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## Opioid-Prescribing Guidelines for Common Surgical Procedures: An Expert Panel Consensus

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### Abstract

**BACKGROUND:** One in 16 surgical patients prescribed opioids becomes a long-term user.

Overprescribing opioids after surgery is common, and the lack of multidisciplinary procedure-specific guidelines contributes to the wide variation in opioid prescribing practices. We

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hypothesized that a single-institution, multidisciplinary expert panel can establish consensus on ideal opioid prescribing for select common surgical procedures.

**STUDY DESIGN:** We used a 3-step modified Delphi method involving a multidisciplinary expert panel of 6 relevant stakeholder groups (surgeons, pain specialists, outpatient surgical nurse practitioners, surgical residents, patients, and pharmacists) to develop consensus ranges for outpatient opioid prescribing at the time of discharge after 20 common procedures in 8 surgical specialties. Prescribing guidelines were developed for opioid-naïve adult patients without chronic pain undergoing uncomplicated procedures. The number of opioid tablets was defined using oxycodone 5 mg oral equivalents.

**RESULTS:** For all 20 surgical procedures reviewed, the minimum number of opioid tablets recommended by the panel was 0. Ibuprofen was recommended for all patients unless medically contraindicated. The maximum number of opioid tablets varied by procedure (median 12.5 tablets), with panel recommendations of 0 opioid tablets for 3 of 20 (15%) procedures, 1 to 15 opioid tablets for 11 of 20 (55%) procedures, and 16 to 20 tablets for 6 of 20 (30%) procedures. Overall, patients who had the procedures voted for lower opioid amounts than surgeons who performed them.

**CONCLUSIONS:** Procedure-specific prescribing recommendations may help provide guidance to clinicians who are currently overprescribing opioids after surgery. Multidisciplinary, patient-centered consensus guidelines for more procedures are feasible and may serve as a tool in combating the opioid crisis.

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An estimated 63,600 people in the US died from a drug overdose in 2016, a 21% increase from the age-adjusted rate in the previous year.<sup>1</sup> More than 60% of the total drug overdose deaths in the US in 2015 involved an opioid, and at least half of these deaths were attributed to prescription opioids.<sup>2,3</sup> Surgery is a common setting in which opioid-naïve patients are first exposed to opioids, with 1 study demonstrating that 1 in 16 patients become long-term users after surgery.<sup>4</sup> More alarming, 45% of patients who do not take opioids at all on their last day of a surgical hospitalization are prescribed opioids at discharge.<sup>5</sup> There is wide variation in outpatient prescribing of opioids at the time of surgical discharge after standardized procedures.<sup>6,7</sup> For example, the number of opioid tablets prescribed to opioid-naïve patients in the US after laparoscopic cholecystectomy varied from 0 to greater than 50 tablets.<sup>7</sup> Prescribing a higher number of opioid tablets than appropriate, or prescribing any opioids when none are needed to reasonably manage pain, demonstrate opportunities to reduce avoidable harm by reducing unnecessary opioid exposure and long-term use.<sup>8-10</sup>

National guidelines list best practices for pain management, but do not provide detailed guidance regarding the quantity of opioids to prescribe after surgery.<sup>11-13</sup> For example, the Centers for Disease Control and Prevention (CDC) Guideline for Prescribing Opioids for Chronic Pain, while often cited, has only 1 paragraph addressing “acute pain” guidelines, and does not specify the morphine milligram equivalents (MME), but rather, only recommends not exceeding a 7-day supply.<sup>14</sup> This is problematic because a single day’s supply spans the range up to 90 morphine MME per day, depending on how the prescription is written. Furthermore, using a day’s supply fails to account for important risks that accompany higher opioid doses, such as the risk of overdose which, compared with

prescriptions of less than 20 MME/day, doubles at or above 50 MME/day.<sup>15</sup> Moreover, commonly performed surgical procedures differ substantially from one another regarding invasiveness, mechanism of pain, and pain intensity, all dependent on the anatomic structures being cut or manipulated. Yet many state governments and large payers recently announced one-size-fits-all, across-the-board limits for all surgical procedures.<sup>16</sup> This response highlights the urgent need for procedure-specific guidance for outpatient opioid prescribing after surgery.

Currently, best practices for outpatient opioid prescribing after surgery exist only in the wisdom of practicing clinicians. To date, there are no formal multidisciplinary guidelines that are procedure specific. To address this knowledge gap and better guide clinicians, we convened a panel of surgeons, pain specialists, outpatient surgical nurse practitioners, surgical residents, patients, and pharmacists to describe best practices for outpatient opioid prescribing at the time of discharge after 20 common procedures.

## METHODS

We formed a multidisciplinary, single-institution expert panel of 30 relevant stakeholders, which included 6 groups: surgeons, pain specialists, outpatient surgical nurse practitioners, surgical residents, patients, and pharmacists. Panel members were chosen by a demonstrated expertise in a specialty area as a clinician or experience with a procedure as a patient. The panel members with experience as postoperative patients after 1 of the 20 procedures were patients who volunteered because of a desire to contribute to addressing the opioid crisis and therefore were well informed individuals with a high level of health literacy on postoperative pain management before serving on the panel. We included individuals representing the 5 hospitals in the Johns Hopkins Health System, including 1 large tertiary medical center and 4 community hospitals in the region. Consensus development was conducted using a modified Delphi method.<sup>17</sup> In accordance with common guideline development processes, a literature review was performed on opioid overprescribing after surgery, and articles on postoperative pain management after each procedure were shared with panelists.<sup>6,13,14,18,19</sup> We selected 20 procedures that are common, have minimal variation in the way in which they are routinely performed, and span the specialties of general, breast, cardiothoracic, orthopaedic, urologic, obstetrics, and gynecologic surgery.<sup>20</sup> A draft perioperative pain management recommendation prepared by acute pain specialists was shared with panelists 2 weeks before the meeting to serve as round 1 of the Delphi method. These documents were also shared at the time of the expert panel meeting.

The second part of the 3-part modified Delphi method was an in-person meeting of the expert panel. Panelists were asked to create best practices for outpatient postsurgical opioid prescribing by procedure for an opioid-naïve, average adult patient with no chronic pain, who had an uncomplicated procedure. An opioid tablet was defined as an oxycodone 5 mg oral equivalent. Pre-meeting comments were collected and served as a starting point for discussion for each procedure. The 5 general and breast surgery procedures with available literature on specific opioid prescribing were discussed first. Discussion for the remaining 15 procedures was informed by the literature on the general and breast surgery procedures, but the recommendations for the number of pills were based on the experience of clinicians

and patients on the panel. Those who commented at the extremes of the range (highest and lowest tablet amounts) were asked to explain to the group the rationale for their recommendation. After a thorough discussion for each procedure, real time voting on the discharge prescription was conducted through an online platform.

Part 3 of the modified Delphi method began with distribution of the results to panel members for final comment and approval, and was followed with a 2-week period of feedback on the guidelines from panel members. After each member of the expert panel confirmed their consensus for the guidelines addressing their specialty and/or relevant patient experience, the modified Delphi method concluded.

## RESULTS

We developed postoperative pain management guidelines for opioid-naïve patients, ranging from the minimum initial therapy to the maximum number of opioid tablets that should be prescribed at the time of discharge. Five important qualifying points were raised and agreed to by experts, with unanimous consensus. First, prescribing any pain medication should consider the patient's wishes and the effectiveness of the medications they have taken in the past and while in the hospital before discharge. It was agreed that clinicians should not prescribe opioids to patients who specifically express the desire to avoid opioids after surgery as well as patients whose postsurgical pain is comfortably managed with nonsteroidal anti-inflammatory drugs (NSAIDs) and/or acetaminophen alone before discharge. Second, unless medically contraindicated, patients should be counseled to maximize non-narcotic pain medication with scheduled doses of acetaminophen and NSAIDs before using opioid medication. Third, patients should be partners in the shared decision-making process regarding outpatient opioid prescribing, being fully informed of the risks and benefits of opioids, including the risk of fatal addiction. Fourth, patients with terminal conditions, such as stage 4 cancer, should be considered special cases because palliation may be an important indication for those patients, but was not a consideration in the development of these guidelines. Finally, opioid prescribing should consider a patient's potential medical contraindications, body weight, response to multimodal pain therapy, addiction potential, and risk aversion.<sup>21,22</sup>

For all 20 surgical procedures reviewed, the panel uniformly agreed that it is appropriate to prescribe only nonopioid pain medication to patients, depending on individual and clinical characteristics unless contraindicated. Therefore, the panel agreed that the minimum number to be listed in the opioid tablet range for each procedure should be 0 opioid tablets. However, the panel acknowledged that, for some of the included procedures, postoperative pain would very rarely be managed with nonopioid pain medication alone at the time of discharge. Examples of these cases are orthopaedic procedures including arthroscopic anterior cruciate ligament/posterior cruciate ligament (ACL/PCL) repair, arthroscopic rotator cuff repair, open reduction and internal fixation (ORIF) of the ankle, and maximally invasive gynecologic procedures like open hysterectomy. For patients who are not prescribed opioids, the panel recommended that clinicians give patients specific administration instructions for commonly available over-the-counter nonopioid analgesics, such as an NSAID, taken in combination with acetaminophen, as well as instructions on where to seek help if they

experience debilitating pain while taking these over-the-counter medications.<sup>23</sup> Unless medically contraindicated, the panel agreed patients should be provided with detailed discharge instructions to optimize scheduled nonopioid medications. An example of such an instructions is: Take ibuprofen 400 mg by mouth every 8 hours and add acetaminophen 1 mg by mouth every 8 hours as needed for pain. Medications may be staggered so something is taken every 4 hours in the immediate postoperative period.

For all 20 surgical procedures reviewed, the median number of opioid tablets recommended at discharge was 12.5 tablets (range 0 to 20 tablets). The panel recommended 1 to 15 opioid tablets for 11 of 20 procedures (55%), which included laparoscopic cholecystectomy, unilateral open and laparoscopic inguinal hernia repair, partial mastectomy with and without sentinel lymph node biopsy, uncomplicated cesarean delivery, minimally invasive hysterectomy, robotic retropubic prostatectomy, arthroscopic partial meniscectomy, and thyroidectomy. The expert panel recommended 0 opioid tablets for 3 of 20 (15%) procedures (uncomplicated vaginal delivery, cochlear implant, and cardiac catheterization), and recommended 16 to 20 tablets for 6 of 20 (30%) procedures (arthroscopic ligament repair surgery, arthroscopic rotator cuff surgery, open reduction and internal fixation of the ankle, video assisted thoracoscopic wedge resection, coronary artery bypass grafting, and open hysterectomy) (Table 1).

Overall, 1 consistent trend observed was that patients who had a procedure voted for lower opioid amounts than surgeons who perform them. For example, 1 patient advocated for 0 opioid tablets to be prescribed on discharge after a laparoscopic cholecystectomy, while general surgeons recommended prescribing 10 tablets of oxycodone. Another patient who had arthroscopic ligament repair surgery strongly recommended taking no opioids, as she did, while surgeons recommended prescribing 20 oxycodone tablets.

## DISCUSSION

We describe 3 primary recommendations by the expert panel: provide patients with instructions to maximize nonopioid analgesics such as NSAIDs and acetaminophen; the minimum number of opioid tablets to prescribe after each procedure is 0, depending on procedure and patient characteristics; and the maximum number of opioid tablets to prescribe varies by procedure, but should not exceed 20 tablets for any of the selected common operations.

In 2014, there were 17.2 million therapeutic surgical procedures in the US.<sup>20</sup> That year, in the US alone, there were 240 million opioid prescriptions dispensed—nearly 1 prescription for every adult in the general population.<sup>2,24</sup> In order to address the opioid epidemic, we should address one of its leading contributors—overprescribing after surgery.<sup>25</sup> Surgeons prescribe the highest rate of opioid pain medications in the US after chronic pain specialists, and recent data suggest that 70% to 80% of opioids are not used after surgery.<sup>9,26</sup> Despite the high overall rates of nonuse of prescription opioids, an alarming 1 in 16 patients becomes a chronic opioid user after undergoing a surgical procedure.<sup>4</sup> In response to these findings, surgeons and pain specialists have begun to consider best practices for the ideal amount of opioids to prescribe after common procedures.<sup>6,27</sup>

## Barriers

During the past few decades, opioid prescribing has been driven more by tradition and dogma and less by science and data.<sup>25</sup> The trend to overprescribe narcotic pain medication is based on an experiential “that’s how I like to do it” model passed along from generation to generation of surgical trainees. This dogma was further magnified by the false but previously accepted notion that opioids are rarely addictive. This concept, advanced in a 1980 *New England Journal of Medicine* letter that stated that only 1% of people become addicted to narcotic pain medication, led to overuse and unleashed aggressive advertising of opioids, including direct-to-consumer marketing.<sup>28,29</sup> Finally, pain became the fifth vital sign of medicine and a high-stakes indicator of patient satisfaction and hospital performance in the absence of other comprehensive measures of clinical quality.<sup>30–32</sup> Using patient satisfaction with pain control as a performance measure after surgery likely contributed to the discrepancy between surgeon and patient recommendations for number of opioid tablets needed after surgery, as demonstrated on our expert panel.<sup>32</sup> Additionally, the inconvenience of returning to the hospital or clinic for a hand-written opioid prescription if pain control is insufficient after discharge is a likely contributor to initial physician overprescribing and is a central component of the national discussion on increased adoption of electronic controlled substance prescribing by surgeons and hospital systems.<sup>33</sup> For these reasons, each expert was given literature on addiction and other risks of opioids, postoperative pain, and variation in postoperative opioid prescribing.<sup>6,14,15,19</sup>

Another driver of high opioid variation in prescribing practices is time pressure. Clinicians can feel rushed because many prescriptions are written between operations or during a busy day. Similarly, discharges may be performed by a clinician who did not participate in the patient’s operation and did not take the time to discuss opioid risks, opioid alternatives, and the patient’s wishes. It is not uncommon for a single intern to be responsible for discharging dozens of surgical patients each month without taking the time to calculate their ideal morphine milligram equivalents relative to what was actually needed to control pain during their inpatient stay. Medical trainees of all levels often write opioid prescriptions for patients at academic medical centers, with interns and junior residents writing the majority of prescriptions at discharge.<sup>34</sup> The discrepancy between the amount of opioid pain medication used in the hospital the day before discharge and the amount prescribed at discharge was quantified by a cross-sectional study at 3 medical centers in Boston, which showed that 45% of postsurgical patients are overprescribed opioids at the time of discharge compared with their inpatient opioid use.<sup>5</sup> The consensus guidelines we describe can serve as a starting point that can be tailored to each individual patient.

## Implications

First, electronic health records often have arbitrarily set prescribing defaults that are not procedure specific. The recommendations presented can be used to create smarter defaults. Changing the default is 1 easy step to aide prescribers who are overprescribing. Indeed, next steps at our institution include hospital-wide electronic medical record changes in the default number of opioid tablets to prescribe and ease of access to published guidelines within a patient’s chart. Quality improvement projects to implement appropriate postoperative opioid



prescribing practices are a hospital priority with widespread clinician and administrative support.

Second, payers, including private and government payers, should use procedure-specific opioid limits rather than set arbitrary rules that apply to all procedures. Levels of postoperative pain vary widely by procedure type, and the amount of pain medication patients need on average after each procedure can be vastly different. For example, 1 single institution study found that, within upper extremity orthopaedic procedures, distal radial open reduction internal fixation patients used an average of 14.5 opioid pills postoperatively, while carpal tunnel release patients used an average of 4.2 opioid pills.<sup>35</sup> Similarly, in general surgery, 82% of patients undergoing partial mastectomy in a single institution study did not require any opioids postoperatively, compared with only 35% of patients undergoing laparoscopic cholecystectomy who did not require postoperative opioid medication.<sup>6</sup> Using clinical wisdom and a patient-centered approach, we demonstrate the feasibility of procedure-specific guideline development. Failure to implement procedure-specific guidelines risks setting thresholds that are too high for some procedures and could result in other patients being denied the pain therapy they need.

Finally, the surgical and medical community should broadly promote the use of specialty-specific expert panels using our multidisciplinary and patient-centered approach to develop more granular recommendations that expand into other procedures. Including patients and clinicians from diverse backgrounds improves the insight gained through this process. Our finding that patients consistently voted for opioid prescribing amounts less than the surgeons who perform the same operations highlights the need for more patient input in the development of clinical guidelines.

### Patterns in big data

Data can be a powerful tool in addressing the opioid overprescribing problem. We and others have previously reported how to identify opioid-naïve patients in claims data by looking at their opioid fill rate before surgery.<sup>7,36</sup> Among this subset of patients, clinicians with a practice pattern of routinely prescribing opioids above the consensus guidelines and above the mean for their peers nationally should be shown their individual prescribing data relative to their surgeon peers nationally performing the same procedure in like opioid-naïve patients. Using a confidential, peer-based data sharing method, outlier overprescribers can be identified and offered help. For example, this help may involve re-education, or simply handing-off postoperative pain management to dedicated specialists, as some centers have done.<sup>37</sup> The Improving Wisely campaign is one such quality improvement project that shows outlier physicians where they stand relative to peers and best practices.<sup>38</sup>

### Limitations

Prescribing any medication should not follow a strict dosage template, but instead, should account for individual patient and clinical characteristics and for patient preferences. Moreover, pain is a subjective experience influenced by a myriad of factors, including psychosocial elements. For example, patients diagnosed with anxiety merit management of this comorbidity in addition to pain experienced after surgery. Additionally, application of

these recommendations to patients taking nonopioid pain medications for unrelated chronic pain, such as gabapentin and pregabalin, may require special consideration. Further, patients who are on benzodiazepines have been identified as individuals at greater risk for the development of dependency postoperatively.<sup>39</sup> Although the presented guidelines apply only to patients who are opioid-naïve and without chronic pain, these recommendations provide a starting point for future investigation of more complex cases. Expert consensus may be complemented or supplemented by reports from large cohorts of patients regarding actual postoperative opioid use.<sup>40,41</sup> Though more detailed, such investigation consumes valuable time and resources, while adoption of consensus-based guidelines may result in more rapid change in prescribing patterns. We believe that our results represent the first step in an evolving understanding of pain and best practices after surgery. We do not claim to have an absolute truth in these guidelines, but instead, offer our local expert consensus from a multi-stakeholder, multi-disciplinary group from the Johns Hopkins Health System. Although the patient representatives on the panel were not randomly chosen, their voices represent actual experiences that should be considered in physician prescribing frameworks. Additional limitations inherent to any modified Delphi technique include loss of anonymity and potential biased results from dominant panel members. We fully acknowledge that any consensus-building process has limitations, but we maintain that the modified Delphi method was a reasonable method for achieving consensus on this particular topic.

## CONCLUSIONS

These procedure-specific recommendations provide a framework to limit unwarranted prescribing variation in opioid-naïve adults after surgery. More consensus guidelines are needed for the pediatric population and for patients previously exposed to opioids. Although it is our hope that the reported results may help provide guidance to clinicians who are currently overprescribing opioids after surgery, it may also serve as a starting point for future guideline development. We demonstrate the feasibility of including patients in guideline development, and encourage future work to use a patient-centered approach. Further work is needed to expand recommendations to more medical procedures.

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## APPENDIX 1

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**Table 1.**

Johns Hopkins Expert Panel Recommendations for Ideal Range of Oxycodone 5-mg Tablets to Prescribe to Opioid-Naïve Patients on Discharge after Undergoing Select Procedures

Procedure	Range (minimum-maximum)
General surgery	
Laparoscopic cholecystectomy (procedure 1) *	0–10
Laparoscopic inguinal hernia repair, unilateral (procedure 2) *	0–15
Open inguinal hernia repair, unilateral (procedure 3) *	0–10
Open umbilical hernia repair	0–15
Breast surgery	
Partial mastectomy without sentinel lymph node biopsy (procedure 4) *	0–10
Partial mastectomy with sentinel lymph node biopsy (procedure 5) *	0–15
Thoracic surgery	
Video-assisted thoracoscopic wedge resection	0–20
Orthopaedic surgery	
Arthroscopic partial meniscectomy	0–10
Arthroscopic ACL/PCL repair	0–20
Arthroscopic rotator cuff repair	0–20
ORIF of the ankle	0–20
Gynecologic surgery and obstetric delivery	
Open hysterectomy	0–20
Minimally invasive hysterectomy	0–10
Uncomplicated cesarean delivery	0–10
Uncomplicated vaginal delivery	0
Urologic surgery	
Robotic retropubic prostatectomy	0–10
Otolaryngology	
Thyroidectomy, partial or total	0–15
Cochlear implant	0
Cardiac surgery	
Coronary artery bypass grafting	0–20
Cardiac catheterization	0

Panel members included surgeons, surgical residents, pain specialists, surgical nurse practitioners, patients, and pharmacists.

\* Procedures with available literature on amount of opioids to prescribe on discharge at the time the panel convened. As a comparison to the table above, the following recommendations from Hill and colleagues<sup>6</sup> for the ideal number of oxycodone 5-mg tablets are listed: (procedure 1) 15 pills, (procedure 2) 15 pills, (procedure 3) 15 pills, (procedure 4) 5 pills, and (procedure 5) 10 pills.

ACL, anterior cruciate ligament; ORIF, open reduction and internal fixation; PCL, posterior cruciate ligament.