

# Republication of “How Will the Foot and Ankle Orthopedic Community Respond to the Growing Opioid Epidemic?”

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**Commentary:** Opioid prescription patterns variation is recognized and approaches to mitigate the harm from these approaches are described including multimodal analgesia, peripheral nerve blocks, NSAIDs, and acetaminophen. A protocol that guides the prescriber and patient through the perioperative period is described.

## Abstract

In the midst of the current opioid crisis, it has become critically important to properly manage opioid-prescribing patterns for the treatment of postoperative pain. There is currently a scarcity of literature specifying prescription and consumption patterns following orthopedic surgery and specifically foot and ankle surgery. Clinical guidelines for postoperative pain management are deficient.

**Keywords:** ankle, current practice, foot surgery, opioid, postoperative pain, practice guideline, prescription, review, survey

This article seeks to provide a review of the literature conducted to date on prescription opioid practice following foot and ankle procedures. A postoperative pain management survey was sent to the North American membership of the American Orthopaedic Foot & Ankle Society (AOFAS) in an effort to gain a better understanding of the current prescribing practice. We suggest reducing the number of opioids prescribed by employing multimodal analgesia, including peripheral nerve blocks, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, and adopting a similar set of prescribing guidelines as outlined by our practice with suggested opioid doses stratified by procedure type.

## What Is the Opioid Epidemic and How Did It Evolve?

Attitudes toward acute and chronic pain management shifted radically in the mid- to late 1990s. Drastic changes in opioid prescribing practices were observed following the American Pain Society campaign of 1995 entitled “Pain Is the Fifth Vital Sign,” and a 1997 consensus statement from the American Academy of Pain Medicine and American Pain Society indicated the unlikelihood of addiction following

opioid use for pain relief.<sup>44</sup> At this time, pharmaceutical companies were also employing aggressive marketing tactics, underemphasizing the risk of addiction and harmful side effects from prescription opioids.<sup>8,47</sup> Consequently, the amount of opioids prescribed in the United States quadrupled between 1999 and 2010.<sup>48</sup> Increases in prescription opioid overdose deaths and opioid use disorder occurred during this period as well.<sup>48</sup> Prescription rates per 100 persons finally leveled off between 2010 and 2012 and were followed by a decrease of 13.1% from 2012 to 2015.<sup>16</sup> Despite this sizable decrease, the amount of opioids currently prescribed in the United States remains approximately 3 times as high as in 1999 and nearly 4 times as high as the amount distributed in Europe.<sup>45,16</sup>

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The use, misuse, and abuse of opioid prescription medications has escalated to a level of great public health concern in the United States. The Centers for Disease Control and Prevention (CDC) reported that prescription opioid drug overdoses accounted for more than 200 000 deaths in the United States between 1999 and 2016, with a 5-fold increase observed between 1999 and 2016.<sup>3</sup> An estimated 3 million people in the United States and 16 million people worldwide have a current or past opioid use disorder.<sup>36,40</sup> Prescription opioid misuse can often result in subsequent illicit drug use, as 80% of first-time heroin users misuse prescription opioids first.<sup>22</sup> As the number of opioid pills prescribed increases, so does drug diversion (legally prescribed controlled substances entering the community for illegal use). One study conducted on urology patients after surgery found that 67% of patients had leftover pain medication and, of those, 91% kept the medication in their home.<sup>1</sup> Opioid use disorders are associated with early death, infectious disease problems, legal problems, and a host of other social and psychological repercussions.<sup>11,43</sup> Prescription opioid abuse also presents a substantial societal cost as the economic burden of this national crisis is estimated to be \$78.5 billion annually.<sup>12</sup> To put this into the context of federal spending, the United States federal government spent \$79.9 billion on the Supplemental Nutrition Assistance Program (SNAP) in 2013, the premier food assistance program for low-income Americans.<sup>12</sup>

The international medical and public health communities are beginning to take note of the opioid epidemic pervading North America.<sup>18</sup> Although United States and Canadian medical practice still utilize significantly more opioids than the rest of the world, there are reports of increasing trends in prescription opioid use and related mortality in almost all European countries.<sup>14,45,35,46</sup> The international medical community needs to be alerted to the lessons learned in North America from the over-prescribing of opioid analgesics.

### **How Does the Opioid Epidemic Pertain to the Orthopedic Community?**

Postoperative pain management presents considerable challenges in all surgical specialties as providers aim to relieve patient discomfort and enable swift return to daily activities, employment, and physical activity.<sup>31</sup> Orthopedic surgical interventions pose unique difficulties, as these procedures are thought to produce the most pain postoperatively of any ambulatory procedure.<sup>5</sup> Inadequate postoperative pain management may result in decreased patient satisfaction, prolonged duration of hospital stay, reduced functional outcomes, and increased morbidity.<sup>30,38</sup>

Similar to other surgical specialties, the orthopedic community encouraged more aggressive analgesic efforts in the early 2000s.<sup>38</sup> Inadequate pain relief was reported in

major orthopedic surgeries, and physicians were charged with undertreating pain.<sup>38</sup> In an effort to address postoperative pain in orthopedic practice, excessive opioid prescribing patterns have resulted and orthopedic surgeons provide more opioid prescriptions than any other surgical specialty.<sup>23,34,49</sup> For example, studies examining the prescription and consumption patterns of opioids following upper extremity orthopedic surgery have found most patients are prescribed 3 times the amount of postoperative narcotics necessary for adequate pain relief, reporting utilization rates of 30% to 34% of prescribed narcotics.<sup>23,34</sup> Thus, a dangerous amount of prescription opioids are available for misuse and diversion in the community as an unintended consequence.

There is wide variation in the amount of prescribed opioids among orthopedic providers.<sup>19</sup> At the 2014 American Academy of Orthopaedic Surgeons (AAOS) conference, the majority of surgeons present admitted to not knowing the appropriate amount of pills to prescribe and/or the amount actually consumed by their patients.<sup>42</sup> This is likely not only due to the scarcity of standardized guidelines for postoperative pain management within the field of orthopedic surgery, but also results from the complexity of standardizing musculoskeletal pain. Certain orthopedic procedures are known to be more painful than others and thus likely warrant greater doses of analgesia. For instance, bone surgeries cause more discomfort than those involving only soft tissue, and some anatomic sites are more painful than others.<sup>34</sup> Ankle surgery, total knee replacement, and spinal fusion are among the most painful forms of orthopedic surgery.<sup>38</sup>

In the wake of the opioid crisis, it has become extremely important to properly manage prescribing patterns of opioids when treating pain. Studies have investigated the physiological and psychosocial effects of increased opioid intake and have demonstrated that more opioids do not necessarily lead to less pain. In fact, patients who consume more opioids following surgery have reported greater pain intensity and decreased satisfaction with pain relief.<sup>17,31</sup> Some strong predictors of greater postoperative opioid use in the orthopedic patient have been identified: ineffective coping strategies, low efficacy, psychiatric diagnoses, myalgia, low-back pain, unemployment or low-income status, preoperative opiate use, and Medicaid insurance.<sup>2,13,23,27,50,53</sup> Prior research has also found that the dose and duration of the initial opioid prescription is a significant predictor of continued opioid use irrespective of the indication for prescription.<sup>37</sup> Patients prescribed doses of  $\geq 90$  morphine milligram equivalents (MME) per day are at greatest risk of continued opioid use, and increasing days' supply of the first prescription is associated with a greater likelihood of opioid continuation.<sup>37</sup> Though this list is not exhaustive, as research is still under way to elucidate all identifiable risk factors, these factors should be considered in our current postoperative pain management regimens.<sup>18</sup>

## What Has the Orthopedic Community Done to Address the Opioid Crisis?

Several studies have been conducted identifying prescription and consumption patterns of opioids following upper extremity procedures. In 2012, one study following outpatient surgical patients found an average prescription size of 30 tablets, with only 10 tablets consumed per prescription, whereas 92% of patients reported adequate pain relief.<sup>34</sup> This research group recommended a reduction in prescription size to 15 tablets with 1 refill of a schedule III opioid analgesic for all elective outpatient upper extremity procedures. In 2016, researchers took previous recommendations a step further by stratifying surgical interventions into bone and soft tissue procedures, as well as varying recommendations by anatomic site.<sup>23</sup>

Along with the need for consensus guidelines for prescribing practice among orthopedic surgeons, continuing education programs are warranted for physicians to understand the risks of addiction, death, and other adverse effects of prescribed narcotics.<sup>18</sup> Educational training programs have proven to be effective in reducing prescription amounts.<sup>41</sup> One center reported success decreasing opioid prescription amounts using a simple educational-assist device consisting of a laminated card highlighting standardized postoperative pain regimens following various hand and upper extremity procedures.<sup>41</sup> This device provided narcotic guidelines detailing procedures that would indicate the use of no narcotics,  $\leq 10$  narcotic pills,  $\leq 20$  narcotic pills,  $\leq 40$  narcotic pills, or other nonopioid prescription medications. Decreases in opioid prescription sizes resulted for all surgical procedures monitored. Interestingly, no evidence of increasing refills was identified, suggesting pain was adequately controlled with the smaller prescription size.

## What Are We Doing in Foot and Ankle?

There is currently a dearth of literature detailing recommended prescription regimens for postoperative pain management following elective foot and ankle procedures. To our knowledge, the strictest guidelines available are based on the results of a systematic review of randomized controlled trials conducted in 2015.<sup>51</sup> The recommendations included a combination of oral acetaminophen with an NSAID or cyclooxygenase-2 (COX-2) selective inhibitor, supplemented with either a weak opioid (tramadol) for low-to moderate-intensity pain and stronger opioids (oxycodone, hydrocodone or hydromorphone) for moderate- to high-intensity pain.<sup>51</sup> Opioid doses, duration, and timing were not provided in these recommendations.

Complete pain relief postoperatively is difficult to achieve with a single drug or technique, hence the need for multimodal analgesia.<sup>6</sup> Multimodal therapy employs the use of multiple pain mechanisms and receptor pathways in

an effort to provide superior pain relief compared to opioids alone. These nonopioid therapies include peripheral nerve blocks, pharmacologic alternatives such as NSAIDs, and acetaminophen. This approach to pain management has been shown to reduce the length of hospitalization in patients after foot and ankle surgery.<sup>28</sup> Multimodal therapy results in a reduction in opioid consumption following total joint replacement and shoulder surgery.<sup>4,32</sup>

Regional analgesia techniques have been shown to reduce postoperative pain scores and reduce opioid consumption. Recommendations for locoregional analgesia in extensive foot and ankle procedures include a popliteal or sciatic nerve block in combination with a femoral nerve block when severe postoperative pain is anticipated.<sup>24,26</sup> For less extensive and minimally invasive procedures, an ankle block with a long-acting local anesthetic is recommended.<sup>51</sup> Continuous local anesthetic infusion was found to have a prolonged analgesic time-effect compared with a single-shot technique, but no clear benefit was observed among long-acting local anesthetics (bupivacaine, ropivacaine, and levobupivacaine).<sup>51</sup> Lastly, no additional analgesic benefit has been observed when additives such as fentanyl or clonidine are included in the local anesthetic solutions.<sup>51</sup>

NSAIDs have been shown to reduce postoperative opioid requirements by 20% to 30% and when used in combination with opioids, lower pain scores are observed compared with patients using opioids alone.<sup>7,20,21,29</sup> In a review of randomized double-blind control studies, a dose of 600 mg of ibuprofen was found to provide the same analgesic efficacy as 15 mg of oxycodone hydrochloride in patients with moderate to severe pain.<sup>33,54</sup> Additionally, there is good evidence to suggest that acetaminophen results in a reduction in postoperative pain and opioid consumption.<sup>9</sup> Acetaminophen should be concurrently administered with NSAIDs on a scheduled basis for an additive effect.<sup>54</sup>

## Current Practice of AOFAS Physicians

To better understand current postoperative pain regimens among foot and ankle surgeons, North American attending physician members of the American Orthopaedic Foot & Ankle Society (AOFAS) were invited to participate in a survey approved by the Institutional Review Board (Partners Healthcare, Boston, MA, USA) and the AOFAS Research Committee on opioid prescribing patterns. Survey invitations were sent via e-mail from the AOFAS using a Research Electronic Data Capture (REDCap) web-based application. Of the 1235 surgeons contacted, 296 (24%) participated in the survey.

Surgeons were asked to indicate their postoperative prescribing regimen for 9 common foot ankle procedures, assuming each patient was opioid naïve. The following procedures were included: Morton neuroma, open peroneal tendon repair, hammer toe correction, hallux valgus correction with proximal metatarsal osteotomy, Achilles tendon

**Table 1.** Opioid Pills Prescribed and Mean Morphine Milligram Equivalents for Each of the Common Foot and Ankle Surgeries Indicated.

Procedure Type	Mean Range Total Opioid Pills Prescribed	Mean Range MME
Morton neuroma	26 (0-105)	147 (0-613)
Peroneal tendon repair	34 (0-120)	215 (0-750)
Hammer toe	29 (0-105)	168 (0-675)
Hallux valgus correction	35 (0-120)	231 (0-825)
Achilles tendon repair	33 (0-120)	207 (0-750)
Anterior ankle arthroscopy	31 (0-120)	198 (0-750)
ORIF lateral malleolus	36 (0-120)	234 (0-750)
Open double or triple arthrodesis	34 (0-120)	277 (0-1200)
Flatfoot reconstruction	40 (0-120)	272 (0-900)

Abbreviations: MME, morphine milligram equivalents; ORIF, open reduction internal fixation.

repair, anterior ankle arthroscopy with debridement and treatment of a talar osteochondral lesion, lateral malleolus open reduction internal fixation, open triple or double arthrodesis, and flatfoot reconstruction (calcaneal osteotomy, gastrocnemius recession, and flexor digitorum longus tendon transfer). For each procedure, surgeons were asked to indicate what postoperative medications they would prescribe and at what dose and number from a list of opioid and nonopioid medications. Table 1 shows the average number of opioid pills per procedure that surgeons prescribed. The opioids were then converted into morphine milligram equivalents to standardize the amounts (Suppl. Table S1).

Results from this survey indicate that the average prescribing pattern following foot and ankle surgery ranges from 147 to 277 MME, or 26 to 40 opioid pills. Surgeons indicated the lowest opioid prescriptions (as measured by MME) following Morton neuroma procedure and the greatest amount following open double or triple arthrodesis.

Lastly, only an average of 8% of surgeons (range, 5%-14%) indicated that they would prescribe NSAIDs in the postoperative period, despite the fact that NSAIDs are known to decrease the opioid requirement after surgery.<sup>54</sup> This percentage likely underestimates the amount of NSAIDs consumed postoperatively as surgeons may not actually give a prescription for this medication that is available over the counter. Some surgeons may also still be hesitant to choose NSAIDs in postoperative pain management following bony procedures because of prior literature suggesting an association between NSAIDs and nonunion after spine fusion surgeries.<sup>15</sup> However, no human study has definitively shown that NSAIDs delay or inhibit bone healing.<sup>25</sup> In fact, more recent literature has demonstrated that NSAIDs should play an active role in the acute postoperative period to help diminish the opioid requirement.<sup>10,39</sup> A comprehensive review of the literature over the last 20

**Table 2.** Opioid Risk Tool.<sup>a</sup>

Mark Each Box That Applies	Female	Male
Family history of substance abuse		
Alcohol	1	3
Illegal drugs	2	3
Rx drugs	4	4
Personal history of substance abuse		
Alcohol	3	3
Illegal drugs	4	4
Rx drugs	5	5
Age between 16-45 years	1	1
History of preadolescent sexual abuse	3	0
Psychological disease		
ADD, OCD, bipolar, schizophrenia	2	2
Depression	1	1
Scoring totals		

Abbreviations: ADD, attention deficit disorder; OCD, obsessive compulsive disorder; Rx, prescription.

<sup>a</sup>Key:  $\leq 3$  = low risk for future opioid abuse; 4-7 = moderate risk;  $\geq 8$  = high risk for opioid abuse.

Source: Opioid risk tool. Adapted from "Predicting Aberrant Behaviors in Opioid-Treated Patients: Preliminary Validation of the Opioid Risk Tool," by Lynn R. Webster, MD, *Pain Med*, 2005.

years on this topic demonstrated that NSAIDs may have a dose- and duration-dependent effect on fusion rates, but still recommended, according to the evidence, prescribing low-dose, short-duration NSAIDs postoperatively.<sup>39</sup>

## Current Practice

In the senior author's practice, a "Foot and Ankle Service Opioid Strategy" has been established, and is currently used by 8 prescribers in the practice. The strategy outlines a protocol that guides the prescriber and patient through the perioperative period. During the preoperative patient visit when the decision to go forward with surgical intervention occurs, the provider and patient discuss postoperative pain expectations, management, and policies. Patients are screened for narcotic use or abuse using the Opioid Risk Tool.<sup>52</sup> This short, validated screening tool is based on a patient's self-reported history and gives the provider an assessment of the patient's risk for developing an opioid substance use or abuse disorder (Table 2). In addition, methods for unused opioid disposal are discussed directly with the patient in order to avoid opioid diversion or further the risk for substance abuse by the patient. A handout in layman's terms is provided to the patient summarizing the discussion and expectations after surgery.

Specific prescribing guidelines are also included in this strategy. Four categories of surgery are outlined according to duration, invasiveness, and predicted postoperative pain. The recommended type and number of opioids is listed for each category. This strategy was formulated based on a current review of the literature on opioid use in the orthopedic

**Table 3.** Current Standard of Care for Opioid Prescribing Practice, Categorized by Procedure Type.

Injury/Procedure	Opioid Type	No. of Pills	Nonopioid Alternatives	Refills	Expected Days of Opioid Use
Fracture, laceration, acute injury in office setting	Hydrocodone (for complex fracture only)	10	Ibuprofen, acetaminophen	None	1-3
Minor <sup>a</sup>	Hydrocodone	10	Ibuprofen, acetaminophen	None	1-2
Moderate soft tissue <sup>b</sup>	Oxycodone or Hydrocodone	20	Ibuprofen, acetaminophen	None	1-3
Moderate bony <sup>c</sup>	Oxycodone	30	Ibuprofen, acetaminophen	Hydrocodone dated POD 3	1-3
Major bony <sup>d</sup>	Oxycodone	30-40	Ibuprofen, acetaminophen	Hydrocodone dated POD 3	1-5

Abbreviation: POD, postoperative day.

<sup>a</sup>Minor procedures include ankle arthroscopy, single hammer toe correction, ganglion excision.

<sup>b</sup>Moderate soft tissue procedures include Achilles tendon repair, gastrocnemius recession, open tendon/ligament repair.

<sup>c</sup>Moderate bony procedures include hallux valgus correction, metatarsal osteotomy, basic ankle ORIF.

<sup>d</sup>Major bony procedures include triple arthrodesis, open ankle fusion, total ankle arthroplasty, complicated fracture.

population, the senior author's participation on the Opioid Task Force at her hospital, a similar plan developed by the Hand and Upper Extremity Service, and on the senior author's anecdotal experience in 10 years of clinical practice. These guidelines are used not only by the attending surgeons on the service, but also rotating fellows and residents, and any physician extenders who may prescribe postoperative pain medications. All prescribers must confirm in the Prescription Monitoring Program website that patients are not receiving narcotic pain medications elsewhere. If a patient is on baseline opioid therapy for chronic pain, the surgeon and chronic pain prescriber must communicate and jointly determine the proper postoperative pain regimen for the patient. Orthopedists should not prescribe opioids for chronic pain.

### Where Do We Go From Here?

As foot and ankle procedures may induce varying levels of pain depending on the anatomic site, patient factors, and the involvement of either bone or soft tissue, the amount of prescribed opioids may vary from patient to patient, and complete standardization may remain an elusive goal. However, utilizing what we know about patient risk factors for longer opioid use, research from other orthopedic subspecialties, and evidence from our own orthopedic practice, we can make the following recommendations for postoperative pain management.

First, the surgeon or a physician extender should have an open discussion with their patients about the realistic expectations regarding postoperative pain. This discussion should also include instructions on proper opioid disposal to avoid diversion. A thorough risk assessment for factors associated with prolonged opioid use, using the Opioid Risk Tool or other validated method, should be performed before surgery. Surgeons should be well informed about multimodal analgesic therapies and also discuss this with the patient.

Secondly, prior research regarding multimodal analgesia in foot and ankle surgery has demonstrated that peripheral nerve blocks should be implemented for extensive foot and ankle procedures, whereas more distal local blocks suffice for minimally invasive procedures.<sup>51</sup> NSAIDs and acetaminophen have been shown to have a synergistic analgesic effect in the postoperative period when taken on a scheduled basis concurrently.<sup>54</sup> Certain health risks in vulnerable patients are associated with NSAID and acetaminophen use, and therefore each patient should be evaluated as to the safety of these nonopioid analgesic options.

Finally, a conscious effort to reduce opioid prescription size is warranted. Research following hand and upper extremity surgeries has indicated that for an average prescription size of 30 pills, only 10 are consumed. No reliable data are currently available for average opioid consumption patterns following foot and ankle surgery, but the present study has identified an average prescription size of 147 to 277 MME (26-40 opioid pills). Although it is difficult to directly compare upper extremity orthopedic procedures to those of the lower extremity, we believe a similar ratio of consumption to prescription would be observed as seen in hand and upper extremity surgery.

### Conclusions

Future research is imperative to better understand the consumption patterns of opioids following foot and ankle procedures and inform clinical decision making. Based on the results of the AOFAS survey, opioid prescription patterns vary widely among foot and ankle surgeons and are likely excessive. We suggest reducing the number of opioids prescribed by employing multimodal analgesia, including peripheral nerve blocks, NSAIDs, and acetaminophen, and adopting a similar set of prescribing guidelines as outlined by our practice (Table 3). As we move forward in changing

our prescribing practice, we should continue to monitor postoperative pain relief to ensure adequate analgesia is achieved with fewer opioids and evaluate what percentage of prescribed pills are actually consumed to avoid unwanted opioid diversion. In ensuring optimal pain management protocols, we should incorporate the expertise of our colleagues across specialties, including other orthopedic subspecialties, anesthesiology, and pain management.

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### Supplemental Material

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