

# Postprocedural Opioid-Prescribing Practice in Nail Surgery

## *A National, Questionnaire-Based, Cross-Sectional Study with Recommendations*

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**Background:** Ingrown toenails are a common condition requiring outpatient procedures in podiatric medical clinics. To prevent recurrence, chemical matrixectomy is often recommended. Postprocedural pain management is largely based on preferences rather than on a formal guideline. This study aims to explore the postprocedural prescribing behavior among practicing podiatric physicians to foster future guideline and policy development.

**Methods:** We administered an open, voluntary, anonymous questionnaire via an online survey platform that included a common nail procedure scenario (chemical matrixectomy) and a prescribed demographics section. Podiatric physicians were asked what they would prescribe to manage postprocedural pain. Opioid and nonopioid options were provided. We developed two multiple logistic regression models to identify associations between prescriber characteristics and prescribing opioids after “standard” chemical matrixectomy.

**Results:** Of the 860 podiatrists who completed the survey, 8.7% opted to prescribe an opioid. Hydrocodone was most commonly chosen. A median of 18 opioid pills were prescribed. No prescriber characteristics were associated with prescribing opioids after chemical matrixectomy scenario. There is a large discrepancy and knowledge gap in the literature on the optimal postprocedural pain management for outpatient procedures, including procedures in specialties such as dentistry and dermatology. The median number of opioids prescribed by podiatrists is higher than that by dentists for management of third molar extraction. In contrast, opioid-prescribing behavior among the 8.7% of respondents is similar to dermatologic management of postprocedural pain in Mohs surgery.

**Conclusions:** Podiatric physicians cannot assume that their prescribing of opioids does not affect the opioid abuse problem in the United States. The presented study serves to be an initiation for procedure-specific opioid prescription benchmarking to foster future guideline and policy development. After nail procedures, opioids should not be routinely prescribed. (J Am Podiatr Med Assoc 113(3), 2023)

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Ingrown toenails are one of the most common conditions that require outpatient procedures in podiatric

medical clinics and offices. It has been estimated that patients with ingrown toenails account for 6.7% of all of the patients who present to a podiatric physician.<sup>1</sup> An ingrown toenail occurs when the skin surrounding the medial or lateral nail fold is disturbed by the neighboring nail plate.<sup>2</sup> The agitation results in a foreign-body reaction and possible symptoms,

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including pain, drainage, foul smell, and hypertrophy of surrounding tissue.<sup>2</sup> The ingrown nail may be caused by trauma, constricting footwear, improper trimming, or underlying anatomical mechanisms. Several treatment options exist, and one of the most common is chemical matrixectomy: removal of the offending nail edge followed immediately by chemical ablation of the nail matrix to prevent future recurrence.<sup>3</sup> Currently, postprocedural pain management is based largely on the clinician's preferences for their patient—rather than on a formal guideline. As such, pain management after matrixectomy can include a combination of rest and elevation, dressing changes with antibacterial ointment coupled with nonsteroidal anti-inflammatory drugs (NSAIDs), and acetaminophen or NSAIDs combined with opioids.<sup>2,4</sup>

Although opioids provide significant pain relief after a procedure, overuse and overprescription have fueled the recent opioid abuse epidemic in the United States. Deaths related to opioid overdose are estimated to be 63,000 in 2016 alone, with nearly half being directly attributed to prescription opioids.<sup>5</sup> The study has shown that one in 16 opioid-naive patients will become long-term users after being prescribed opioids after a surgical procedure.<sup>5</sup> Moreover, use of prescription opioids for pain management is responsible for a 19-fold increase in the likelihood of illicit heroin use initiation.<sup>6</sup> Therefore, the implementation of a multimodal pain management strategy that reduces opioid consumption without compromising patient comfort has been recommended to improve patient safety and prevent further exacerbation of opioid addiction.<sup>7</sup> For example, the combination of NSAIDs and acetaminophen is capable of synergistic pain relief greater than either product individually.<sup>8</sup> In addition, clinician education plays a vital role in reducing opioid use and optimizing prescriptions.<sup>9</sup> Clinician education is especially important because current prescribing habits have been driven by tradition and a false notion that opioids are rarely addictive rather than by objective data and science.<sup>5</sup> Sustained improvements, including a reduction in quantity, in opioid prescriptions have been observed for 15 months after initial instruction according to a recent systematic review.<sup>10</sup> This review aimed to identify the effects of an educational intervention on the opioid-prescribing habits of clinicians by including studies with at least one objective measure of opioid use in the acute-care setting after clinician education.<sup>10</sup>

Pain management after chemical matrixectomy, like many procedures, is without a formal national guideline. Considering how often chemical matrixectomies are performed by podiatric physicians,

knowing the prescribing habits of those practicing in the United States will help define the current standard of care for pain after chemical matrixectomy with a goal of mitigating the current opioid epidemic in the United States. We aimed to survey the opioid-prescribing behavior among currently practicing podiatric physicians after performing chemical matrixectomy on an opioid-naive patient.

## Methods

### Research Design

This study was originally part of a larger study by Brooks et al<sup>11</sup>; we made a post priori decision to publish this study separate from the original study. We obtained institutional review board exempt status from the institutional review board at the Rosalind Franklin University of Medicine and Science and the Committee for the Protection of Human Subjects at Dartmouth College for an open, voluntary, anonymous, online questionnaire distributed on the internet via Qualtrics (Qualtrics, Seattle, Washington), an online survey platform that uses panel-based sampling to reach specific demographic groups. No personal or identifiable information was stored, and respondents received no incentive for survey completion. They could use a back button to revisit their answers. The concept of this survey was inspired by Hearty et al.<sup>12</sup> Content validity was established through an extensive review of the literature in September 2018 and by the members of the 2019-2020 Clinical Practice Advisory Committee of the American Podiatric Medical Association, who served as content experts and offered input on the patient scenario and medication options. We completed the pilot study in October 2019.

### Sample and Survey

The target population was practicing podiatric physicians in the United States. We recruited practicing podiatric physicians exclusively through e-mail invitation from the American Podiatric Medical Association's membership list, which consisted of approximately 8,736 members who fit the eligibility criteria. Survey respondents who did not complete the demographics section, retired podiatric physicians, practicing podiatric physicians who no longer perform surgery/procedures, current fellows, and residents were excluded from the study.

The survey took an estimated 10 to 15 min to complete. From December 10, 2019, to April 10, 2020,

eight survey invitations were sent via e-mail to the American Podiatric Medical Association's membership list. In the consent statement provided at the beginning of the survey, participants were asked to respond to the questionnaire only once. Respondents were presented with a patient scenario and were then provided six multiple-choice options (five commonly prescribed opioids and a nonnarcotic option) regarding which postoperative medication they would prescribe and asked to complete a fill-in-the-blank response for the number of pills (dosage units) prescribed at the time of surgery.

We collected the following demographic information from prescribers: gender identity, years in practice, podiatric medical school, years of residency, completion of a fellowship, practice setting, and the state in which each respondent primarily practiced. States were then reclassified into the United States Census regions (Midwest, Northeast, South, and West), with Puerto Rico classified in the South region.

### Patient Scenario

"A 55-year-old man has recurrent ingrowing medial and lateral borders of his right hallux; otherwise healthy. He previously underwent a total nail avulsion with another podiatrist and now requests a permanent nail-removal procedure. He has been taking ibuprofen for the pain and has never taken opioid pain medication."

*Procedure: chemical matrixectomy*

### Variables of Interest

There were two outcome variables of interest: prescribing opioids of any quantity and prescribing more than six opioid dosage units. Both outcome variables were dichotomous. Six was selected as a cutoff point because it reflects the maximum amount of medication that can be consumed in a 24-hour period for prescriptions written for every 4 to 6 hours, which is a common schedule for pain medication. The most common opioid was also reported.

### Statistical Analysis

Unweighted responses were analyzed. Univariate analysis (*t* test for dichotomous variables and analysis of variance for categorical variables) and multiple logistic regression models were used to understand the strength and direction of the association between the outcome variables and

prescriber characteristics, as well as to adjust for any confounding. All of the assumptions were tested and met. Although we adjusted for the nine podiatric medical schools in the United States, we did not report the results by school due to considerations of anonymity for the respondents. We analyzed the data using STATA v15.1 (College Station, Texas). A predefined  $\alpha \leq 0.05$  was used for statistical significance, and only completed surveys were analyzed.

## Results

### Descriptive Results

The survey included 860 podiatric foot and ankle surgeons, which resulted in a response rate of 9.8%, which is approximately 5% of the total practicing podiatric physicians in the United States. The completeness rate was 84%. Of the 860 respondents, 8.7% opted to prescribe an opioid. All five opioid options were selected at least once. The most common opioid prescribed was hydrocodone. The median quantity of opioid dosage units prescribed was 18.

### Statistical Analysis

In the univariate analysis, no prescriber characteristics were statistically significant for either outcome of interest. Likewise, no characteristics were associated with statistically significant differences in either logistic regression model (Tables 1 and 2). The prescriber characteristic that was closest to statistical significance was fellowship training; fellowship-trained podiatric physicians tended to have decreased—albeit not statistically significantly—odds of prescribing opioids compared with their non-fellowship-trained counterparts (Tables 1 and 2).

## Discussion

### Overall Summary of Findings/Implications

In this cross-sectional study of 860 podiatric physicians, 785 (91.3%) would not prescribe an opioid for standard chemical matrixectomy. This finding suggests that most of the practicing podiatric physicians agree that a standard chemical matrixectomy patient does not warrant an opioid prescription. Overall, this finding is consistent with other specialists who perform in-office/in-clinic procedures,

**Table 1. Odds of Prescribing Opioids After Chemical Matrixectomy**

Predictor (Prescriber Characteristic)	Odds Ratio	95% CI	P Value
Intercept	0.1	0.06–0.18	<.001
Female sex	0.88	0.47–1.65	.686
Region			
Northeast	1.21	0.56–2.60	.63
South	1.43	0.73–2.79	.293
West	1.6	0.76–3.38	.214
Fellowship trained	0.35	0.11–1.16	.087
Years in practice			
≤5	0.59	0.24–1.43	.242
6–15	0.87	0.45–1.68	.681
Academic practice	0.36	0.05–2.74	.327
Federal health services	0.36	0.05–2.72	.322
Hospital/health system	0.57	0.20–1.65	.302

**Table 2. Odds of Prescribing More Than 6 Opioid Dosage Units after Chemical Matrixectomy**

Predictor (Prescriber Characteristic)	Odds Ratio	95% CI	P Value
Intercept	0.05	0.03–0.11	<.001
Female sex	1.11	0.52–2.36	.788
Region (Midwest = Referent)			
Northeast	1.35	0.54–3.43	.522
South	1.45	0.63–3.31	.382
West	1.15	0.43–3.12	.78
Fellowship trained	0.39	0.09–1.68	.209
Years in practice			
≤5	0.63	0.21–1.87	.403
6–15	0.86	0.38–1.98	.731
Academic practice	0.63	0.08–4.84	.661
Federal health services	0.66	0.09–5.08	.692
Hospital/health system	0.76	0.22–2.56	.655

such as dentists and dermatologists. Nonetheless, we could not determine the reasons why the remaining 75 practicing podiatrists (8.7%) would elect to prescribe an opioid after chemical matrixectomy based on the given scenario. Of these prescribers, the median number of opioid dosage units given at the time of the procedure was 18 pills. This result further indicates the importance of benchmarking and guideline development for a clinical procedure such as chemical matrixectomy to help combat unnecessary and excess opioid prescriptions that contribute to the opioid epidemic in the United States.

### Comparison with Foot and Ankle Surgery Literature on Opioid-Prescribing Habits

Overton et al<sup>5</sup> at Johns Hopkins University established an opioid-prescribing guideline by reviewing 20 common surgical procedures in six surgical subspecialties and coming to a consensus decision

with a panel of 30 stakeholders. The expert panel recommended 0 opioid dosage units for procedures, including uncomplicated vaginal delivery and cardiac catheterization. The same expert panel recommended 16 to 20 opioid dosage units prescribed for procedures such as open reduction and internal fixation of the ankle and maximally invasive gynecologic procedures.<sup>5</sup>

In contrast to an expert panel, other studies base the quantity of opioids prescribed on whether the procedure is osseous (any procedure involving bone manipulation) or nonosseous (all of the other procedures).<sup>13,14</sup> Rodgers et al<sup>13</sup> compared opioid consumption after bony and nonbony upper-extremity procedures and found that patients undergoing bony procedures had a higher visual analog scale pain score (possible range, 0–10) than the nonbony procedure group (2.4 versus 1.9;  $P = .089$ ). The group that received bony procedures also consumed a median of 14 dosage units compared with 9 for the nonbony group ( $P = .010$ ).<sup>13</sup> In addition,

Saini et al<sup>14</sup> performed a prospective observational cohort study to evaluate opioid consumption in bony versus nonbony procedures after orthopedic foot and ankle surgery, which also found that patients who received nonbony procedures consumed fewer narcotic pain pills (median, 16) compared with those who underwent bony procedures (20 dosage units). However, disagreement regarding opioids for bony versus nonbony procedures exists.<sup>15</sup> A retrospective case study by Merrill et al<sup>15</sup> examined opioid consumption after foot and ankle surgery for bony and nonbony procedures but did not find a significant difference ( $P = .491$ ) between the number of opioid dosage units taken for bony (21.6 pills) versus nonbony (19.7 pills) procedures, despite those undergoing a bony procedure trending toward a higher pain score. As a result, the current evidence suggests that prescribing habits may be beyond the type of procedure.<sup>15,16</sup> For example, Bhashyam et al<sup>16</sup> created location-specific opioid recommendations based on a prospective observational cohort study across a 1-year period for bony and nonbony procedures. They recommend a maximum of 10 opioid dosage units for a nonbony procedure of the forefoot and 20 opioid dosage units for a bony procedure of the forefoot.<sup>16</sup>

Although type (bony versus nonbony) and location (forefoot versus rearfoot) are important factors in potential prescribing guidelines, it is important to consider the effect that a general protocol may have. For example, the incorporation of a simple multimodal postoperative pain protocol in an outpatient setting of a foot and ankle surgery department has been shown to reduce opioid prescriptions by 30% after 1 year.<sup>17</sup> This protocol, created by Boffeli and Gorman,<sup>17</sup> combines acetaminophen with ibuprofen for the first 3 days after a foot and ankle procedure and advises opioids on an as-needed basis for severe or breakthrough pain.

### **Comparison with Mohs Dermatologic Literature on Opioid-Prescribing Habits**

A nonbony outpatient procedure that is somewhat similar to chemical matrixectomy is Mohs micrographic surgery. This procedure is commonly performed to treat skin malignancies in an outpatient setting, with opioids prescribed as a means for postprocedural pain management.<sup>18</sup> In a retrospective cross-sectional study, opioid prescriptions to Medicare patients for post-Mohs procedure pain management were compared between a general dermatologist group and a Mohs surgeon-specific group.<sup>18</sup> Mohs

surgeons were defined as those who billed for the surgery using the most recent terminology code.<sup>18</sup> Approximately 93.3% of the general dermatologists prescribed none to ten opioids postprocedurally, with 6.7% opting to prescribe more than ten pills.<sup>18</sup> It is interesting to note that the prescribing habits of the general dermatologists were significantly lower than those of the Mohs surgeons.<sup>18</sup> Approximately 52% of the Mohs surgeons opted to prescribe more than ten opioid pills, and 40% prescribed one to ten opioids pills, with an average duration of 4 days.<sup>18</sup>

The Mohs procedure in dermatology and chemical matrixectomy in podiatric medicine share a similar struggle with the lack of specific recommendations regarding postprocedural pain management.<sup>19</sup> For example, a systematic review by Saco and Golda,<sup>19</sup> which examined postoperative pain management in outpatients undergoing a Mohs procedure, noted an inability to make a recommendation because of a lack of data in the included studies. Instead, Saco and Golda<sup>19</sup> recommended prescribing a small quantity of opioids on the day of surgery based on location and expected pain level. Note that when opioids were prescribed for postoperative pain, patients often did not feel the need to use them, or they consumed only one to a few of the prescribed pills.<sup>20</sup> Unfortunately, there is also a lack of data for studies that examine postoperative pain related to Mohs procedures performed on a nail unit. A study by Topin-Ruiz et al<sup>21</sup> found that individuals undergoing excision of a subungual squamous cell carcinoma reported experiencing severe pain for days after surgery. Specifically, severe pain was rated greater than 7 on a visual analog scale.<sup>21</sup> Although excision of the nail unit followed by a Mohs procedure differs from chemical matrixectomy, it seems appropriate to consider the similarity in location and the possibility of comparable pain levels.

### **Comparison with Dental Literature on Opioid-Prescribing Habits**

Looking beyond the foot and ankle, dental procedures are also commonly performed in the outpatient setting. Dentists held the number 2 rank of health-care professionals prescribing opioids in 2011.<sup>22</sup> In addition, dentists often perform third molar dental impactions (wisdom tooth removal), which are commonly the first experience many patients have with prescription opioids.<sup>23</sup> However, unlike foot and ankle procedures, numerous dental-specific opioid-prescribing guidelines exist.<sup>24</sup> For example, a comprehensive dental guideline on opioid prescribing was released in 2017 by the

Agency Medical Director's Group, a collaboration of seven state agencies in Washington State.<sup>24</sup> These recommendations suggest a limit of eight to 12 opioid tablets for individuals younger than 24 years in addition to numerous considerations made before prescribing opioids for pain management.<sup>24</sup> Moreover, a different dental guideline suggests that postprocedural dental pain should be managed based on perceived degree of pain.<sup>25</sup> For example, severe pain warrants ibuprofen with acetaminophen and hydrocodone for the first 72 hours after the procedure.<sup>25</sup> Under this model, both mild and moderate pain are managed with ibuprofen or ibuprofen and acetaminophen.<sup>25</sup> National procedure-specific consensus guidelines represent an area of improvement for managing acute pain for podiatric medicine and other specialties in general.<sup>26</sup>

### Limitations

This study had a 9.8% response rate (n = 860); the low overall response rates make it difficult to generalize findings to all of the podiatric physicians practicing in the United States. In addition, the patient scenario was hypothetical; as such, we did not obtain data regarding actual prescribing practice data, and there may be variation between what prescribers say they will prescribe and what they actually prescribe.

### Conclusions and Recommendations

Although we recognize that postprocedural pain management should be tailored to each patient's medical history, allergies, and pain tolerance, among other things, we recommend that routine prescribing of opioids for nail procedures, such as chemical matrixectomies, is unwarranted. This is an area for improvement in podiatric medicine. Most podiatric physicians (91.3% in this study) do not prescribe postprocedural opioids for routine chemical matrixectomy. No basic demographic characteristics were associated with prescribing opioids after chemical matrixectomy. Although procedure-specific national guidelines for opioid prescribing after nail procedures have yet to be established, prescribing 18 opioid dosage units reflects unnecessary excess given that most podiatric physicians do not prescribe any opioids. Opioids should be prescribed only in the rarest of cases after nail procedures and should be limited to breakthrough pain during the first 24 hours after the procedure. In these rare cases, such as patients with extremely low pain tolerance and contraindications to other analgesics,

we recommend educating the patient on pain management before the procedure and prescribing no more than 6 dosage units to cover breakthrough pain for the first 24 hours, which is well below the median of 18 prescribed in this study.

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**Acknowledgment:** Reed Bratches, MPH, of The Dartmouth Institute for his contribution and assistance with statistical analysis.

**Financial Disclosure:** None reported.

**Conflict of Interest:** None reported.

**Disclosure:** The contents herein do not represent the views of the US Department of Veterans Affairs or the United States Government.

**Note:** The project was inspired by Saint Servatius; the first author prefers that this principle of avoiding routine opioid prescribing for nail or other minor procedures be referenced as the "Saint Servatius Principle."

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