ignore [1]. Increased awareness of postoperative opioid use in the greater context of the opioid epidemic has prompted introspection by authors across multiple specialties, ultimately leading to the publication recommendations for postoperative pain management [22, 23].

The current literature demonstrates that postoperative pain management is wrought with high-risk prescribing and deviations from best practice guidelines, a trend that reflects physicians' unintentional contribution to the opioid epidemic [5–12, 24–26]. However, when looking at the field of plastic surgery specifically, there is a dearth of data regarding the role of trainees in this paradigm. As such, evaluating the prescribing practices of plastic surgery residents can help to determine the need for a more thorough education program. Prior studies have demonstrated that residents do not feel confident in managing patients on opioids, and as many as 90% of residents report a lack of formal training in this area [13, 17, 27–31]. Based on self-rated comfort in managing patients requesting additional opioids, which was significantly lower for interns and senior residents as compared to attendings, an opportunity exists to further improve resident education in this situation. As the prevalence of opioid addiction in the USA continues to climb, it is likely that residents will find themselves in this type of scenario with increased frequency over time.

Over-prescription of opioids has been noted extensively throughout the literature, although this practice occurs in both residents and attendings [5–11, 15, 32]. Recent studies of opioid prescribing following common plastic surgery procedures have noted similar trends [33, 34]. This may be due, in part, to the perceived negative consequences of under-prescribing. Since opioid prescriptions cannot be called in to a pharmacy, a patient requiring more opioid medication than that which was prescribed must present to either the emergency room (ER) or the clinic for a signed prescription. Over-prescription may be an unintended consequence of this policy, as an additional office or ER

Table 1 Summary of opioid-prescribing practices

Practice	*N* (%)
Total	78
Percentage of patients receiving opioid prescriptions	
< 10%	2 (2.6%)
10–25%	0 (0.0%)
26–50%	4 (5.1%)
51–75%	20 (25.6%)
> 75%	50 (64.1%)
Average number of opioid prescriptions written per week	
< 5	15 (19.2%)
5–7	21 (26.9%)
8–10	22 (28.2%)
> 10	18 (23.1%)
Most commonly prescribed opioid	
Hydrocodone/acetaminophen (Vicodin, Norco)	28 (35.9%)
Oxycodone/acetaminophen (Percocet)	21 (26.9%)
Oxycodone	27 (34.6%)
Hydrocodone	1 (1.3%)
Quantity of a single opioid prescription	
< 10	3 (3.8%)
10–20	13 (16.7%)
21–30	34 (43.6%)
31–40	21 (26.9%)
41–50	2 (2.6%)
> 50	4 (5.1%)
Stop date on opioid prescriptions	
No stop date given	43 (55.1%)
1–3 days	7 (9.0%)
4–7 days	13 (16.7%)
8–10 days	4 (5.1%)
11–14 days	10 (12.8%)
> 14 days	0 (0.0%)
Do you prescribe additional opioids to avoid phone calls and follow-up visits?	
Never	31 (39.7%)
Sometimes	33 (42.3%)
Often	10 (12.8%)
Always	3 (3.8%)
Provision of emergency opioid medications	
Never	43 (55.1%)
Sometimes	27 (34.6%)
Often	5 (6.4%)
Always	3 (3.8%)
Use of a preoperative drug screen	
Yes	19 (24.4%)
No	59 (75.6%)
Query of prescription monitoring database	
Yes	34 (43.6%)
No	43 (55.1%)

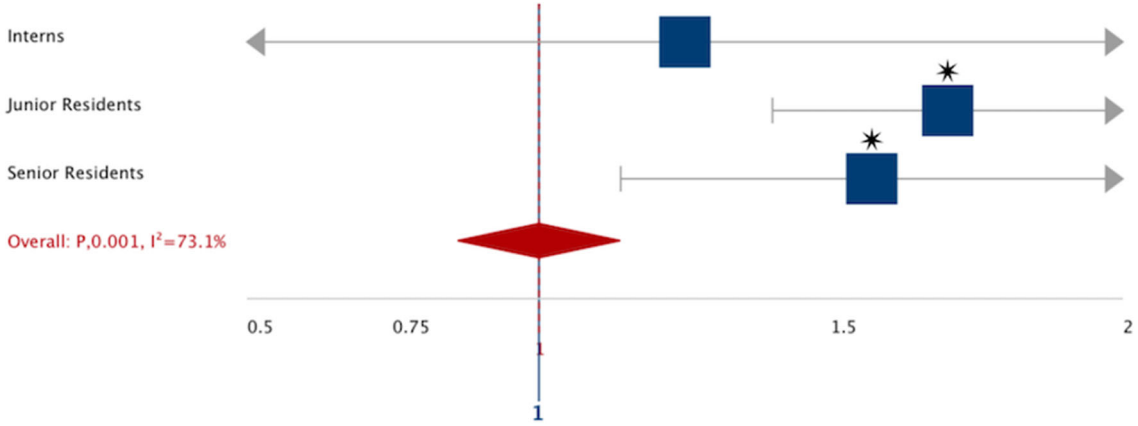

Fig. 2 Junior and senior residents are more likely to prescribe additional opioids to avoid phone calls than attendings (represented by red diamond; $p < 0.05$)

visit has implications for the patient, the resident, and the attending. This is supported by our study finding which showed the proclivity of junior and senior residents to prescribe additional opioids in order to avoid phone calls and patient follow-up visits. The desire to maximize rewards and minimize risks in the short term without consideration of long-term outcomes is a phenomenon that economists and psychologists have termed 'temporal discounting' [35, 36]. Residents, with their high workload and long hours, are especially susceptible to such a line of thinking. Alternatively, it is important to consider patient-specific factors in this situation as well. The early postoperative period is often marked by reliance on others for care and transportation, given postoperative pain, narcotic use, and recovery instructions. As such, the need for additional pain medications represents a burden to the patient as well.

Analgesic preference is another point of divergence between residents and attendings. Interns prescribed oxycodone more than any other group. At present, oxycodone is the most frequently prescribed opioid and also the most commonly involved overdose deaths [21]. In contrast to trainees, we found that attendings were more likely to utilize combination medications (i.e., hydrocodone with acetaminophen). As with many other practices in clinical medicine, pain management strategies have undergone numerous paradigm shifts over the years. As a result, the era in which individuals receive training may very well explain some of the differences noted in our study.

Despite well-established evidence that nonopioid regimens can be equally as effective, trainees continue to rely heavily on opioids for postoperative pain control [37–41]. A 2019 systematic review by O'Neill et al. suggests that non-narcotic medications, such as NSAIDs, gabapentin, and long-acting local anesthetics, have a favorable safety profile [42]. Interestingly, as many as 40% of surgical residents report a lack of knowledge regarding the proper ways to prescribe non-narcotic pain medications, which suggests that opportunities to educate residents on pain control exist in a broader context than purely opioid management.

The majority of providers in our study do not routinely use preoperative drug screens or prescription monitoring databases, a finding that is consistent with prior studies [13–17]. Compared with attendings, senior residents were significantly less likely to refer patients to pain specialists in response to a request for additional opioids. A prior study of analgesic control following outpatient surgery in patients with previously established pain management specialists showed that only 15% of residents contacted them for guidance [15]. In another study of over 600,000 patients on opioid medications, less than 4% were given a referral prescription [43]. The high rates of under-referral likely arises from a failure to recognize when referral is necessary as well as lack of knowledge regarding the available resources to help manage these patients [15]. Overall, the inadequate management and referral for patients taking medications with high addictive potential undoubtedly contributes to the increased rates of opioid abuse in America.

Together, these findings demonstrate that residents are lacking in knowledge and comfort level with opioid prescribing and pain management. Numerous studies have illustrated the impact that education in opioid prescribing and patient management can have on residents' knowledge and comfort level [27–31]. As a new generation of healthcare providers, residents are the prime candidates to serve as the vehicle for this change. This is especially true in the field of plastic surgery, as a substantial proportion of opioids dispensed annually are from postoperative prescriptions. As such, there is a strong need to develop and

Table 2 Management practices and comfort level

Scenario	*N* (%)
Total	78
Management of opioid request at follow-up	
Small quantity of opioids at patient request	
Never	10 (12.8%)
Sometimes	51 (65.4%)
Often	13 (16.7%)
Always	2 (2.6%)
Refusal to prescribe additional opioids	
Never	11 (14.1%)
Sometimes	39 (50.0%)
Often	22 (28.2%)
Always	2 (2.6%)
Referral to PCP	
Never	24 (30.8%)
Sometimes	21 (26.9%)
Often	27 (34.6%)
Always	4 (5.1%)
Referral to pain specialist	
Never	8 (10.3%)
Sometimes	45 (57.7%)
Often	17 (21.8%)
Always	4 (5.1%)
Self-rated comfort level in management of patients requesting more than appropriate levels of narcotics postoperatively	
1: I find them extremely challenging	3 (3.8%)
2	3 (3.8%)
3	17 (21.8%)
4	9 (11.5%)
5	9 (11.5%)
6	17 (21.8%)
7	7 (9.0%)
8	6 (7.7%)
9	3 (3.8%)
10: I find them easy to manage	4 (5.1%)

PCP primary care physician

implement a thorough educational component to all plastic surgery residency training programs.

There are several limitations to this study, the first of which is the small sample size, especially in the intern category. Additionally, only 24 programs participated in the study, which could also introduce bias. Another limitation is the inability to control for institutional and/or state guidelines and regulations regarding pain management. It is possible that certain responses, namely those related to drug choice and dosing, may be more reflective of policy-based decision making as opposed to personal preference. Similarly, the inability to control for differences in demographic characteristics of the patient populations at each institution may have confounded certain responses.

Conclusions

Surgeons are responsible for roughly 10% of the total opioid prescriptions in the USA [4]. As such, it is our moral obligation as plastic surgeons to protect our patients by implementing strategies to minimize our contribution to this epidemic. By examining the prescribing practices of residents as early as intern year, we have shown that

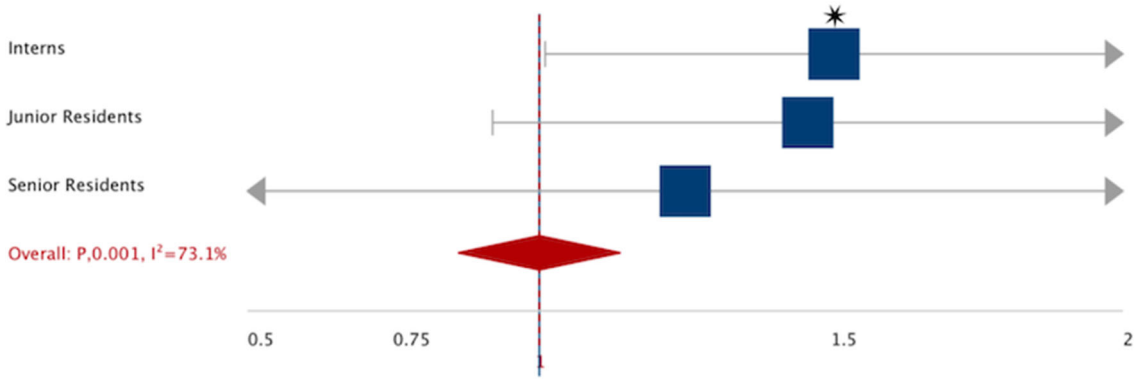

Fig. 3 Interns are more likely to refer patients to their PCP for pain management than attendings (represented by red diamond; $p < 0.05$)

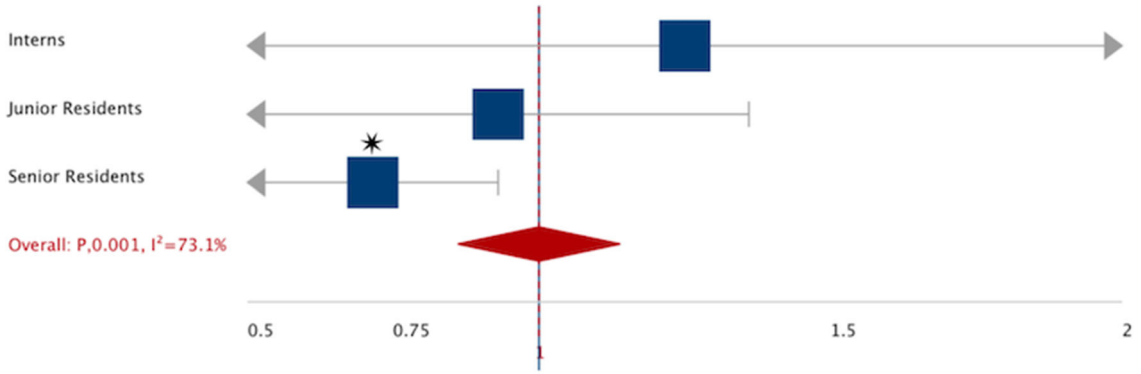

Fig. 4 Senior residents were less likely to refer patients to a pain specialist than attendings (represented by red diamond; $p < 0.05$)

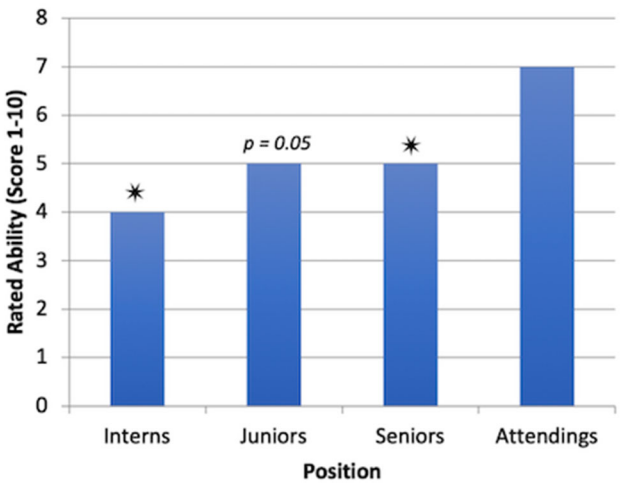

Fig. 5 Compared with attendings, residents are significantly less comfortable with opioid prescribing and the management of patients requesting additional postoperative narcotics ($p < 0.05$, except where noted for junior residents, $p = 0.05$)

knowledge deficits do exist among trainees. Further, we have shown that trainees are significantly less comfortable than their attending counterparts with respect to opioid prescribing and patient management.

There has never been a greater need to integrate a thorough didactic program for postoperative pain management into residency training. In line with the findings from prior studies, this approach to pain management education may be a cogent strategy in mitigating the opioid crisis. Given that the role of educational intervention on resident behavior and practice has only been studied in the short term, a possible direction of future studies would be a more long-term assessment of the impact that such a program might have. Additionally, an international comparison of prescribing practices in other countries would be beneficial in benchmarking best practice guidelines, and thus represents an important future direction.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

Human and Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of study, informed consent is not required.

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