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Policy Guideline

Evidenced-Based Opioid Prescribing Recommendations Following Hand and Upper-Extremity Surgery

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The United States' opioid epidemic has taken an immense toll over the past 2 decades when assessed by morbidities, mortalities, and economic costs. Prescription opioids are a substantial contribution to this public health emergency, and it is critical for health care providers to practice good analgesic stewardship. Interventions have effectively curtailed opioid overuse, including prescription drug monitoring programs, educational initiatives, and multimodal analgesia strategies. Surgeons, particularly hand surgeons or those who perform musculoskeletal procedures, have been implicated as high-volume opioid prescribers. Guidelines for appropriate opioid dosing and analgesic management strategies after common hand and upper-extremity surgeries are sparse and offer an area for meaningful improvement. We sought to generate comprehensive, evidence-based recommendations for postoperative analgesia regimens for common hand and upper-extremity procedures.

The scope of the United States' opioid epidemic is staggering. From 1999 to 2019, approximately 500,000 people have died from an opioid-related overdose.[1] Drug overdose deaths in the United States increased in 2019 to 70,630 people, with >70% involving an opioid, translating to 136 daily deaths from opioid overdose.[2] Prescription opioids were involved in >28% of all opioid overdose deaths in 2019, totaling >14,000 deaths or 38 deaths daily.[3] From an economic standpoint, prescription opioid abuse, dependence, and overdose cost the US economy an estimated US $78.5 billion annually.[3] Although Americans represent <5% of the global population, they consume 80% of the global oral opioid supply.[4]

Measures have been enacted to curb opioid overprescription, including prescription drug monitoring programs, provider education on opioid prescribing, and multimodal analgesia strategies.[3,5–10] These initiatives have resulted in an overall 19% decrease in annual US opioid prescribing rates from 2006 to 2017 and a 7% decrease in prescription opioid-involved US death rates from 2018 to 2019.[3] Despite these advances, the total opioid amounts prescribed per person in morphine milligram equivalents (MMEs) are still >3 times higher than those prescribed in 1999.[3] In 2019, 10.1 million people misused prescription opioids.[11] In 2017, >17% of Americans had at least 1 opioid prescription filled, with a mean of 3.4 opioid prescriptions dispensed per patient, at an average dose of 45.3 MME per day over 18 days.[12] Recent studies also reported an increase in opioid-related overdoses since the rise of the recent coronavirus disease 2019 pandemic, attributed to stresses on social and health care safety nets.[13–15]

Hand and upper-extremity surgeons are generally high-volume surgeons who routinely prescribe opioids after surgery.[9,16,17] Opioid abuse and dependence increased 152% in hand surgery patients between 2002 and 2011.[18] Beyond the greater societal consequences, excessive opioid use directly affects the hand surgeon's daily practice. Farley et al[19,20] showed that preoperative opioid use was associated with poorer surgical outcomes and greater complication and revision rates in thumb carpometacarpal (CMC) arthroplasty and arthroscopic rotator cuff repair. Opioid misuse has been associated with increased overall morbidity (odds ratio, 2.3) and mortality (odds ratio, 3.7) after elective hand surgery.[18] Complications in other organ systems have been cited in hand surgery patients, including respiratory failure, surgical site infection, pneumonia, myocardial infarction, hyperalgesia, and gastrointestinal events.[18,21,22]

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Several studies have shown that larger initial prescriptions were associated with a higher postoperative opioid usage in common procedures, including cubital tunnel release, trigger finger release, thumb CMC arthroplasty, and carpal tunnel release.[23–25] Yeung et al[26] showed that hand surgery patients retained unused postoperative opioids in 78% of cases, which may lead to diversion and abuse. Fortunately, there has been a trend toward reducing opioid overprescription by upper-extremity surgeons. Education has been implicated as a critical factor in reducing opioid overprescription after hand surgery.[27,28]

Stepan et al[29] instituted a mandatory 1-hour opioid education program for their hand and upper-extremity surgeons. They demonstrated a 52.3% reduction in the mean total MME prescribed, and the adherence to guidelines improved after dissemination up to 9–11 months later. Stanek et al[30] distributed an index card containing prescription guidelines for 4 common procedures to all hand surgery providers. They demonstrated a reduction in the mean postoperative prescription size ranging from 15% to 48% and less variability among prescription patterns.[30] Rhode Island passed the state legislature in 2016 that capped daily MMEs that providers can prescribe to opioid-naïve patients.[31] Six months after passing this legislation, there was a 30% decrease in total MMEs in the 30-day postoperative period after thumb CMC arthroplasty and distal radius fracture fixation.[31] However, clinical outcomes were not examined.[31] In summary, it is paramount for hand surgeons to improve opioid prescribing through opioid stewardship and education while still meeting their patients' analgesia requirements.

Problem Statement

After common hand and upper-extremity surgeries, inadvertent postoperative opioid prescribing can lead to dependency, abuse, diversion, death, and poor surgical and nonsurgical treatment outcomes; however, guidelines for appropriate opioid dosing and analgesic strategies are lacking.[18–26]

Proposed Solution

Comprehensive, evidence-based recommendations for postoperative analgesia regimens for common hand and upper-extremity procedures, based on published evidence in hand surgery and overall medical/surgical literature.

Future Direction and Long-Term Focus

Pain management can vary based on the individual circumstances. Analgesic principles are typically divided into acute, postoperative, chronic, and palliative pain management. For this review, pain management principles refer to acute and postoperative pain and will be presented using the current best evidence and defining principles.[32] The defining principles for postoperative analgesia regimens are outlined in the following section; detailed, evidence-based recommendations are presented later.

1. Nonpharmacologic treatment strategies should be used whenever possible.
2. Multimodal nonopioid analgesics should be considered as the first-line pain management prescription and are best prescribed as standing, rather than as needed (PRN), regimen.
3. Opioids should be provided for breakthrough pain PRN at the lowest dose, duration, and quantity feasible.
4. Risk factors for opioid abuse should be considered before prescribing an opioid.
5. Opioid use education should be delivered before surgery or when providing an opioid prescription.

Nonpharmacologic treatment strategies should be incorporated whenever possible. These strategies include but are not limited to rest, ice, elevation, and compressive surgical dressings that are secure but not constrictive.[33]

Nonopioid analgesics should be considered as the first-line pharmacologic treatment for pain and the foundational agent in a multimodal pain management strategy. Moreover, nonopioid analgesics are best used on standing rather than on a PRN basis. Specifically, acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) have shown great effectiveness in multimodal analgesia studies.[9,10] Multimodal regimens have a unique potential to target multiple pain pathways, unlike opioids alone, and they are further detailed below. However, opioid-acetaminophen combination medications (ie, Percocet, Roxicet, Vicodin, etc) should be avoided to prevent accidental overdosing on acetaminophen.

Risk factors for opioid abuse and dependence should be considered before providing opioid prescriptions. These include substance abuse history, psychiatric conditions, and low-educational level.[25,34] Qin et al[35] also demonstrated nonhome discharge, inpatient surgery, long-term pain, age <65 years, and preoperative opioid use to be significant risk factors for excess opioid use after open treatment of distal radius fractures ($P < .001$). Providers should use their state's prescription drug monitoring programs to review the patient's prescription drug history before prescribing opioids and periodically throughout their course of therapy beyond the acute period. Early research suggests that electronic prescribing, or "E-prescribing," may also decrease opioid abuse and diversion and, thus, should be considered.[36] E-prescribing presents the providers with patient prescription histories within the same place and may prevent fraud by limiting patient prescription access to a single provider-chosen pharmacy.

Before prescribing an opioid, counseling on safe opioid use should be performed with the patient. Counseling has decreased voluntary opioid use while maintaining high pain management satisfaction.[37–39] Counseling should establish the duration of therapy and goals of opioid use (2 weeks postoperative is recommended, with a maximum duration of 6 weeks) and may include the use of a physician-patient opioid agreement. Also, patients should be advised on the safe storage of prescribed opioids to avoid diversion and abuse.[40] Ilyas et al[37] randomized 237 patients undergoing outpatient hand surgeries to receive preoperative education or not. Patients receiving education consumed significantly fewer opioids ($P < .05$) and still had similar daily visual analog scale scores.[37] Vincent et al[39] similarly randomized 131 patients undergoing upper-extremity surgery to receive preoperative opioid counseling. They found that counseling resulted in a significant decrease in opioid consumption after surgery despite no difference in reported pain levels ($P = .007$).[39] Counseling consisted of a short video instruction presented on a tablet before surgery, a paper handout, and a face-to-face discussion with the surgeon. Zohar-Bondar et al[41] showed similar results in their study of patients receiving counseling before outpatient soft tissue hand procedures.

If an opioid is prescribed, the lowest dose and shortest duration possible should be prescribed.[42] The Centers for Disease Control and Prevention recommends a maximum of 50 MMEs (approximately 6 doses of 5 mg of oxycodone) for no more than 3–7 days in most acute musculoskeletal injuries. Tramadol may be considered a first-line opioid agent because it may be equally efficacious as other stronger opioids with a lower risk of dependency.[43] Tramadol is a schedule IV drug by the Drug Enforcement Administration compared with schedule II traditional opioids, similar to morphine, codeine, oxycodone, and hydrocodone, which have a higher risk of

dependence and dangerous side effects. Compared with traditional opioids, tramadol has a lower affinity for opioid receptors and causes mild reuptake inhibition of norepinephrine and serotonin.[44] However, medication interactions with tramadol must be considered on an individual basis, and risks of its use still exist, including but not limited to dependence and rarely serotonin syndrome. Analgesia regimens should be individualized to the specific procedure at hand; for example, carpal tunnel release will require less analgesia than elbow fracture repair.

Surgeon prescribers should engage other providers on the patient's health care delivery team during the perioperative period (ie, primary care provider or pain management specialist). This communication can avoid double-prescription and discrepancies in prescription assumptions.[45] If patients with an opioid use history proceed to surgery, baseline opioid prescription doses should be continued. They may require dose increases by 1.5–2 times in the acute postoperative period (2 weeks).[38,40] For these patients, postoperative analgesia is best managed by their pain management provider preferentially, if applicable. Finally, these guidelines are based on the current evidence on postoperative analgesia in hand and upper-extremity surgery. Future studies should examine opioid-free multimodal regimens, nerve block alternatives, other anti-inflammatories and nonnarcotics, and the role of sleep and patient psychology on postoperative pain.

Current Evidence for Oral Nonopioid Analgesics

1. Nonsteroidal anti-inflammatory drugs

Multiple regimens have been presented for common hand and upper-extremity procedures, including naproxen 220 mg twice a day for 14 days, and ibuprofen 800 mg every 8 hours for 3 days, scheduled then as PRN.[30,40] Insufficient evidence exists to recommend against NSAIDs for bone healing when used for <14 days.

Standard precautions and contraindications of NSAIDs should be considered, and pharmacy or medical specialists should be consulted for assistance in unclear cases. Nonsteroidal anti-inflammatory drugs should be used with caution in patients with renal insufficiency, cardiovascular disease, gastrointestinal bleeding, and anticoagulation/antiplatelet therapy. A concomitant proton pump inhibitor can be used, such as omeprazole 20 mg twice a day or pantoprazole 40 mg daily. This is recommended in high-risk patients aged >50 years and/or patients with gastric ulcer risk factors while taking NSAIDs as recommended by the American College of Gastroenterology.[46]

2. Acetaminophen

Multiple regimens have been presented for common hand and upper-extremity procedures, including acetaminophen 650 mg twice a day or every 6 hours or 1,000 mg every 8 hours for 14 days.[40] The US Food and Drug Administration recommends maximum of 4,000 mg daily for <10 days in healthy adults with normal liver function, no other acetaminophen sources, and <2 alcoholic drinks daily. Recently, manufacturers such as McNeil's "Tylenol" have recommended 3,000–3,250 mg daily because of reports of overdoses in patients taking standard doses up to 4,000 mg daily.[40] However, these reports have been because of patients unintentionally ingesting acetaminophen through other sources (sleep medications, cough medications, etc). Patients with abnormal liver function tests, active hepatitis, cirrhosis, or another active hepatic disease should consider a daily maximum dose of ≤2,000 mg daily. Standard precautions and contraindications should be considered, and pharmacy or medical specialists should be consulted for assistance in unclear cases.

3. Neuralgia-related Drugs

Anticonvulsant regimens have been less commonly reported in the hand surgery literature. However, they have been reported to be effective in nerve repair surgery and historically more painful procedures such as olecranon open reduction internal fixation and basal joint arthroplasty.[40] Regimens include dexmedetomidine (intravenous 0.5 mcg/kg over 20 minutes at the start of surgery) for nerve repair and gabapentin 300 mg twice or thrice a day for 3 weeks after surgery.[30,40] Zollinger et al[47] proposed via in a randomized controlled trial that 500 mg of vitamin C taken daily by patients with distal radius fractures resulted in an absolute risk reduction of 15% of developing complex regional pain syndrome, to which many institutions have adhered.[30,40] However, more recent studies have challenged the effectiveness of prophylactic vitamin C against chronic regional pain syndrome.[48,49] Therefore, there is insufficient evidence to justify recommending the use of vitamin C. However, given its low cost and lack of side effects, its use has few drawbacks.

Current Evidence for Postoperative Opioid Requirements

The published literature from hand and upper-extremity surgery publications and other relevant sources provides valuable data to develop evidence-based opioid prescribing recommendations. Tables 1 to 4 provide the breakdown of the current best evidence on patient-reported opioid requirements after common soft tissue hand/wrist, soft tissue elbow/forearm, bony hand/wrist, and bony elbow/forearm procedures, respectively. A broad synthesis of this literature can be summarized accordingly:

1. Opioids are overprescribed after hand and upper-extremity surgery at 2 or 3 times above actual consumption.[5,7] Greater initial prescriptions are associated with higher postoperative opioid usage in hand surgery.[23–25]
2. Opioid use after most soft tissue hand surgeries is <5 opioid tablets, and even 0 when nonopioid analgesics are recommended. [5,7,33–41]
3. Opioid use after bony surgeries is higher than that for soft tissue surgeries.[5,7,34] Procedures involving joints, such as CMC arthroplasty, are especially painful.[50,51]
4. Older patients typically consume opioids less than younger patients. [5,7,34,39,43]
5. Multimodal analgesia strategies result in less opioid use.[52,53]
6. Preoperative counseling has decreased voluntary opioid use while maintaining high pain management satisfaction.[37–39]

Additional supplemental findings for each procedure category are included. Oxycodone 5 mg was considered the standard reference dose, with equivalent doses including hydromorphone 2 mg, morphine immediate release 7.5 mg, and oxycodone elixir 1 mg/ml.[40]

Recommendations

Multimodal anesthesia

The existing literature on nonopioid multimodal anesthesia strategies and opioid requirements for common upper-extremity procedures organized by anatomic location and tissue type has been presented thus far. We recommend a multimodal anesthesia strategy for all upper-extremity procedures, regardless of type (Table 5). This includes using NSAIDs and acetaminophen after surgery (unless medically contraindicated). A concomitant proton pump inhibitor, such as omeprazole 20 mg twice a day or

Table 1
Hand/Wrist Soft Tissue Procedure Opioid Requirements

Author	Journal	Level of Evidence	Y	Procedure (N Patients)	Opioid Requirement	Comments
Rodgers et al[16]	J Hand Surg Am	I	2012	CTR, ganglion & mass excision, TFR, tendon/nerve repair (156)	9 ± 9 pills (≤2 d)	—
Stepan et al[59]	J Hand Surg Am	II	2018	CTR, TFR, DQR (123)	4–10 pills/25 MME (range 0–330)	—
Adalbert and Ilyas[50]	Hand (N Y)	II	2021	1. Soft tissue 2. Hand 3. Wrist procedures (185)	1. 4.2 pills 2. 3.9 pills 3. 6.3 pills	Soft tissue procedures used no opioids in 44% of cases.
Chapman et al[58]	Hand (N Y)	II	2017	CTR (277)	4.3 pills (median 3.2)	Fewer pills required with age and male sex
Peters et al[60]	J Hand Surg Am	IV	2018	CTR (56)	>50% used <2 tablets over 2 d (range 0–7 d)	—
Miller et al[61]	Hand	II	2017	1. TFR (78) or CTR (103) with WALANT 2. TFR (50) or CTR (185) with MAC	1. WALANT: 3.85 pills (range 0–32, SD 6.7) 2. MAC: 3.95 pills (range 0–33, SD 5.7)	No difference in opioid use by procedure or anesthesia type.
Miller et al[62]	Hand	II	2017	CTR with postoperative 1. Tramadol (110) or 2. Oxycodone (159)	1. Tramadol: 3.3 pills for 1.8 d 2. Oxycodone: 4.9 pills for 2.3 d	Reduced overall opioid use with tramadol.
Kim et al[9]	J Bone Joint Surg Am	II	2016	1. Soft tissue (904) 2. Hand (593) 3. Wrist (658) 4. CTR (380) 5. TFR (155) 6. Mass excision (95)	1. 7.4 pills in 2.9 d 2. 7.7 pills in 2.9 d 3. 7.5 pills in 3.5 d 4. 4.2 pills 5. 3.8 pills 6. 4.7 pills	Authors recommended ≤10 opioid pills for hand/wrist soft tissue procedures.
Dwyer et al[63]	J Hand Surg Am	II	2018	CTR (121)	3 pills (range 0–20) + 11 OTC pills (range 0–20)	Authors recommended 5–10 opioid pills after CTR.
Gaspar et al[27]	J Bone Joint Surg Am	II	2018	1. CTR 2. TFR (266 surveyed attendings)	1. 112.7 MME (95% CI 101.3–124.1) 2. 100.2 MME (95% CI 90.8–110.0)	Results based on survey of surgeons not actual patient use.
Ilyas et al[64]	Orthopedics	II	2019	CTR (112)/TFR (76)	<5–10 pills	Pain scores equivalent for oxycodone, ibuprofen, Tylenol

CTR, carpal tunnel release; DQR, de Quervain release; MAC, monitored anesthesia care; OTC, over-the-counter; TFR, trigger finger release; WALANT, Wide awake, local anesthesia, no tourniquet.

Table 2
Elbow/Forearm Soft Tissue Procedure Opioid Requirements

Author	Journal	Level of Evidence	Y	Procedure (N Patients)	Opioid Requirement	Comments
Kim et al[9]	J Bone Joint Surg Am	II	2016	1. Soft tissue (904) 2. Elbow & forearm (141) 3.Tendon repair (28)	1. 7.4 pills in 2.9 d 2. 11.1 pills in 4 d 3. 14.5 pills	Recommend ≤22.5 MME; more for youth, self-pay, Medicaid, Worker's compensation.
Hozack et al[57]	Hand (N y)	II	2019	1. Cubital tunnel procedures (100) 2. CuTR (76) 3. UNT (24)	1. 50 MME (range 0–300) 2. 40.4 MME (5.4 pills) 3. 625 MME (8.3 pills)	Medicare < private insured & worker's compensation. Older patients consumed less.

CuTR, cubital tunnel release; MME, morphine milligram equivalents; UNT, ulnar nerve transposition.

pantoprazole 40 mg daily, should be used in patients with a high risk of gastric ulcers. Preoperative nerve blocks and catheters should be considered on a case-by-case basis and are not discussed in this article. However, their use does not substantially change the prescribing recommendations.

Recently, there has been great interest in oral anticonvulsant medications, gabapentin and pregabalin, as part of perioperative analgesia. Gabapentin was US Food and Drug Administration-approved in 1994 for the adjunctive treatment of seizure disorders.[54] Pregabalin earned US Food and Drug Administration approval in 2004 for treating partial onset seizures, diabetic neuropathy, postherpetic neuralgia, and later in 2007, for fibromyalgia.[54] Both medications target the α2δ1 subunit of N-type voltage-gated calcium channels on dorsal root ganglions and spinal cord neurons. Binding suppresses the release of neurotransmitters similar to substance P, which then reduces neuronal excitability. There have been no high-quality studies in hand surgery examining these medications. However, some promising off-label evidence was shown in lumbar spine surgery, shoulder surgery, and adult reconstruction.[55,56] Gabapentin is considered less potent than pregabalin, but it has a generic formulary, so it is more cost-effective. Side effects are dizziness, somnolence, ataxia, headache, and edema, which are more pronounced in elderly and renal-impaired patients. The duration of treatment is variable in the literature and ranges from a single postoperative dose to 30 days of treatment.[55,56] Further controlled studies are necessary before definitive recommendations can be made. Early evidence is promising that these medications may play a role in upper-extremity surgeons' analgesic armamentarium, particularly for nerve-related surgeries (ie, carpal tunnel or cubital tunnel syndrome), more painful surgeries, and chronic opioid-consuming patients. Multimodal recommendations are summarized in Table 5.

Table 3
Hand/Wrist Bony Procedure Opioid Requirements

Author	Journal	Level of Evidence	Y	Procedure (N Patients)	Opioid Requirement	Comments
Rodgers et al[16]	J Hand Surg Am	I	2012	Hand/wrist ORIF or arthroplasty (46)	14 ± 11 pills	—
Kim et al[9]	J Bone Joint Surg Am	II	2016	1. Unspecified fracture (260) 2. Joint procedure (252) 3. Finger CRPP (23) 4. Metacarpal ORIF (46) 5. Thumb BJA (31) 6. DRF ORIF (114)	1. 13 pills in 4.5 d 2. 14.5 pills in 5.0 d 3. 8.1 pills 4. 9.6 pills 5. 21.5 pills 6. 13.7 pills	Authors recommended ≤30 MME for hand/wrist fracture or joint procedures.
Dwyer et al[63]	J Hand Surg Am	II	2018	DRF ORIF(24)	16 pills (range 0–30) + 20 OTC pills (range 0–65)	Authors recommended 30–45 MME after DRF ORIF.
O'Neil et al[65]	Am J Orthop	II	2017	DRF ORIF (98)	58.6 MME (range 0–280) in 4.8 d (range 0–16 d), 14.6 pills	No difference by anesthesia/fracture type. Increased with younger patients, self-pay, Medicaid.
Adalbert and Ilyas[50]	Hand (N Y)	II	2021	1. Fracture ORIF (53) 2. Arthroplasty (26)	1. 6.7 pills 2. 8.7 pills	Rx use differed by location for hand (63%), wrist (76%), and elbow (80%).
Cunningham et al[66]	Injury	III	2021	DRF ORIF (174,091)	Mean 45 pills filled	Results based on prescriptions filled not actual use.
Gaspar et al[27]	J Bone Joint Surg Am	II	2018	1. Thumb BJA 2. DRF ORIF (266 surveyed attendings)	1. 254.9 MME (95% CI 242.0–267.8) 2. 318.5 MME (95% CI 202.1–333.9)	Results based on survey of surgeons not actual patient use.
Bhashyam et al[67]	J Orthop Trauma	III	2019	DRF ORIF (1,445)	204 MME	Results are author recommendations, not actual patient use.

BJA, basal joint arthroplasty; CRPP, closed reduction percutaneous pinning; DRF, distal radius fracture; ORIF, open reduction internal fixation.

Table 4
Elbow/Forearm Bony Procedure Opioid Requirements

Author	Journal	Level of Evidence	Y	Procedure (N Patients)	Opioid Requirement	Comments
Cunningham et al[66]	Injury	III	2021	1. Forearm ORIF (18,276) 2. Olecranon ORIF (24,415) 3. Radial head ORIF (9663) 4. Distal humerus ORIF (11,869)	1. 54.8 pills 2. 43 pills 3. 44.7 pills 4. 55.4 pills 5. 59.7 pills	Results based on large database study on prescription filling patterns, not patient-reported use.
Bhashyam et al[67]	J Orthop Trauma	III	2019	1. Proximal radius & ulna ORIF (619) 2. Distal humerus ORIF (138)	1. 218 MME 2. 254 MME	Results are author recommendations, not actual patient use.

ORIF, open reduction internal fixation.

Table 5
Summary Of Multimodal Analgesia Types

Medication	Recommended Dosage	Maximum Daily Dosage	Comments
Acetaminophen	3,000 mg daily (500 mg every 4 h standing) for up to 10 d after surgery	4,000 mg (2,000 mg if history of liver disease)	Consider medical consultation if existing liver disease history.
Naproxen	440–500 mg twice a d standing for up to 10 d after surgery	1,100 mg	-Only 1 NSAID should be used. -PPI should be used when peptic ulcer risk present.
Ibuprofen	800 mg every 8 h for up to 10 d after surgery	2,400 mg	-Only 1 NSAID should be used. -PPI should be used when peptic ulcer risk present. -Consider medical consultation if kidney/gastric disease history.
Anticonvulsant class ie, gabapentin and pregabalin	N/A	Gabapentin: 3,600 mg (after up-titration) Pregabalin: 600 mg (after up-titration)	Evidence is inconclusive for the effective and safe use of these medications for postoperative analgesia in hand and upper-extremity surgery, thus it is not recommended here.
Peripheral nerve block/catheter	Case-by-case basis	N/A	Dependent on patient, surgeon, and anesthesiologist preference.

N/A, not available; PPI, proton-pump inhibitor.

Soft tissue procedures

Opioids should be routinely prescribed on a PRN basis for breakthrough pain above standing acetaminophen and NSAID prescription. For soft tissue procedures of the hand and wrist, a maximum of 30 MME per day (equivalent to 4 doses of 5 mg oxycodone tablets per day) for postoperative analgesia is indicated, with a maximum prescription of 5 tablets at a time (Table 6). For soft tissue procedures of the forearm and elbow, a maximum of 50 MME per day (equivalent to 7 doses of 5 mg oxycodone tablets per day) for postoperative analgesia, with a maximum prescription of 10 tablets at a time (Table 6). Smaller initial prescription amounts

Table 6
Summary Of Oral Analgesia Recommendations

Surgery Type	Representative Procedures	Recommended Postoperative Prescription
Soft tissue surgeries of the hand and wrist	CTR	Naproxen 500 mg twice a d, dispense #20
	TFR	Acetaminophen 500 mg every 4 h, dispense #60
	DQR	Oxycodone 5 mg every 6 h PRN, dispense #5
	Mass or Cyst Excision	
Soft tissue surgeries of the forearm and elbow	CuTR	Naproxen 500 mg twice a d, dispense #20
	Ulnar nerve transposition	Acetaminophen 500 mg every 4 h, dispense #60
	Tennis elbow debridement	Oxycodone 5 mg every 4–6 h PRN, dispense #5 or #10
Bony surgeries of the hand, wrist, and elbow	Thumb basal arthroplasty	Naproxen 500 mg twice a d, dispense #20
	Hand fracture repairs	Acetaminophen 500 mg every 4 h, dispense #60
	Radius fracture repair	Oxycodone 5 mg every 4–6 h PRN, dispense #10 or #20
	Olecranon fracture repair	

CTR, carpal tunnel release; CuTR, cubital tunnel release; DQR, de Quervain release; TFR, trigger finger release.

are recommended to avoid inadvertent overprescribing and diversion. Furthermore, this is the maximum-recommended amount, as lower quantities are typically sufficient, especially for older and/or male patients.[9,57,58] Soft tissue procedures with small incisions, superficial and limited dissection, and no implant placement (such as skin excisions and trigger finger release), generally require no opioids after surgery.

Bony procedures

For bony procedures of the hand, wrist, forearm, and elbow, a maximum prescription of 50 MME per day (equivalent to 7 doses of 5 mg oxycodone tablets per day) for postoperative analgesia is indicated, with a maximum prescription of 10–20 tablets (Table 6). Smaller initial prescription amounts are recommended to avoid inadvertent overprescribing and diversion. Moreover, refill requests are desirable in lieu of overprescribing initially. Furthermore, this is the maximum-recommended amount; lower quantities are typically sufficient, especially for older and/or male patients.[9,57,58]

Opioid stewardship by hand surgeons can substantively combat the US opioid epidemic. Appropriate opioid dosing and postoperative multimodal analgesic strategies are more imperative than ever with the coronavirus disease 2019 pandemic, leading to increased opioid overdoses. This review offers comprehensive, evidence-based, easy-to-follow analgesic regimens and opioid dosages for common hand and upper-extremity surgeries.

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