Opioid-Prescribing Approaches—One-Size-Fits-All versus Patient-Centric and Procedure-Focused—Among Podiatric Physicians

A Cross-Sectional Study

Brandon M. Brooks, DPM, MPH*
Reed W. R. Bratches, MPH, MALS*
Kristina B. Wolff, PhD, MPH*
Mickey D. Stapp, DPM‡
Kyle W. Bruce, DPM, MPH§
Dyane E. Tower, DPM, MPH, MS

Background: More than half of opioid misusers last obtained opioids from a friend or relative, a problematic reflection of the commonly known opioid reservoir maintained by variable prescription rates and, notably, excessive postoperative prescription. We examined the postoperative opioid-prescribing approaches among podiatric physicians.

Methods: We administered a scenario-based, anonymous, online questionnaire via an online survey platform. The questionnaire consisted of five patient-foot surgery scenarios aimed at discerning opioid-prescribing approaches. Respondents were asked how many opioid “pills” (dosage units) that they would prescribe at the time of surgery. We divided respondents into two opioid-prescribing approach groups: one-size-fits-all (prescribed the same dosage units regardless of the scenario) and patient-centric and procedure-focused (prescribed varied amounts of opioid dosage units based on the patient’s opioid history and the procedure provided in each scenario). We used the Mann-Whitney U test to determine the difference between the opioid dosage units prescribed at the time of surgery by the two groups.

Results: Approximately half of the respondents used a one-size-fits-all postoperative opioid-prescribing approach. Podiatric physicians who used a patient-centric and procedure-focused approach reported prescribing significantly fewer opioid dosage units in scenarios 1 (partial toe amputation; –9.1; \( P = .0087 \)) and 2 (incision and drainage with partial fifth-ray resection; –12.3; \( P = .0024 \)), which represented minor procedures with opioid-naive patients.

Conclusions: Podiatric physicians who used a one-size-fits-all opioid-prescribing approach prescribed more postoperative opioid dosage units regardless of the scenario. Given that the patient population requiring foot surgery is diverse and may have multiple comorbidities, the management of postoperative pain, likewise, should be diverse and nuanced. The patient-centric and procedure-focused approach is suited to limit excess prescribing while defending the physician-patient relationship. (J Am Podiatr Med Assoc 113(4), 2023)

The US opioid epidemic has substantially worsened during the COVID-19 pandemic. The Centers for Disease Control and Prevention estimates that more than 100,000 Americans have died of overdoses during the first 12 months of the COVID-19 pandemic following lock downs. It is estimated that at least 75% of these overdose deaths were from opioids. Overdose deaths are up 28.5% from the previous 12 months. Among the many things that the COVID-19 pandemic has demonstrated is the need for large-scale cooperation to solve complex issues with willing buy-in from stakeholders.

Excess prescribing of opioids has contributed to the US opioid epidemic. More than half of opioid misusers last obtained opioids from a friend or relative, a problematic reflection of the commonly known opioid reservoir maintained by variable prescription rates and, notably, excessive postoperative prescription. We examined the postoperative opioid-prescribing approaches among podiatric physicians.
relative, a problematic reflection of the commonly known opioid reservoir, which results from excess prescribing. Changes to state laws since 2016 have produced mixed results in reducing excess opioid prescribing for acute pain. Brooks et al were the first to demonstrate that significant opioid-prescribing variation exists on the national level among podiatric physicians at the National Scientific Conference of the American Podiatric Medical Association (APMA) in 2020. Given that clinically meaningful postoperative opioid-prescribing variation exists among podiatric physicians, it is pertinent to further understand the underlying origin of these prescribing habits.

We aimed to determine whether differences in postoperative opioid-prescribing practice exist among two different prescribing approaches: one-size-fits-all and patient-centric and procedure-focused. The one-size-fits-all approach represents podiatric physicians who prescribe the same quantity of opioids at the time of surgery regardless of the patient and procedure, whereas the patient-centric and procedure-focused approach results in varying quantities of opioids prescribed at the time of surgery by podiatric physicians. We hypothesize that podiatric physicians who use the patient-centric and procedure-focused approach prescribe fewer postoperative opioids at the time of surgery compared with those who subscribe to the one-size-fits-all prescribing approach.

Methods

Research Design

Content validity was established through an exhaustive review of the literature in September 2019 and by the members of the 2019–2020 Clinical Practice Advisory Committee of the APMA, who functioned as content experts. We received institutional review board exempt status from the Committee for the Protection of Human Subjects at Dartmouth College (Hanover, New Hampshire) for an open, voluntary, anonymous, five-scenario, online questionnaire distributed on the Internet via Qualtrics, an online survey platform (Qualtrics, Seattle, Washington). Respondents received no incentive for survey completion, and they could use a back button to revisit their answers. No personal or identifiable information was stored. We completed the pilot study in March 2020. We decided a posteriori to break the original study into separate publications and subsequently received institutional review board modification approval to do so. This study followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES), which is listed in Appendix 1.

Questionnaire and Sample

The survey took an estimated 10 to 15 min to complete. There were 120 questions in the survey; however, we used conditional branching so that each respondent who elected to prescribe only one opioid per scenario would have no more than 60 questions appear. There were never more than seven questions per page. Respondents were presented with five different scenarios (Appendix 2), each with a varied opioid history (ie, opioid naive, off-and-on opioid user, and daily user for chronic pain/opioid tolerant) and a unique foot surgery (ie, soft tissue, osseous). For each scenario, respondents were asked to complete a fill-in-the-blank response for the number of opioid “pills” (dosage units) prescribed at the time of surgery. Respondents who reported that they prescribe the same quantity of dosage units regardless of the scenario were classified as the one-size-fits-all approach group. Respondents who reported varied quantities of dosage units based on the scenario were classified as the patient-centric and procedure-focused approach group. Survey respondents who did not complete the demographics section or respond to at least two scenarios were also excluded from analysis. We excluded respondents who provided information for only one scenario because they could not be classified in either approach group.

The target population was practicing podiatric physicians in the United States. We recruited practicing podiatric physicians by way of e-mail invitation from the APMA, which consisted of approximately 8,736 members who fit the eligibility criteria. Retired podiatric physicians, podiatrists who no longer perform surgery, current fellows, and residents were excluded. An a priori decision was made to exclude respondents from states with restrictive laws for acute pain, which we defined as less than 7 days of postoperative opioids being the limit. Florida, which has a more complex law with a 3-day maximum that can be extended to 7 days, was also excluded. States with laws of 7 days or more or no laws were included in the analysis. Two survey invitations were sent out via e-mail to practicing APMA members during the data collection period (March 20, 2020, to April 20, 2020). The consent statement (Appendix 3), which was provided at the beginning of the survey, asked participants to respond to the questionnaire only once.
Statistical Analysis

Completed surveys were analyzed at a predefined alpha level of 0.05 or less for statistical significance. Unweighted responses were analyzed. We analyzed the data using R v4.0.3 (The R Foundation, Boston, Massachusetts). The Mann-Whitney U test was used to determine whether a difference exists between the two aforementioned approaches. Opioid “pills” (dosage units) prescribed at the time of surgery was the outcome variable.

Results

Descriptive Results

One hundred fifteen podiatric physicians completed the demographics section at the end of the survey, resulting in an overall response rate of 1.32% (115 of 8,736). The survey was sent to 8,736 APMA members who met the inclusion criteria. There was a completeness (made it to the end) rate of 89.84% (115 of 128); however, not all respondents answered the amount of opioid dosage units prescribed for each scenario. Of note, by decision a priori, respondents were not removed from the analysis if they responded to at least two of the five scenarios; however, this led to the number of opioids prescribed by the one-size-fits-all approach to be different in each scenario (ie, a respondent might have prescribed the same in four scenarios and skipped one because they do not regularly perform that surgery). Consequently, the sample size for each scenario varied slightly. Approximately 49% of respondents, which was the average across all scenarios, used the one-size-fits-all postoperative opioid-prescribing approach, and 51% of respondents used the patient-centric and procedure-focused approach.

Mann-Whitney U Test

Scenario 1 (P = .0087) and scenario 2 (P = .0024) were significant. Scenario 3 (P = .0747), scenario 4 (P = .5604), and scenario 5 (P = .2727) were not significant (Table 1). The full scenarios are listed in Appendix 2. Podiatric physicians who used the patient-centric and procedure-focused approach reported prescribing less in scenarios 1 (–9.1), 2 (–12.3), 3 (–8.2), 4 (–2.7), and 5 (–4.5) compared with podiatric physicians who used a one-size-fits-all prescribing approach.

Discussion

In this questionnaire-based, cross-sectional study of 115 podiatric physicians, most respondents self-reported their use of a patient-centric and procedure-focused approach for postoperative opioid prescribing. Those who used this approach reported prescribing significantly fewer opioids compared with those who self-reported a one-size-fits-all approach for minor procedures with opioid-naive patients (scenarios 1 and 2); the difference between prescribing approaches for the minor procedures was approximately nine to 13 fewer opioid dosage units prescribed at the time of surgery. We believe this to be clinically meaningful as we established 8 opioid dosage units a priori as clinically meaningful.

Table 1. Postoperative Opioid Reduction with the Patient-Centric and Procedure-Focused Approach Compared with the One-Size-Fits-All Approach via Mann-Whitney-Wilcoxon Test Results by Scenario

<table>
<thead>
<tr>
<th>Scenario No. (Procedure)</th>
<th>Patient’s Opioid History</th>
<th>P Value</th>
<th>Opioid Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (partial toe amputation)</td>
<td>Opioid naive</td>
<td>.0087a</td>
<td>–9.1</td>
</tr>
<tr>
<td>2 (I&amp;D with partial fifth-ray resection)</td>
<td>Opioid naive</td>
<td>.0024a</td>
<td>–12.3</td>
</tr>
<tr>
<td>3 (TMA with percutaneous TAL)</td>
<td>Opioid naive</td>
<td>.0747</td>
<td>–8.2</td>
</tr>
<tr>
<td>4 (partial calcanectomy)</td>
<td>Opioid tolerant; chronic pain</td>
<td>.5604</td>
<td>–2.7</td>
</tr>
<tr>
<td>5 (split-thickness skin graft)</td>
<td>Opioid tolerant; daily use</td>
<td>.2727</td>
<td>–4.5</td>
</tr>
</tbody>
</table>

Abbreviations: I&D, incision and drainage; TAL, tendon Achilles lengthening; TMA, transmetatarsal amputation.

*P < .05.
Several strategies have been suggested or developed to help mitigate the US opioid epidemic. Robert Smith, a podiatric physician, outlined the need for an interprofessional team approach, and furthermore, he advocated for the utilization of opioid stewardship programs to identify gaps in quality and development in the implementation of a change of long-standing opioid culture and practice, which include customizing analgesics for the patient. Various states have implemented policies or guidelines setting limits on the supply of opioids that can be prescribed for acute pain. As of December 2021, 38 states have such policies. Two of these states have no set limit for opioid prescriptions but require doctors to prescribe the lowest effective dose, such policies can create a gray area. What is the lowest effective dose? Should the lowest effective dose be procedure based, patient based, set in stone, or some combination?

In 2018, Overton et al emphasized a procedurespecific approach for opioid prescribing. Specifically, they used a 3-step modified Delphi method involving a multidisciplinary expert panel of 6 relevant stakeholder groups to create acceptable opioid ranges for common procedures in opioid-naive patients; of note, Overton et al set the opioid recommendation range for open reduction internal fixation for an ankle fracture at 0 to 20 “pills.” Although a procedure-specific or procedure-first approach may indeed help misguided clinicians, particularly overprescribers, the ranges fail to take into consideration parameters beyond patients’ opioid history. Furthermore, Overton et al concede that any approach should be patient centered.

In 2021, Bleicher et al (n = 596) noted that opioid prescribing was rarely patient centered, with little correlation between patients’ inpatient opioid use and discharge after abdominal surgery at a single institution; the study suggests that many folks use a one-size-fits-all strategy regardless of the patient’s actual pain on discharge. Furthermore, the lack of patient-centered prescribing led not only to overprescribing for most patients but also to underprescribing. An example of overprescribing was discharging patients with opioids who had no opioid use 24 hours before their discharge. To our knowledge, the study by Bleicher et al is one of the first to examine patient-centric opioid prescribing. Building off the work of Overton et al and Bleicher et al, we propose a modified approach, the patient-centric and procedure-focused approach.

The patient-centric and procedure-focused approach is best suited to help combat both overprescribing and underprescribing of opioids while defending the physician-patient relationship. Opioid-prescribing approaches should be tailored to the patient’s unique pain tolerance and opioid history among other parameters. Prescribers should access a patient’s social determinants of health and baseline quality of life to gain additional insight; for example, single patients who live alone will not have a spouse or partner to help them, which may result in an increased risk of weightbearing against medical advice and/or bumping the foot after surgery. In general, opioid prescribing should also be procedure focused. A digital amputation should not require as many opioids as a total ankle replacement, especially in a neuropathic patient. Furthermore, soft-tissue procedures of the foot and ankle tend to require fewer opioids than osseous procedures. There is an art to opioid prescribing, which is complicated and cannot be fully accounted for by any single approach because it enters into the realm of the physician-patient relationship. The physician-patient relationship is built on trust, knowledge, regard, and loyalty. Patient-dependent factors, system-dependent factors, provider-dependent factors, and patient-provider mismatch can impact the physician-patient relationship. The patient-centric and procedure-focused approach defends this sacred relationship.

There are a few limitations of the presented study. First, the low response rate limits generalization of the findings to all of the podiatrists practicing in the United States. Furthermore, nonresponse bias was not assessed; the sample may be inherently different than the overall population. Second, there may be a discrepancy between what respondents reported that they would do and what they actually do. Third, although we attempted to capture the represented population via the APMA, its membership may not accurately serve as a proxy for the entire podiatric physician population in the United States. Finally, despite several inherent limitations, the presented study was the first attempt to investigate podiatric physicians’ opioid-prescribing approaches; a lack of previous literature on the subject may have led to additional bias or errors.

Conclusions

Podiatric physicians who used a one-size-fits-all opioid-prescribing approach reported prescribing more postoperative opioids compared with those who used a patient-centric and procedure-focused approach. Given that the patient population that requires foot surgery is diverse and may have
multiple comorbidities, the management of postoperative pain, likewise, should be diverse and nuanced. The patient-centric and procedure-focused approach is best suited to limit excess prescribing while defending the physician-patient relationship. Further research into the postoperative opioid-prescribing habits of podiatric physicians and other surgeons is warranted.

Acknowledgment: The members of the Clinical Practice Advisory Committee of the American Podiatric Medical Association for their role as content experts.

Financial Disclosure: None reported.

Conflict of Interest: None reported.

Dual Publication: This abstract won first place in the large study category at the annual scientific meeting of the American Podiatric Medical Association (“The National”) in Nashville, TN, in July of 2023.

Note: The first author was inspired to investigate this topic after reading about by the life of Saint Boniface; consequently, he prefers to call this customized approach to managing pain the “Saint Boniface Approach.”

References

## Appendix

### Appendix 1. Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Explanation</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe survey design</td>
<td>Describe target population, sample frame. Is the sample a convenience sample? (In “open” surveys this is most likely.)</td>
<td>2</td>
</tr>
<tr>
<td>IRB approval</td>
<td>Mention whether the study has been approved by an IRB.</td>
<td>2</td>
</tr>
<tr>
<td>Informed consent</td>
<td>Describe the informed consent process. Where were the participants told the length of time of the survey, which data were stored and where and for how long, who the investigator was, and the purpose of the study?</td>
<td>2</td>
</tr>
<tr>
<td>Data protection</td>
<td>If any personal information was collected or stored, describe what mechanisms were used to protect unauthorized access.</td>
<td>2</td>
</tr>
<tr>
<td>Development and testing</td>
<td>State how the survey was developed, including whether the usability and technical functionality of the electronic questionnaire had been tested before fielding the questionnaire.</td>
<td>2</td>
</tr>
<tr>
<td>Open survey versus closed survey</td>
<td>An “open survey” is a survey open for each visitor of a site, while a “closed survey” is open only to a sample that the investigator knows (password-protected survey).</td>
<td>2</td>
</tr>
<tr>
<td>Contact mode</td>
<td>Indicate whether the initial contact with the potential participants was made on the Internet. (Investigators may also send out questionnaires by mail and allow for Web-based data entry.)</td>
<td>2</td>
</tr>
<tr>
<td>Advertising the survey</td>
<td>How/where was the survey announced or advertised? Some examples are offline media (newspapers), or online (mailing lists [If yes, which ones?] or banner ads (Where were these banner ads posted and what did they look like?). It is important to know the wording of the announcement as it will heavily influence who chooses to participate. Ideally the survey announcement should be published as an appendix.</td>
<td>2</td>
</tr>
<tr>
<td>Web/e-mail</td>
<td>State the type of e-survey (eg, one posted on a Web site, or one sent out through e-mail). If it is an e-mail survey, were the responses entered manually into a database, or was there an automatic method for capturing responses?</td>
<td>NA (Qualtrics)</td>
</tr>
<tr>
<td>Context</td>
<td>Describe the Web site (for mailing list/newsgroup) in which the survey was posted. What is the Web site about, who is visiting it, what are visitors normally looking for? Discuss to what degree the content of the Web site could preselect the sample or influence the results. For example, a survey about vaccination on an anti-immunization Web site will have different results from a Web survey conducted on a government Web site</td>
<td>2</td>
</tr>
<tr>
<td>Mandatory/voluntary</td>
<td>Was it a mandatory survey to be filled in by every visitor who wanted to enter the Web site, or was it a voluntary survey?</td>
<td>2</td>
</tr>
<tr>
<td>Incentives</td>
<td>Were any incentives offered (eg, monetary, prizes, or nonmonetary incentives such as an offer to provide the survey results)?</td>
<td>2</td>
</tr>
<tr>
<td>Time/date</td>
<td>In what time frame were the data collected?</td>
<td>2</td>
</tr>
<tr>
<td>Randomization of items or questionnaires</td>
<td>To prevent biases, items can be randomized or alternated.</td>
<td>NA</td>
</tr>
<tr>
<td>Adaptive questioning</td>
<td>Use adaptive questioning (certain items, or only conditionally displayed based on responses to other items) to reduce the number and complexity of the questions.</td>
<td>NA</td>
</tr>
<tr>
<td>Number of Items</td>
<td>What was the number of questionnaire items per page? The number of items is an important factor for the completion rate.</td>
<td>2</td>
</tr>
<tr>
<td>Number of screens (pages)</td>
<td>Across how many pages was the questionnaire distributed? The number of items is an important factor for the completion rate.</td>
<td>NA</td>
</tr>
<tr>
<td>Completeness check</td>
<td>It is technically possible to do consistency or completeness checks before the questionnaire is submitted. Was this done, and if “yes,” how (usually JAVAScript)? An alternative is to check for completeness after the questionnaire has been submitted (and highlight mandatory items). If this has been done, it should be reported. All items should provide a nonresponse option such as “not applicable” or “rather not say,” and selection of one response option should be enforced.</td>
<td>NA (Qualtrics)</td>
</tr>
<tr>
<td>Checklist Item</td>
<td>Explanation</td>
<td>Page No.</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Review step</td>
<td>State whether respondents were able to review and change their answers (e.g., through a Back button or a Review step that displays a summary of the responses and asks the respondents if they are correct).</td>
<td>2</td>
</tr>
<tr>
<td>Unique site visitor</td>
<td>If you provide view rates or participation rates, you need to define how you determined a unique visitor. There are different techniques available, based on IP addresses or cookies or both.</td>
<td>NA (Qualtrics)</td>
</tr>
<tr>
<td>View rate (ratio of unique survey visitors/unique site visitors)</td>
<td>Requires counting unique visitors to the first page of the survey, divided by the number of unique site visitors (not page views!). It is not unusual to have view rates of less than 0.1% if the survey is voluntary.</td>
<td>NA (Qualtrics)</td>
</tr>
<tr>
<td>Participation rate (ratio of unique visitors who agreed to participate/unique first survey page visitors)</td>
<td>Count the unique number of people who filled in the first survey page (or agreed to participate, e.g., by checking a checkbox), divided by visitors who visit the first page of the survey (or the informed consent page, if present). This can also be called &quot;recruitment&quot; rate.</td>
<td>NA (Qualtrics)</td>
</tr>
<tr>
<td>Completion rate (ratio of users who finished the survey/users who agreed to participate)</td>
<td>The number of people submitting the last questionnaire page divided by the number of people who agreed to participate (or submitted the first survey page). This is relevant only if there is a separate &quot;informed consent&quot; page or if the survey goes over several pages. This is a measure for attrition. Note that &quot;completion&quot; can involve leaving questionnaire items blank. This is not a measure for how completely questionnaires were filled in. (If you need a measure for this, use the word &quot;completeness rate.&quot;)</td>
<td>3</td>
</tr>
<tr>
<td>Cookies used</td>
<td>Indicate whether cookies were used to assign a unique user identifier to each client computer. If so, mention the page on which the cookie was set and read, and how long the cookie was valid. Were duplicate entries avoided by preventing users access to the survey twice; or were duplicate database entries having the same user ID eliminated before analysis? In the latter case, which entries were kept for analysis (e.g., the first entry or the most recent)?</td>
<td>NA</td>
</tr>
<tr>
<td>IP check</td>
<td>Indicate whether the IP address of the client computer was used to identify potential duplicate entries from the same user. If so, mention the period for which no two entries from the same IP address were allowed (e.g., 24 hours). Were duplicate entries avoided by preventing users with the same IP address access to the survey twice; or were duplicate database entries having the same IP address within a given period eliminated before analysis? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?</td>
<td>NA</td>
</tr>
<tr>
<td>Log file analysis</td>
<td>Indicate whether other techniques to analyze the log file for identification of multiple entries were used. If so, please describe.</td>
<td>NA</td>
</tr>
<tr>
<td>Registration</td>
<td>In &quot;closed&quot; (non-open) surveys, users need to log in first, and it is easier to prevent duplicate entries from the same user. Describe how this was done. For example, was the survey never displayed a second time once the user had filled it in, or was the username stored together with the survey results and later eliminated? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?</td>
<td>NA (Open survey)</td>
</tr>
<tr>
<td>Handling of incomplete questionnaires</td>
<td>Were only completed questionnaires analyzed? Were questionnaires that terminated early (where, for example, users did not go through all questionnaire pages) also analyzed?</td>
<td>3</td>
</tr>
<tr>
<td>Questionnaires submitted with an atypical timestamp</td>
<td>Some investigators may measure the time people needed to fill in a questionnaire and exclude questionnaires that were submitted too soon. Specify the time frame that was used as a cutoff point, and describe how this point was determined.</td>
<td>NA</td>
</tr>
<tr>
<td>Statistical correction</td>
<td>Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for the nonrepresentative sample; if so, please describe the methods.</td>
<td>3</td>
</tr>
</tbody>
</table>

Abbreviations: IRB, institutional review board; NA, not applicable.

Appendix 2. Patient Scenarios

**Patient 1.** A 56-year-old woman with a history of poorly controlled type 2 diabetes mellitus (hemoglobin A1c [HbA1c] level, 10.5%), hypertension, and a BMI of 35 presents for a neuropathic ulceration of the left second toe due to clawing of digit. The patient is unsure of when it began but noticed stains on her carpet when she went barefoot. The left second digit is rigidly contracted. The ulceration is purulent and probes deep to bone. Radiographic findings are consistent with osteomyelitis. The patient denies pain and use of opioids.

Operation: Left second partial toe amputation.

**Patient 2.** A 67-year-old man with a history of poorly controlled type 2 diabetes mellitus (HbA1c level, 9.5%), hypertension, hyperlipidemia, and stage 2 chronic kidney disease presents for chronic sub–fifth metatarsophalangeal joint planar neuropathic ulceration. The ulceration began almost 1 year ago and has been worsening the past few weeks. Previously, the patient had been following up at a wound care center for serial debridement but stopped going because his ulceration never hurt him. He now reports 2 of 10 pain. You note fluctuance on examination, and plain film radiographs are concerning for soft-tissue emphysema and osteomyelitis of the fifth metatarsal head as well as the base of the fifth proximal phalanx. His 1-month-old noninvasive vascular studies were normal. Patient has palpable dorsalis pedis/posterior tibial pedal pulses. He denies previous opioid use and has been taking over-the-counter ibuprofen for pain.

Operation: Right lateral forefoot incision and drainage with a partial fifth-ray amputation.

**Patient 3.** A 57-year-old man with a history of poorly controlled type 2 diabetes mellitus (HbA1c level, 12.7%), stage 1 chronic kidney disease, and a previous left partial first-ray amputation presents with a chronic left second sub–metatarsophalangeal joint wound that probes to bone. The ulceration is red, hot, swollen, and warm with purulence. The patient reports no pain. Protective sensation is absent plantarly and diminished elsewhere to the level of the ankle joint. Radiographs reveal underlying osteomyelitis of the second metatarsal head and proximal shaft. Palpable dorsalis pedis/posterior tibial pulses bilaterally. Vascular laboratory studies suggest good healing potential. The patient reports never taking opioids.

Operation: Left transmetatarsal amputation with a percutaneous tendon Achilles lengthening.

**Patient 4.** A 55-year-old nondiabetic man with a history of cauda equina complicated by paraplegia presents with a chronic right heel pressure ulcer that probes to bone. The ulceration began more than a year ago. There is radiographic evidence of osteomyelitis of the right calcaneus on radiographs and magnetic resonance images. Patient had previously undergone 6 weeks of intravenous antibiotics. The wound has continued to worsen despite multiple attempts at off-loading. Palpable pedal pulses bilaterally. The patient has chronic pain due to his spinal cord injury and regularly takes hydrocodone 10 mg.

Operation: Right partial calcanectomy.

**Patient 5.** A 62-year-old man with a history of poorly controlled type 2 diabetes mellitus (HbA1c level, 9.5%), lower back pain, hypertension, hyperlipidemia, peripheral artery disease, and Charcot’s neuroarthropathy is referred to you for foot pain. Patient has bounding pedal pulses and reports 4 of 10 pain. His magnetic resonance images reveal a deep abscess secondary to his Charcot’s neuroarthropathy. You perform an incision and drainage of the deep abscess, after which the resulting wound is too large for primary closure; even after the use of negative pressure wound vacuum-assisted closure therapy, which improved the wound depth, the wound remains open. The patient reports daily use of hydrocodone 5 mg for his low back pain.

Operation: Debridement and application of a split-thickness skin graft to the right plantar midfoot.

Appendix 3. Consent Statement

Postoperative Narcotic-Prescribing Practices in Podiatric Limb Salvage Surgery. Hello! We are interested in understanding the postoperative prescribing practices of podiatric physicians following limb salvage surgeries. We are inviting you to participate in this questionnaire-based research study because of your expertise and experience as a podiatric physician practicing in the United States. This questionnaire contains five hypothetical patient scenarios based on an aggregate of patients seen by podiatric physicians. Participation is voluntary, and we appreciate your input. Please review the entire form before agreeing to participate if you choose to do so.

This study is being conducted by:
Brandon Brooks, DPM; Co-Primary Investigator, Dartmouth College, Geisel School of Medicine.
Kristina Wolff, PhD MPH; Co-Primary Investigator, Dartmouth College, Geisel School of Medicine.

Please ask any questions you have now. If you have questions later, you may contact Brandon Brooks, DPM, at brandon.m.brooks.gr@dartmouth.edu or Kristina Wolff, PhD, at Kristina.b.wol@dartmouth.edu.

Procedures:
If you agree to be in this study, please answer questions to the best of your ability. If a question is not completely applicable to you, you may either skip the question or answer “what you would have done” in that situation. Please only take the survey once. This questionnaire should take approximately 10 to 15 minutes of your time.

Confidentiality and Anonymity:
Your responses and information collected via the questionnaire will be maintained confidentially. The results of this study will be kept private and only reported in aggregate. Identifying information will not be used in any presentation or paper written about this project. Research records will be stored securely, and only the co-primary investigators will have access to the raw data.

Voluntary Nature of the Study:
Participation in this study is voluntary. If you decide to participate, you are free to not answer any question or to withdraw at any time. If you decide not to participate, we appreciate your time and consideration.

Statement of Consent:
I have read the above information and agree to take part in the study.
Yes
No