

Are US Plastic Surgery Residents Equipped to Face the Opioid Epidemic? A National Survey

Banafsheh Sharif-Askary, MD
Salma A. Abdou, MD
Tanvee Singh, MPH
David H. Song MD, MBA

Summary: The United States opioid epidemic is among this century's most profound threats to public health and demands that all physicians consider their role in reversing its trajectory. Previous literature demonstrated that plastic surgery trainees lack vital practices that promote opioid stewardship. However, it is not understood why this practice gap exists. This is a national survey-based study evaluating the availability and effectiveness of opioid education in US plastic surgery programs. A total of 91 residents completed the survey. Our study found that there is an unmet need for practical and comprehensive training regarding safe opioid prescribing among plastic surgery trainees. "Informal training," defined as the "learn as you go" method, was found to be more common than formal training and considerably more valuable according to trainees. Trainees cited real-world applicability of informal training and that it comes from teachers whom they know and trust as valuable attributes of this type of education. Furthermore, the severity of the opioid epidemic has not translated into improved trainee education, as there was no significant difference in knowledge on safe opioid prescribing practices between junior and senior residents. To change the course of the epidemic, plastic surgery programs need to better train younger generations who believe they are critical stakeholders. This study lays the framework for the "formalization of informal training," and the creation of practical and efficacious educational initiatives. (*Plast Reconstr Surg Glob Open* 2021;9:e3761; doi: [10.1097/GOX.0000000000003761](https://doi.org/10.1097/GOX.0000000000003761); Published online 23 August 2021.)

INTRODUCTION

Prescription opioid addiction in the United States represents a staggering public health crisis.^{1,2} The National Center for Health Statistics and Centers for Disease Control and Prevention reported an estimated 46,802 opioid-related deaths in 2018, with prescription opioid medications accounting for nearly one-third of these deaths.^{3,4} This figure represents a more than four-fold increase since 1999.⁵ The United States prescribes more opioids per capita than any other nation, and consumes more than 80% of the world's opioid supply.⁶ As the devastating social and economic implications of this crisis become more

apparent, physicians must consider their role in reversing this trajectory.⁷⁻¹⁵ Surgeons continue to be among the most frequent prescribers of opioid medication.¹⁶⁻¹⁹ Recent research has shown that plastic surgeons are over-prescribing narcotics, sometimes by two-fold, following reduction mammoplasty, breast reconstruction, and abdominoplasty.²⁰⁻²⁶ Furthermore, a significant proportion of patients continue to take opioids up to 90 days after upper extremity and hand surgery.²⁷

A recent survey-based study demonstrated that US plastic surgery residents prescribe significantly more postoperative opioids when compared with their Canadian counterparts and lack critical opioid stewardship behaviors.²⁸ However, it is not understood why this practice gap exists. At most major academic medical centers, surgical trainees are the primary dispensers of postoperative

From the MedStar Georgetown University Hospital Department of Plastic and Reconstructive Surgery, Washington, D.C.

Received for publication May 17, 2021; accepted June 22, 2021.

Presented at the virtual Plastic Surgery The Meeting, American Society of Plastic Surgeons 2020 and at the virtual North Eastern Society for Plastic Surgeons 2020 Annual Meeting.

Copyright © 2021 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: [10.1097/GOX.0000000000003761](https://doi.org/10.1097/GOX.0000000000003761)

Disclosure: *Dr. Song receives royalties from Elsevier for Plastic Surgery, 3rd and 4th editions, and from Biomet Microfixation for Sternalock. All the other authors have no financial interest to declare in relation to the content of this article.*

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

opioid prescriptions. Thus, there is a critical need to focus efforts on determining how plastic surgery residency programs can train conscientious and accountable surgeons in the face of the current opioid epidemic. This is the first study evaluating the current state of opioid education in US plastic surgery residency programs. In addition to determining the availability and effectiveness of current resources, this study identifies where knowledge and practice gaps exist to lay the groundwork for future educational efforts.

METHODS

Survey Design

Following MedStar Health Research Institute IRB approval (STUDY00001552), a survey was designed to identify the resources used in opioid prescribing education in plastic surgery residency and their perceived value. (See survey, **Supplemental Digital Content 1**, which displays the survey. <http://links.lww.com/PRSGO/B758>.) The primary outcomes of the survey included the quantity and quality of education on opioid prescribing available to current plastic surgery trainees as well as knowledge of safe opioid prescribing practices among trainees. Training was categorized into “formal” and “informal” opioid training. “Formal” was defined as purposeful teaching (ie, planned curriculum). “Informal” was defined as the “learn as you go” method (eg, experience from seeing the practice of other residents.). Secondary outcomes of the study included resident prescribing habits, attitude toward the opioid epidemic, and satisfaction toward current opioid education in plastic surgery residency. The web-based survey was anonymously hosted by Qualtrics Survey Software (Qualtrics, Seattle, Wash.).

Survey Distribution

A standardized email invitation was distributed to program coordinators and program directors of all 97 academic plastic surgery programs listed by the American Council of Academic Plastic Surgeons.²⁵ (See document, **Supplemental Digital Content 2**, which displays the mail for survey distribution. <http://links.lww.com/PRSGO/B759>.)

The email requested that the survey be forwarded to all current plastic surgery residents. An initial email was distributed to program directors on January 28, 2020. Follow-up reminder emails were sent at 4 and 6 weeks from the initial date of distribution. The survey remained open for a 3-month period. Respondents were not compensated for their participation.

Statistical Analysis

Descriptive analysis was performed using SPSS, version 24.0 (IBM, Armonk, N.Y.). All responses were analyzed based on respondent demographics, including gender, ethnicity, PGY level as well as training pathway (independent versus integrated), US geographic location, and practice setting of training program (eg, urban versus suburban). Residents were divided into “junior” (ie, PGY1–PGY3) and “senior” residents (ie, PGY4–PGY7) for further

analysis using Fisher’s exact test for categorical variables. Values were evaluated using descriptive statistical methods (mean, SD) and results were significant at a *P* value less than 0.05.

Qualitative Analysis

Open ended questions that allowed participants to respond using free text were included to provide better insight into what residents found valuable about each type of training (formal versus informal) and what they would like to see incorporated into their education. The responses were independently reviewed by two authors (BSA and SAA) and following discussion, were placed under categories prospectively created based on common themes that came up in one or more responses.

RESULTS

Respondent Demographics

A total of 105 participants started the survey. After excluding incomplete surveys, 91 responses were analyzed (Table 1). Based on the Accreditation Council for Graduate Medical Education Data Resource Book 2018–2019, there are approximately 1101 residents who are eligible to take this survey. Assuming that all eligible residents received an invitation to participate in the survey, the response rate was estimated to be 8.3%. Average respondent age was 30.6 ± 4.5 years, and a majority were in an integrated residency program (85, 93.4%). There was a relatively even distribution across all postgraduate years. Most survey respondents attended programs in the

Table 1. Demographics of Included Survey Respondents

| Characteristic | N (%) |
|--------------------------------------|----------------|
| Mean age \pm SD (y) | 30.6 \pm 4.5 |
| Gender | |
| Men | 46 (50.5) |
| Women | 54 (50.5) |
| Race/ethnicity | |
| White | 61 (67.0) |
| Black or African American | 4 (4.4) |
| Hispanic or Latino | 2 (2.2) |
| Asian/Pacific Islander | 18 (19.8) |
| Other | 6 (6.6) |
| Post-graduate training | |
| Integrated pathway | 85 (93.4) |
| Independent pathway | 3 (3.3) |
| Other | 3 (3.3) |
| Level of training | |
| PGY1 | 15 (16.5) |
| PGY2 | 15 (16.5) |
| PGY3 | 16 (17.6) |
| PGY4 | 13 (14.3) |
| PGY5 | 16 (17.6) |
| PGY6 | 14 (15.4) |
| PGY7 | 2 (2.2) |
| US region of training program | |
| Northeast | 43 (47.3) |
| Midwest | 17 (18.7) |
| West | 16 (17.6) |
| South | 15 (16.5) |
| Practice setting of training program | |
| Urban | 60 (65.9) |
| Rural | 2 (2.2) |
| Suburban | 4 (4.4) |
| Mixed | 25 (27.5) |

PGY, postgraduate year.

Northeast (43, 47.3%) and practiced in an urban setting (60, 65.9%).

Opioid Knowledge

Almost half of the residents reported not knowing how to query prescription drug monitoring databases (47.3%). Seventy percent of residents do not know of any preoperative screening tools to assess risk for opioid abuse. Sixty percent of residents reported not knowing how patients can safely dispose of unused opioid pain medications in their community. There was no significant difference in knowledge of these specific safe opioid prescribing practices between junior and senior residents (all P values >0.05 ; Table 2). Residents rated their understanding of pharmacokinetics, doses, and side-effects of opioids they regularly prescribe on a five-point Likert scale (1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor). Of the respondents, 31.9% believed their understanding was “good,” whereas 29.7% reported “poor” knowledge. With regard to understanding of the causes and exacerbating factors of the US opioid epidemic, 30.8% of residents’ self-reported knowledge level was “good” and 27.8% was “poor.” The most common sources of information on the current opioid crisis among trainees were documentaries and news articles (75.8%) and online-training modules (40.7%). The strong majority of trainees strongly agreed that physician residents play a role in affecting the trajectory of the opioid epidemic (67, 73.6%). There was no difference in opioid-related knowledge when comparing trainee gender, race, geographical region, or practice setting (all P values >0.05).

Formal versus Informal Training

More than half of survey respondents received formal training on safe opioid prescribing practices (54, 59.3%; Table 3). The most common settings for formal training were didactics/departmental conferences (36, 66.7%) and online-training modules (36, 66.7%). Reversal of opioid overdoses (38, 70.4%) was the most commonly covered topic.

A vast majority of residents (83, 91.2%) reported having informal training on safe opioid prescribing practices (Table 4). The most common modality was instruction from a senior resident/attending without explanation

Table 2. Comparing Knowledge of Safe Opioid Prescribing Practices between Junior and Senior Residents

| Safe Opioid Prescribing Knowledge | Junior Residents (N = 46) | Senior Residents (N = 45) | P^* |
|---|---------------------------|---------------------------|-------|
| Do not know how to query prescription drug monitoring databases, n (%) | 23 (50.0) | 20 (44.4) | 0.596 |
| Do not know preoperative screening tools to assess risk for opioid use, n (%) | 31 (67.4) | 33 (73.3) | 0.535 |
| Do not know how patients in their community can safely dispose of unused opioid pain medications (eg, DEA-designated drop box, take-back programs), n (%) | 29 (63.0) | 26 (57.8) | 0.608 |

Junior residents, PGY1–PGY3; Senior residents, PGY4–PGY7.

* $P < 0.05$ was considered statistically significant.

Table 3. Topics Covered by Formal Training

| Topic | N (%) |
|---|-----------|
| Reversal of opioid overdose | 38 (70.3) |
| Appropriate use of nonopioid adjuncts | 35 (64.8) |
| Patient counseling regarding risks of opioid use | 35 (64.8) |
| Managing patient expectations regarding pain | 28 (51.9) |
| Duration, onset, and clearance of different opioids | 27 (50.0) |
| ERAS protocols | 26 (48.1) |
| Screening for high-risk patient populations | 19 (35.2) |
| Appropriate transition from IV to PO opioids | 15 (27.8) |
| Available pain service consultants | 9 (16.7) |

(75, 90.3%), followed by discussion with a senior resident/attending with explanation (73, 88.0%). Only 59.3% of participants who received formal training found it to be valuable, whereas 95.2% who received informal training found it valuable. Among respondents who had both forms of training (77, 84.6%), the vast majority (66, 85.7%) found informal training to be more valuable.

Residents provided free text responses exploring what they found to be valuable about different forms of training. We categorized their free text responses into several recurring themes (Fig. 1). Reasons cited for the value of formal training were categorized into one of two unique categories: (1) tools for patient counseling and (2) removal of personal bias/attending preference. Valuable qualities of informal training fell under one of two unique categories: (1) practical, real-world applicability and (2) instruction from a trusted/experienced mentor. Providing guidelines on specific and safe regimens/dosing was a common theme cited as valuable in both formal and informal training.

Prescribing Practices

Residents most commonly cited the magnitude of the procedure (34, 37.3%) and concern for patient dissatisfaction (17, 18.7%) as important factors informing type and amount of opioids prescribed (Table 5). More than half (60, 65.9%) of residents reported regularly reviewing the medication administration record before prescribing discharge opioid medication. When a patient calls the on-call pager requesting additional pain medication, most residents reported encouraging nonopioid adjuncts (63, 69.2%) and more than half (51, 56.0%) said they have refilled opioid prescriptions for discharged patients they did not operate on or examine. Eight percent of junior residents reported that they “always” ask for rationale for the amount and type of opioids they are instructed to prescribe, whereas 4.1% of senior residents reported “always” providing rationale. There was no difference in prescribing

Table 4. Delivery of Informal Instruction in Opioid Prescribing

| Format | N (%) |
|---|-----------|
| Instruction from senior resident/attending (without explanation/discussion) | 75 (90.4) |
| Discussion with senior resident/attending | 73 (88.0) |
| Consults/recommendations from acute or chronic pain teams | 67 (80.7) |
| Acquired order sets | 52 (62.7) |
| Suggestion from nursing staff | 24 (28.9) |
| Other | 3 (3.6) |

Table 5. Factors Influencing Opioid Prescribing Practices

| Factor | N (%) |
|--|-----------|
| Magnitude of the procedure | 34 (37.3) |
| Concern for patient dissatisfaction | 17 (18.7) |
| Attending or senior resident preference | 13 (14.3) |
| Patient history of illicit substance abuse | 11 (12.1) |
| Standardized departmental prescribing | 7 (7.7) |
| Patient age | 4 (4.4) |
| Prescriber concern for opioid addiction | 2 (2.2) |
| Perceived patient pain tolerance | 1 (1.1) |

patterns when comparing trainee gender, race, geographic region, or practice setting (all *P* values > 0.05).

DISCUSSION

Physicians across all specialties are critically evaluating their prescribing practices in the face of the current opioid epidemic. The basic tenet of “do not harm,” which encompasses opioid addiction and misuse, is particularly salient in plastic surgery, where nearly 70% of cases are considered elective.²⁹ Studies have identified education as an area of emphasis for future initiatives to promote opioid stewardship.^{21,25,26,30,31} While prior work has quantified opioid prescribing among residents, this is the first study evaluating the availability and efficacy of educational resources for safe opioid prescribing practices in US plastic surgery residency programs.

Gaps in Knowledge

Our study found that plastic surgery residents lack essential safe opioid prescribing practices. Nearly half of respondents reported not knowing how to query prescription drug monitoring databases. Furthermore, more than half reported not knowing of any preoperative screening tools to assess risk for opioid abuse or how patients can safely dispose of unused opioid pain medications. Previously, it was unclear why trainees lacked these critical stewardship practices. This study demonstrates that this is not due to lack of time or because trainees do not find them to be useful. In fact, our survey demonstrates that the strong majority of plastic surgery trainees believe they have a role in influencing the trajectory of the opioid epidemic. Indeed, a majority of narcotics prescribed in the United States are done so by resident physicians, making them perhaps the strongest agents of change.³² Our study illustrates that plastic surgery trainees do not receive the necessary education to pursue this change.

Like all other aspects of surgical education, competency related to opioid stewardship should increase with more exposure; however, we found no significant difference in safe opioid prescribing knowledge between junior and senior residents. The US government first declared the opioid epidemic a national public health crisis in 2017.³³ Although it is possible that junior residents received earlier opioid-related education as medical schools adjusted their curriculums in response to this declaration, it is evident that residency training programs have not responded similarly.³⁴ Our finding of equivalent knowledge among junior and senior residents is especially concerning, given the prevalence

of informal training, which is dependent on senior to junior resident teaching.

Formal versus Informal Training

To better understand how trainees gain skills and knowledge related to opioid prescribing, we categorized training as “formal” and “informal.” Informal training was more common and considered significantly more valuable than formal training. Free text responses allowed for a unique insight into what aspects of each training type residents found valuable (Fig. 1).

Managing Patient Expectations

Residents reported that formal training effectively equips them with tools to counsel patients regarding pain management. Ancillary information that respondents cited as useful included alternative treatment options and data that may be presented to patients to justify minimizing opioids as first line. Risk factors for chronic opioid abuse among opioid-naïve patients include older age, male gender, mood disorders, and chronic pain disorders.^{35,36} Despite this, respondents cited concern for patient dissatisfaction and attending/senior resident preference as more influential on opioid prescribing decisions than patient risk factors. Concern for patient dissatisfaction remains among the strongest influences on postoperative opioid prescribing following surgery.³² In an era of performance-based metrics, it can be difficult to reconcile the desire to leave patients pain free with prescribing safely. However, studies suggest that opioid-sparing approaches have not led to detrimental changes in patient satisfaction.³⁷ Our survey demonstrates that plastic surgery residents recognize the pressures of reconciling patient expectations with safe prescribing and rely on formal training to prepare them to face this challenge.

Removing Personal and Attending Bias

By presenting objective data, formal training also equips trainees to remove bias from their learning and subsequent clinical practice. Attending preference strongly influences opioid prescribing across surgical specialties.^{32,38} However, residents often report no direct communication with attendings regarding the rationale for their preference.³⁸ Similarly, 90.4% of residents who received “informal training” had received instruction from a senior resident or attending without discussion or explanation. Over the last two decades, there has been a major paradigm shift in attitudes toward opioids for postoperative pain management. Whereas senior attendings trained during an era when pain was seen as a “fifth vital sign,”³⁹ it has since been recognized that this approach leads to inappropriate prescribing by physicians and misuse by patients.⁴⁰ Based on our survey, formal training helps trainees combat personal and attending biases when prescribing opioids. In the words of one respondent, “(I) often feel like we prescribe based on what an attending wants despite feeling that we are over prescribing.” The objective, data-driven guidance from formal training gives residents “backup from higher level” evidence regarding their decision to (or not to) prescribe opioids. Based on another respondent, “(formal training) help(s) to combat

| FORMAL TRAINING THEMES | COMMON THEMES | INFORMAL THEMES |
|---|---|---|
| Removing attending/personal bias | Guidelines on specific and safe regimens/dosing | Real world applicability |
| "Back up from higher level—often feel like we prescribe based on what an attending wants despite feeling that we are over prescribing." Helped to combat personal bias that pain medications should be avoided." | "Baseline knowledge of what is "reasonable" to be prescribing to patients who are experiencing pain that I personally have not experienced before, so it is hard to have a reference point." "Scheduled Tylenol/ibuprofen. Adjuncts such as gabapentin and methocarbamol. Ketamine drips for severe pain." | "It was more personalized to each patient and more up to date (ie. wariness from opioid epidemic)." "Real patients who underwent surgeries that I understand." "Prescribing for real patients who I am taking care of." |
| Managing patient expectations | | Instruction from experienced mentors |
| "Knowing alternatives and when to say no." "Alternative treatment modalities, patient counseling techniques." "Data I could present to patients." | "Dosing. Common practices. Managing them safely." "That I finally had a guideline for what to do, before I was randomly guessing." "Learning max safe dosing." "Doses and length of prescription doses." "Understanding the importance of limiting the amount of opioids we prescribe." | "Hearing from senior residents what they prescribe for patients having undergone XYZ procedure based on their clinical experience." "Advice from mentors I trust and who have experience with the relevant procedures." "Based on anecdotal experience—done before, so should be safe to do now right?" "Advice from trusted individuals with experience." |

Fig. 1. Common themes on the value of formal and informal training.

personal bias that pain medications should be avoided," therefore allowing for its indicated use.

Real-world Applicability

The real-world benefit of informal training stems from its applicability to patients and procedures that residents are familiar with. In the words of one respondent, "(informal training) occurs in real time, and in relation to a patient population I understand." Formal opioid education is often generalized and nonspecific. In contrast, informal training allows trainees to, "put recommendations into context of patients (we) see every day." Prior opioid education initiatives demonstrated that guided instruction (ie, informal training), with immediate application in the clinic-setting and feedback from attendings, led to greater comfort and efficiency with safe opioid tapering in residents.⁴¹ Like in all facets of surgical education, "repeated reinforcement (leads) to recognition of patterns and learning," and helps residents in, "seeing the effectiveness of different medications prescribed for patients on a day to day basis." In the same way that trainees actively receive direct feedback on technical skills, opioid education should be intentional and not be considered marginal. Indeed, pedagogical research has demonstrated that deliberate practice of learned skills in a real environment, with constant feedback, is the best way to form a long-lasting, conceptual understanding of concepts.⁴²

Instruction from Experienced Mentors

Residents cited instruction from trusted mentors as another valuable component of informal training. One respondent noted that "(instruction came from) attendings who know the surgeries and patient populations." Informal training provides insight into, "what combinations and standard durations of prescribing certain medications have had the best results for others." Another respondent stated that the value of informal training derived from, "(mentors) who I have seen practice and who have seen these patients before and are credible." Thus, residents seek real-time direction from attending physicians who have the privilege of continuity of care and who, with experience, have optimized pain management for their niche of practice.

It is important to reconcile the value of guidance from attendings with residents' desire to receive unbiased training. While residents reported undue influence from attendings, the credibility and value of attending insight does not stem from their knowledge of opioids, but rather from experience with certain procedures and patients. However, this does not account for additional factors that determine safe and effective pain regimens, including patient risk factors for opioid abuse. Due to a lack of resources, trainees have come to view attending surgeons as the all-encompassing "credible" resource when, in reality, their insight is meant to inform, not determine, opioid prescribing.

Future Directions: Formalization of Informal Training

Both formal and informal training on opioid prescribing education are valuable means of providing opioid education. A common theme of both formal and informal training was guidance on specific and safe dosing of pain medications. Unsurprisingly, when asked what they would like to see more of incorporated into their opioid education, trainees commonly requested more enhanced recovery after surgery (ERAS) protocols. In addition to providing explicit guidance on specific medication dosing and duration, ERAS protocols encompass many of the previously discussed valuable characteristics unique to both formal and informal training. It is evidence-based, relies heavily on preoperative patient education, and it removes personal bias.⁴³ At the same time, ERAS protocols are targeted toward common plastic surgery procedures,^{44–46} it is practiced in real time, and it draws on expert plastic surgery opinion (ie, trusted, credible mentors). In this way, ERAS protocols best represent the concept of “formalization of informal training” as it relates to opioid education training. This is based on the notion that formal and informal training both play a role in preparing young surgeons to practice opioid stewardship. The strength of formal training derives from its reliance on science and objective data. Concurrently, informal training makes opioid education more personal to the trainee via a trusted mentor and patient, while being targeted to the procedure. While it is not possible to implement a streamlined ERAS protocol for all plastic surgery procedures due to the diversity of cases, there remains a paucity of higher-level studies that examine the value of these protocols as an educational medium. As of 2020, the Plastic Surgery Foundation has awarded only three research grants to projects with objectives related to reducing postoperative opioid management.⁴⁷ Notably, none of these grants fell under education. Increasing funding for projects with an emphasis on opioid education has become a mission of the American Foundation for Surgery of the Hand’s research grants.⁴⁸ Encouraging research into new frameworks for opioid education will help guide protocols for trainees across all medical specialties.

Our survey further highlights the need for a plastic surgery specific opioid curriculum. Currently, for a fee, the American Society of Plastic Surgeons offers members a “Patient Safety: Opioids” online-training module that explores topics such as the challenges of opioid use, collaboration with other medical specialties, and legislation regarding opioid prescriptions.⁴⁹ Online-training modules, though convenient, can be ineffective because they are often unengaging, not done in a practice environment, and sometimes out of date.⁵⁰ The annual American Council of Academic Plastic Surgeons intern boot camp, a three-day course aimed at preparing new plastic surgery interns, may be an ideal platform for implementation of a basic safe opioid prescribing curriculum because it is well-established and available to nearly all incoming plastic surgery interns.⁵¹ This proposed curriculum would include the aspects of “formal” training that were commonly cited as valuable, including addressing implicit bias, assessing patient risk factors, and patient counseling. It would also

be led by experienced surgeons and, if delivered with examples of real plastic surgery cases, can re-create the “real world applicability” factor inherent to “informal” training. For example, presenting the evidence on the use of transversus abdominis plane blocks in microvascular abdominally based breast reconstruction to minimize postoperative narcotic use or use gabapentin and pregabalin in limb amputation patients whose neuropathic pain is better addressed with nonopioid adjuncts.^{52,53} By “formalizing informal training” in this way, new trainees have the baseline knowledge to safely prescribe opioids postoperatively, as well as a clinical context relevant to their training to apply this knowledge safely and effectively. This curriculum will also provide an initial metric to track comfort with opioid prescribing and improvement in delivery of opioid training over time.

Limitations

This study has several limitations, the most notable being our relatively low response rate as is often the case for survey-based studies. Our response rate is estimated to be 8.3% based on the number of eligible residents (1101) cited in the Accreditation Council for Graduate Medical Education Data Resource Book 2018–2019. However, it is likely that this is an underreported rate as we did not email residents directly. Due to the anonymous platform utilized for survey distribution, we cannot confirm that all program coordinators and directors forwarded the invitation to their residents, and it is thus possible that not all eligible survey participants received an invitation. Despite this, our absolute number of responses is comparable to or greater than most resident-based surveys in the plastic surgery literature.^{28,54} Furthermore, nonresponder analysis demonstrated that survey participants are a representative sample of eligible participants. (See document, **Supplemental Digital Content 3**, which displays the nonresponder analysis. <http://links.lww.com/PRSGO/B760>.)

However, because of the small sample size, there may be limited power to address both trainee-related associations such as race or gender, or program-specific factors, such as geographic region practice setting. Additionally, our survey respondents were mostly from programs in the northeast region which is a possible bias related to name recognition among local programs. Within these limitations, however, we were still able to identify very important trends in opioid education in plastic surgery training programs to inform efforts to improve education on this topic.

CONCLUSIONS

This is the first study within plastic surgery to demonstrate that there is an unmet need for practical and comprehensive training on essential practices related to opioid stewardship. To change the course of the epidemic, plastic surgery residency programs need to better train younger generations who believe they are critical stakeholders. This study lays the framework for the “formalization of informal training”—a concept that draws on the strength of *both* modalities to create an educational paradigm that is cohesive, complementary, and complete.

David H. Song, MD, MBA

Department of Plastic and Reconstructive Surgery
 MedStar Georgetown University Hospital
 3800 Reservoir Rd NW
 Washington, DC 20007
 E-mail: david.h.song@gunet.georgetown.edu

REFERENCES

1. Manchikanti L, Helm S, Fellows B, et al. Opioid epidemic in the United States. *Pain Physician*. 2012;15(3 suppl):ES9–E38.
2. CDC grand rounds: prescription drug overdoses – a U.S. epidemic. *MMWR Morb Mortal Wkly Rep*. 2012;61:10–13.
3. Wilson N, Kariisa M, Seth P, et al. Drug and opioid-involved overdose deaths – United States, 2017–2018. *MMWR Morb Mortal Wkly Rep*. 2020;69:290–297.
4. Drug overdose deaths. CDC Injury Center. 2020. Available at <https://www.cdc.gov/drugoverdose/data/statedeaths.html>. Accessed Jun 1, 2020.
5. Hedegaard H, Warner M, Minino AM. *Drug overdose deaths in the United States, 1999–2015. NCHS Data Brief*. Washington, D.C.: Centers For Disease Control and Prevention; 2017.
6. Manchikanti L, Singh A. Therapeutic opioids: a ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids. *Pain Phys*. 2008;11(2 suppl):63.
7. Rosson GD, Singh NK, Ahuja N, et al. Multilevel analysis of the impact of community vs patient factors on access to immediate breast reconstruction following mastectomy in Maryland. *Arch Surg*. 2008;143:1076–1081.
8. Minozzi S, Amato L, Davoli M. Development of dependence following treatment with opioid analgesics for pain relief: a systematic review. *Addiction*. 2013;108:688–698.
9. Wasan AD, Correll DJ, Kissin I, et al. Iatrogenic addiction in patients treated for acute or subacute pain: a systematic review. *J Opioid Manag*. 2006;2:16–22.
10. Keller CE, Ashrafioun L, Neumann AM, et al. Practices, perceptions, and concerns of primary care physicians about opioid dependence associated with the treatment of chronic pain. *Subst Abus*. 2012;33:103–113.
11. Coffin P, Banta-Green C. The dueling obligations of opioid stewardship. *Ann Intern Med*. 2014;160:207.
12. Ballantyne JC. Opioid analgesia: perspectives on right use and utility. *Pain Physician*. 2007;10:479–491.
13. Paulozzi LJ, Mack KA, Hockenberry JM. Variation among states in prescribing of opioid pain relievers and benzodiazepines—United States, 2012. *J Safety Res*. 2014;51:125–129.
14. Hill MV, McMahon ML, Stucke RS, et al. Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. *Ann Surg*. 2017;265:709–714.
15. Hwang CS, Turner LW, Kruszewski SP, et al. Primary care physicians' knowledge and attitudes regarding prescription opioid abuse and diversion. *Clin J Pain*. 2016;32:279–284.
16. Von Korff M, Korff MV, Saunders K, et al. De facto long-term opioid therapy for noncancer pain. *Clin J Pain*. 2008;24:521–527.
17. Pasricha SV, Tadrus M, Khuu W, et al. Clinical indications associated with opioid initiation for pain management in Ontario, Canada: a population-based cohort study. *Pain*. 2018;159:1562–1568.
18. Ladha KS, Neuman MD, Broms G, et al. Opioid prescribing after surgery in the United States, Canada, and Sweden. *JAMA Netw Open*. 2019;2:e1910734.
19. Callinan CE, Neuman MD, Lacy KE, et al. The initiation of chronic opioids: a survey of chronic pain patients. *J Pain*. 2017;18:360–365.
20. Isbester KA, Younis JO, Knusel KD, et al. Plastic surgeons and opioid prescription trends in the medicare population. *Plast Reconstr Surg Glob Open*. 2019;7:e2357.
21. Demsey D, Carr NJ, Clarke H, et al. Managing opioid addiction risk in plastic surgery during the perioperative period. *Plast Reconstr Surg*. 2017;140:613e–619e.
22. Rose KR, Christie BM, Block LM, et al. Opioid prescribing and consumption patterns following outpatient plastic surgery procedures. *Plast Reconstr Surg*. 2019;143:929–938.
23. Khansa I, Jefferson R, Khansa L, Janis JE. Optimal pain control in abdominal wall reconstruction. *Plast Reconstr Surg*. 2018;142(3 suppl):142S–148S.
24. Janis JE, Joshi GP. Introduction to “current concepts in pain management in plastic surgery”. *Plast Reconstr Surg*. 2014;134(4 suppl 2):6S–7S.
25. Schoenbrunner AR, Janis JE. Pain management in plastic surgery. *Clin Plast Surg*. 2020;47:191–201.
26. Barker JC, Joshi GP, Janis JE. Basics and best practices of multimodal pain management for the plastic surgeon. *Plast Reconstr Surg Glob Open*. 2020;8:e2833.
27. Johnson SP, Chung KC, Zhong L, et al. Risk of prolonged opioid use among opioid-naïve patients following common hand surgery procedures. *J Hand Surg Am*. 2016;41:947–957.e3.
28. Grant DW, Power HA, Vuong LN, et al. Differences in opioid prescribing practices among plastic surgery trainees in the United States and Canada. *Plast Reconstr Surg*. 2019;144:126e–136e.
29. Plastic Surgery Statistics Report. ASPS National Clearinghouse of Plastic Surgery Procedural Statistics. American Society of Plastic Surgeons;2020:5-10. Available at <https://www.plasticsurgery.org/documents/News/Statistics/2020/plastic-surgery-statistics-full-report-2020.pdf>. Accessed July 29, 2021.
30. Jack MC, Pozner JN. Putting it all together: recommendations for pain management in nonsurgical facial rejuvenation. *Plast Reconstr Surg*. 2014;134(4 suppl 2):101S–107S.
31. Wang AMQ, Retrouvey H, Wanzel KR. Addressing the opioid epidemic: a review of the role of plastic surgery. *Plast Reconstr Surg*. 2018;141:1295–1301.
32. Chiu AS, Healy JM, DeWane MP, et al. Trainees as agents of change in the opioid epidemic: optimizing the opioid prescription practices of surgical residents. *J Surg Educ*. 2018;75:65–71.
33. Assistant Secretary of Public Affairs (ASPA). What is the U.S. opioid epidemic? HHS.gov. 2017. Available at <https://www.hhs.gov/opioids/about-the-epidemic/index.html>. Accessed Jun 1, 2020.
34. Singh R, Pushkin GW. How should medical education better prepare physicians for opioid prescribing? *AMA J Ethics*. 2019;21:E636–E641.
35. Sun EC, Darnall BD, Baker LC, et al. Incidence of and risk factors for chronic opioid use among opioid-naïve patients in the postoperative period. *JAMA Intern Med*. 2016;176:1286–1293.
36. Bennett KG, Kelley BP, Vick AD, et al. Persistent opioid use and high-risk prescribing in body contouring patients. *Plast Reconstr Surg*. 2019;143:87–96.
37. Hallway A, Vu J, Lee J, et al. Patient satisfaction and pain control using an opioid-sparing postoperative pathway. *J Am Coll Surg*. 2019;229:316–322.
38. Gaspar MP, Pflug EM, Adams AJ, et al. Self-reported postoperative opioid-prescribing practices following commonly performed orthopaedic hand and wrist surgical procedures: a nationwide survey comparing attending surgeons and trainees. *J Bone Joint Surg Am*. 2018;100:e127.
39. American Pain Society. Principles of analgesic use in the treatment of acute pain and chronic cancer pain, 2nd edition. *Clin Pharm*. 1990;9:601-12.
40. Scher C, Meador L, Van Cleave JH, et al. Moving beyond pain as the fifth vital sign and patient satisfaction scores to improve pain care in the 21st century. *Pain Manag Nurs*. 2018;19:125–129.
41. Austin RC, Fusco CW, Fagan EB, et al. Teaching opioid tapering through guided instruction. *Fam Med*. 2019;51:434–437.

42. McGaghie WC, Issenberg SB, Cohen ER, et al. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. *Acad Med.* 2011;86:706–711.
43. Echeverria-Villalobos M, Stoicea N, Todeschini AB, et al. Enhanced recovery after surgery (ERAS): a perspective review of postoperative pain management under ERAS pathways and its role on opioid crisis in the United States. *Clin J Pain.* 2020;36:219–226.
44. Offodile AC II, Gu C, Boukovalas S, et al. Enhanced recovery after surgery (ERAS) pathways in breast reconstruction: systematic review and meta-analysis of the literature. *Breast Cancer Res Treat.* 2019;173:65–77.
45. Batdorf NJ, Lemaine V, Lovely JK, et al. Enhanced recovery after surgery in microvascular breast reconstruction. *J Plast Reconstr Aesthet Surg.* 2015;68:395–402.
46. Shea-Budgell M, Schrag C, Dumestre D, et al. Order sets for enhanced recovery after surgery protocol. *Plast Reconstr Surg Glob Open.* 2017;5:e1323.
47. Grants we funded. The Plastic Surgery Foundation. 2020. Available at <https://www.thepsf.org/research/grants-we-funded>. Accessed Jun 12, 2020.
48. American Foundation for Surgery of the Hand. AFsH grants, awards, and programs. Available at <https://www.afsh.org/s/grants-awards-and-programs>.
49. American Society of Plastic Surgeons. Patient safety: opioids. 2019. ASPs. Available at <https://www1.plasticsurgery.org/shopping/product.aspx?id=27357&to=shopasps>. Accessed June 1, 2020.
50. Zisblatt L, Hayes SM, Lazure P, et al. Safe and competent opioid prescribing education: Increasing dissemination with a train-the-trainer program. *Subst Abus.* 2017;38:168–176.
51. Davidson EH, Barker JC, Egro FM, et al. A national curriculum of fundamental skills for plastic surgery residency: report of the inaugural ACAPS boot camp. *Ann Plast Surg.* 2017;78:121–126.
52. Abdou SA, Daar DA, Wilson SC, et al. Transversus abdominis plane blocks in microsurgical breast reconstruction: a systematic review and meta-analysis. *J Reconstr Microsurg.* 2020;36:353–361.
53. Salibian AA, Frey JD, Thanik VD, et al. Transversus abdominis plane blocks in microsurgical breast reconstruction: analysis of pain, narcotic consumption, length of stay, and cost. *Plast Reconstr Surg.* 2018;142:252e–263e.
54. Joseph WJ, Cuccolo NG, Chow I, et al. Opioid-prescribing practices in plastic surgery: a juxtaposition of attendings and trainees. *Aesthetic Plast Surg.* 2020;44:595–603.