

An Evidence-Based Approach to the Prescription Opioid Epidemic in Orthopedic Surgery

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Orthopedic surgery is associated with significant perioperative pain. Providing adequate analgesia is a critical component of patient care and opioids play a vital role in the acute postoperative setting. However, opioid prescribing for patients undergoing orthopedic procedures has recently been identified as a major contributor to the current opioid epidemic. As opioid usage and related morbidity and mortality continue to rise nationwide, opioid-prescribing practices are under increased scrutiny. Here, we update the evidence base and recommendations behind a set of interventions developed at the Hospital for Special Surgery to address the national epidemic at the local level. The main components of our program include (1) guidelines for managing patients who are opioid tolerant and/or have a substance abuse disorder; (2) education programs for patients, emphasizing the role of opioids in recovery after elective orthopedic surgery; (3) education programs for prescribers of controlled substances, including clinical and regulatory aspects; (4) the development of surgery-specific prescribing recommendations for opioid-naïve patients; and (5) mechanisms to modify prescribing habits to limit unnecessary prescribing of controlled substances. (*Anesth Analg* 2017;125:1704–13)

Despite increased awareness, opioid use-and-abuse in the surgical population continues to grow relentlessly. Orthopedic surgery has been identified as a key driver of opioid overprescribing: According to a recent study, orthopedic surgeons are the third highest prescribers of opioids among physicians in the United States, accounting for 7.7% of all opioid prescriptions nationwide.¹ These data prompted a call to clinicians to examine how orthopedic surgery contributes to the epidemic, and to derive solutions to the problem.²

There are several challenges to caring for patients undergoing orthopedic surgery in the current prescribing climate: how to appropriately treat acute pain in the opioid-naïve patient; how to balance the risks of opioid withdrawal or overdose with reasonable analgesia in the opioid-tolerant patient; how to transition prescribing responsibility from the hospital setting to the community after a painful procedure; and how to define the roles and responsibilities of the institution in curbing the opioid epidemic.

Confronted with these challenges, the Department of Anesthesiology at Hospital for Special Surgery (HSS) convened a controlled substances task force. Membership spans a wide range of disciplines, including anesthesiology, orthopedic surgery, hospital administration, risk management, physician assistants, nursing, and pharmacy. The task force was charged with creating an institutional response to the opioid epidemic.

Here, we describe the development of an evidence-based, comprehensive program for managing controlled

substance prescribing at our institution. The program focuses on 3 strategic initiatives: (1) changing prescribing habits; (2) managing pain for patients with opioid tolerance and/or substance use disorders (SUDs); and (3) educating prescribers and patients.

CHANGING THE PRACTICE OF CONTROLLED SUBSTANCE PRESCRIBING

There are 2 major opportunities for changing prescribing habits. These can be loosely divided into clinical (appropriate use and duration) and regulatory/compliance aspects.

Clinical Opportunities

Opioids have demonstrated efficacy in the treatment of acute perioperative pain. However, multiple advisory bodies currently recommend that opioids are used only when necessary, at the lowest effective dose, for the minimum duration required.^{3–6} Unfortunately, evidence suggests that these recommendations have not yet translated into clinical practice. Conventional prescribing after elective surgery often results in arbitrary doses and quantities of opioids being dispensed. Data from multiple studies published after the advisories shows that, on average, patients are prescribed 3 times more opioids than are consumed after orthopedic surgery.^{7–10} Additionally, only a minority of patients are counseled regarding safe disposal of unused opioid medications.^{9,10} This represents a vast source for potential opioid overuse and diversion.

Interventions evaluating standardized opioid prescribing (by procedure) are starting to be reported.⁸ Although limited, data suggest that variability in opioid prescribing, total amount prescribed, and number of prescription refills can be reduced by standardizing prescribing after orthopedic surgery.¹¹

Accordingly, each surgical service at HSS was charged with creating procedure-specific discharge prescribing guidelines for the opioid-naïve patient (Figure 1). Each guideline includes a recommended initial agent, dose, frequency, duration, and maximum number of tablets to be dispensed. Wherever possible, these recommendations

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were based on published accounts of expected pain burden and average opioid requirement. Where quantitative data were lacking, expert opinion and consensus based on historic prescribing were used. In some cases, it was possible to extrapolate from 1 procedure to another, or stratify expected pain scores by invasiveness of the surgical procedure. General principles of safe opioid prescribing were standardized across services, consistent with national recommendations to prescribe only 1 short-acting opioid at a time, to minimize concurrent use of sedatives or hypnotics, and a prohibition against preprescribing opioids before the procedure.

Several state agencies, including the New York State Department of Health, have identified clinical assessment as a key facilitator of safe opioid prescribing.¹² Evaluating patients on an ongoing basis provides the opportunity to determine treatment efficacy and adjust doses and agents. Additionally, a risk assessment can be performed and an intervention staged if indices of misuse are detected

(Figure 2).¹³ Our institutional guidelines require the patient to be physically present when the initial prescription for a controlled substance is made. No new prescriptions are made or refilled if the patient has not been seen and examined within the prior 30 days (New York State Law allows an initial 7-day supply of controlled substances, with a 30-day refill or renewal for the same condition). These circumstances are documented in the electronic medical record, along with a pain diagnosis, indication for opioid use, and details of the regimen, strength, and directions for use and tapering.

Regulatory Opportunities

Combating opioid abuse has become a top priority at the state and federal levels. The US Department of Health and Human Services has articulated an approach to combat opioid abuse, which emphasizes health care information technology to prevent prescription misuse, promoting safer treatment of pain conditions and a timeline with targeted

SERVICE: JOINT ARTHROPLASTY

POLICY STATEMENT/PURPOSE: Promote judicious prescribing practices; encourage prescribers to employ conservative opioid prescribing practices to enhance patient safety and minimize risks of overuse & diversion

CONTENT APPLIES TO: Post-operative inpatient & ambulatory patients with no history of opioid dependency (chronic opioid treatment with daily use > 6 months).

PRINCIPLES OF PRESCRIBING OPIOIDS AT DISCHARGE:

1. Generally, we recommend that you prescribe only one (1) short-acting opioid. In situations where you prescribe two (2) short-acting opioids, the combined number of pills should not exceed the recommended maximum to prescribe (below).
2. Do not prescribe long-acting opioids.
3. Consider discontinuing or decreasing benzodiazepines (e.g. Valium, Xanax) with concurrent use of opioids. Consult with attending surgeon/medical doctor or pain management specialist if patient will take benzodiazepines and opioids due to increased respiratory risks.
4. Do not pre-prescribe opioids for a patient's discharge needs prior to the procedure.

RECOMMENDED PRESCRIBING BY PROCEDURE:

PROCEDURE	OPIOID	DOSE ROUTE FREQUENCY	DURATION	MAXIMUM	MULTIMODAL AGENTS	ALTERNATIVE (** do not prescribe acetaminophen with any other acetaminophen-containing medication)
Total Hip Arthroplasty	<ul style="list-style-type: none"> oxycodone 5mg hydromorphone 2mg 	<ul style="list-style-type: none"> 1-2 tablets Oral Every 3-4 hours as needed 	2 weeks supply	90 tablets	<ul style="list-style-type: none"> acetaminophen 1000mg 3-4x daily meloxicam 15mg daily, 15 tabs 	<ul style="list-style-type: none"> oxycodone/acetaminophen 5/325 mg hydrocodone/acetaminophen 5/325 mg
Total Knee Arthroplasty	<ul style="list-style-type: none"> oxycodone 5mg hydromorphone 2mg 	<ul style="list-style-type: none"> 1-2 tablets Oral Every 3-4 hours as needed 	2 weeks supply	120 tablets	<ul style="list-style-type: none"> acetaminophen 1000mg 3-4x daily meloxicam 15mg 1x daily, 15 tabs 	<ul style="list-style-type: none"> oxycodone/acetaminophen 5/325 mg hydrocodone/acetaminophen 5/325 mg

Figure 1. Changing prescribing habits: example of service and procedure-specific prescribing guidelines, from the HSS Joint Arthroplasty Service. Guidelines are available in printed and online versions to all practitioners (including physicians, physician assistants, nurses, and pharmacists).

Signs of Potential Prescription Drug Misuse or Abuse
Obtaining prescriptions from multiple sources and locations
Use of illegal drugs or controlled substances not prescribed for the patient
Resistance to changing medications despite deterioration in function or significant side effects
Concurrent alcohol abuse / substance use disorder
Repeated episodes of: <ul style="list-style-type: none"> requests for early refills of controlled substances prescription loss or theft increasing dose without prescriber instruction
Foraging prescriptions for opioids
Aggressive demands for opioids

Figure 2. Risk factors for prescription drug misuse.¹³

interventions for minimizing abuse and misuse.¹⁴ The states have also recognized the opioid crisis: Legislation authorizing the creation and use of a Prescription Drug Monitoring Program (PDMP) has been enacted in all states (except Missouri), the District of Columbia, and Territory of Guam. PDMPs collect electronic data regarding controlled substance prescriptions from in-state pharmacies and mail-order pharmacies that ship prescriptions into the state. Accessing the state PDMP allows prescribers to obtain their patients' controlled substance prescription history, including dose, supplier, and frequency of refill.

PDMPs are a valuable resource to identify patients who may be engaged in high-risk behavior, or who are at risk for abuse of or dependence on controlled substances. For example, patients who routinely obtain controlled substances from multiple prescribers are 7 times more likely to die of opioid overdose than those who do not; patients who obtain medications from more than 1 pharmacy are over 13 times more likely to suffer an overdose death.¹⁵ Proponents argue that compulsory PDMP consultation is necessary and sufficient to change prescribing behavior and reduce opioid abuse.¹⁶ Indeed, Florida reported a decline in the number of "doctor shoppers" and prescription drug overdose deaths after implementation of PDMPs.¹⁷ Critics point to other data suggesting small, mixed effects of PDMPs on influencing prescribing practices, poor study design, and low prescriber utilization of PDMPs.^{18,19}

Academic arguments notwithstanding, our local guidelines were developed according to applicable state and

federal laws (Figure 3). All HSS practitioners who prescribe, administer, or dispense controlled substances are registered with the US Drug Enforcement Administration and hold an active New York State License appropriate to their clinical certification. New York State has instituted mandatory electronic prescribing for all controlled substances, after compulsory review of the state PDMP. We further mandated that HSS prescribers are personally responsible for each prescription: Designating an assistant to generate or sign electronic prescriptions via shared passwords or access to e-prescribing is strictly prohibited. In contrast, review of the state PDMP may be delegated if an assistant is properly credentialed, but they must use their own username and password. The ultimate responsibility for reviewing the PDMP information rests with the prescriber.

The PDMP must be interrogated within 24 hours of any prescription for controlled substances. Once checked, the prescriber must document the query and any relevant findings, particularly concurrent use of other controlled substances or signs of prescription drug misuse (Figure 2).

To ensure compliance with applicable laws and regulations, our local Department of Internal Audit and Corporate Compliance performs continuous monitoring of controlled substance prescribing and of our written policies and guidelines. It is also made clear to all prescribers that failure to comply may result in disciplinary action. The written policies have been distributed to all clinicians, together with directions for reporting violations or concerns about clinical practices or applicable laws.

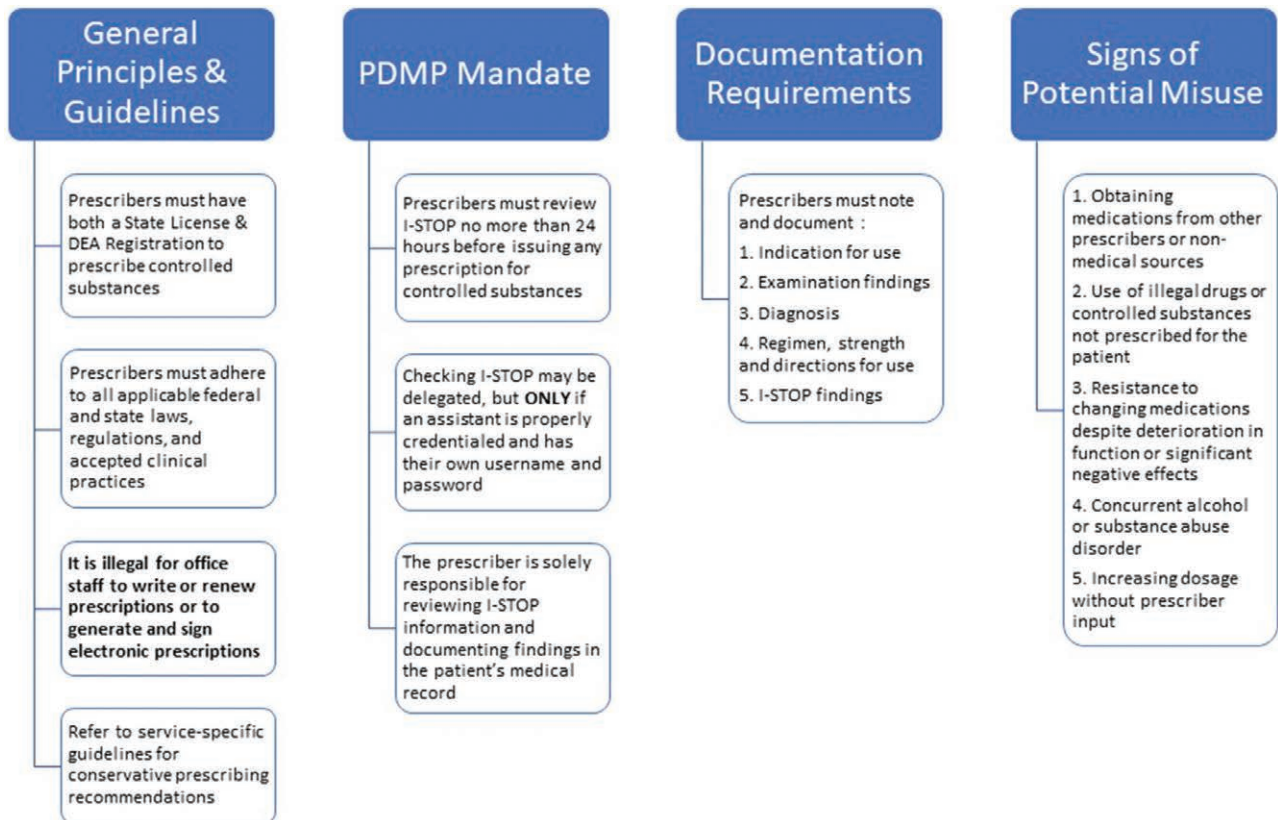


Figure 3. Prescribing controlled substances appropriately: Excerpted from A Fact Sheet for HSS Prescribers. I-STOP is New York State's PDMP. DEA indicates Drug Enforcement Agency; I-STOP, Internet System for Tracking Overprescribing; PDMP, Prescription Drug Monitoring Program.

THE OPIOID-TOLERANT PATIENT PRESENTING FOR ELECTIVE ORTHOPEDIC SURGERY

Elective orthopedic surgery is frequently indicated to address a painful condition. Thus, the prevalence of opioid use at the time of surgery tends to be significantly higher in orthopedic patients compared to the general surgical population.^{20–23} The development of opioid tolerance leads to decreased analgesic effects over time, and consequently, dose escalation to achieve adequate pain control. Additionally, long-term opioid use can lead to opioid-induced hyperalgesia (OIH), an enhanced painful response to painful stimuli.²⁴ Tolerance and OIH frequently co-occur, necessitating a careful approach to opioid management across the perioperative period. However, evidence guiding management is limited and principally comes from case reports, case series, and expert opinion.^{6,25,26} We have updated the evidence base for key components in management to create the HSS guidelines (the summary guidelines are provided in Figure 4).

Identify Opioid Tolerance

Preoperative opioid use and dependence are linked to longer hospital length of stay, poor functional recovery, and more complications after spine surgery,²⁷ major elective orthopedic procedures,²⁸ and hip,²⁹ knee,³⁰ and shoulder arthroplasty.³¹ According to the US Food and Drug Administration, opioid tolerance is defined in patients taking 60 mg oral morphine daily, or an equianalgesic dose of another opioid, for at least 1 week.³² The US Centers for Disease Control and Prevention definition of long-term opioid therapy is the use of opioids on most days for >3 months.³

Opioid tolerance should be diagnosed preoperatively. Early identification minimizes the risk of acute withdrawal,

provides an opportunity to optimize preoperative status, and allows time to formulate a postoperative analgesic plan.²⁶ Doses of prescribed controlled substances should be verified via the relevant state PDMP, or by contacting the original prescriber or dispensing pharmacist.

At HSS, we set the goal of identifying all opioid-tolerant patients before elective surgery. To identify this cohort, we instituted a simple tool called “Ask Every Patient” (Figure 5): a set of 5 questions to ask every patient during the preoperative evaluation phase. Positive answers necessitate further review to establish whether the patient has a SUD, complex pain condition, or opioid tolerance. These conditions in turn prompt a referral for a pain management evaluation (Figure 5). Opioid-tolerant patients presenting for elective surgery who have not been preidentified and optimized typically have their procedure postponed until this can be done. Referrals are also made for all patients with a history of SUD, irrespective of whether they are taking abstinence therapy (or the same agents indicated for chronic pain), or have an intrathecal analgesic pump.

Identify Any Concurrent SUD

It is imperative to diagnose SUD in patients with chronic pain because of the frequency with which the 2 conditions co-occur: The prevalence of substance abuse disorder is significantly higher in patients with chronic pain compared to the general population.³³ Conversely, patients seeking treatment for addiction report more chronic pain and more severe pain.³⁴ Each makes the other more difficult to treat.³⁵ Although evidence to guide optimal management strategies is lacking, consensus guidelines recommend referral to an addiction specialist for all patients who meet criteria for SUD.^{36,37}

Based on these data, our institutional practice is to ask every patient about their history of drug and alcohol use

Preoperative (Chronic Pain and/or Addiction Specialist)

- Urine toxicology screening for compliance/concordance with prescribed medications
- Risk factor assessment for opioid withdrawal and difficult-to-treat pain
- Develop and communicate a coordinated treatment plan with entire care team
- Careful opioid dose reduction prior to surgery
- Patient education and expectation setting: including who will prescribe controlled substances after surgery and discharge from hospital

Day of Surgery & Intraoperative (Anesthesiologist, Pain Services)

- Ensure sufficient pre- and intraoperative opioid to avoid acute withdrawal
- Provide balanced multimodal analgesia, emphasizing adjuvant, opioid analgesics
- Use regional analgesia and anesthesia techniques and local anesthetics wherever possible
- Arrange post-operative follow-up with acute and/or chronic pain teams.

Postoperative (Pain Services, Transitional Care Teams)

- Continue multimodal analgesic regimen, with scheduled opioid medications
- Consider recovery in a monitored setting (patients at risk of sedation, respiratory depression or anticipated high opioid requirements or intravenous analgesic infusions, including ketamine).
- Use oral opioids as soon as tolerated; Intravenous patient controlled analgesia (IVPCA) should be supervised by pain management specialists
- Reinforce the postoperative pain management plan, established at the preoperative consultation: who will prescribe opioids and how to taper back to baseline doses after discharge

Figure 4. Summary recommendations: Hospital for Special Surgery Guidelines for Management of the Opioid-Tolerant Patient Undergoing Elective Orthopedic Surgery.

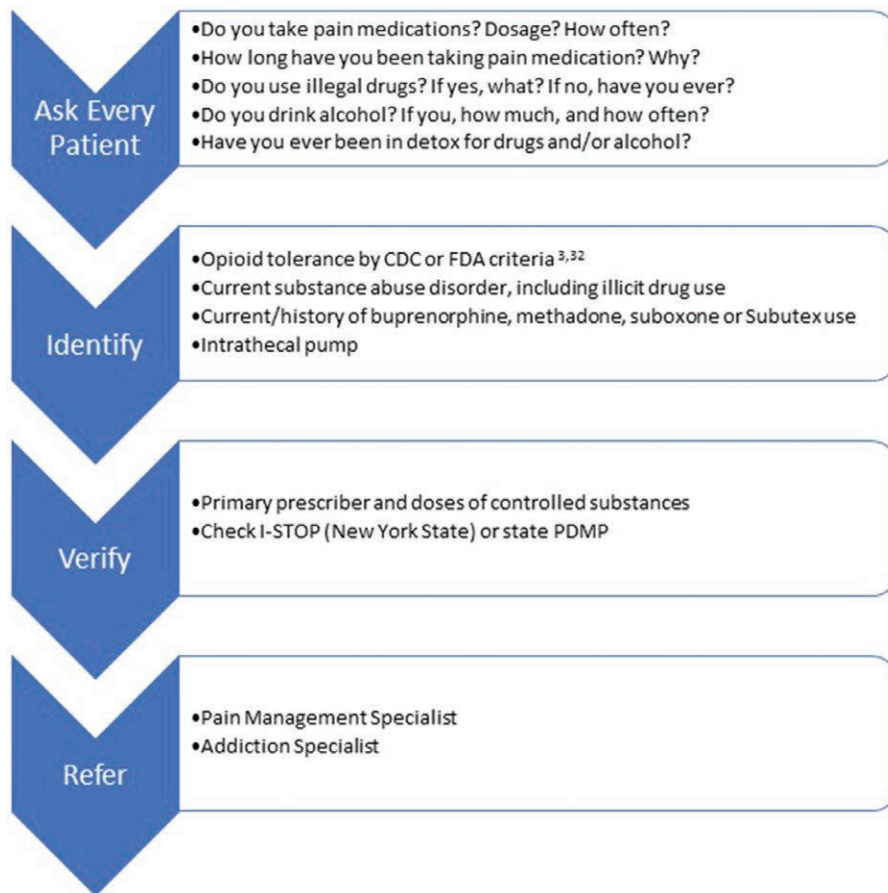


Figure 5. Criteria and process to identify patients requiring preoperative evaluation by a pain management and/or addiction specialist. CDC indicates Centers for Disease Control and Prevention; FDA, Food and Drug Administration; I-STOP, Internet System for Tracking Overprescribing; PDMP, Prescription Drug Monitoring Program.

and misuse, including prescription drug abuse (Figure 5). We are currently transitioning to a practice of referring all patients with positive history of SUD to an addiction specialist for counseling and treatment before elective procedures. Patients who have been referred for a preoperative pain management consultation who have urine toxicology results consistent with SUD are likewise referred.

Patients on methadone maintenance for addiction should be identified and doses verified as for any controlled substance. These patients should typically continue their daily dose of methadone and receive a different opioid for acute pain. Buprenorphine should be stopped preoperatively, under the auspices of a pain management or addiction specialist, and short-acting opioids can be substituted for analgesia.³⁸

The Preoperative Pain Consult

The main goals of the consultation are to clarify which patients might be at risk for opioid overdose, misuse disorder, OIH, or difficult-to-control pain, and to determine which patients will benefit from extended monitoring or interventions when risk factors are present. Optimization typically includes tapering opioids, or transitioning to non-opioid analgesics before surgery.

The nature and extent of a preoperative pain management evaluation depends on the patient and their pain history. A careful history is taken, focusing on the context in which the pain has occurred, the patient's past and current treatments for pain, preferences for analgesics, and any

underlying or co-occurring disorders and conditions.⁶ The nature of the planned procedure, the expected pain caused by that procedure, and the likely duration of that pain are clarified.

For every patient, the initial evaluation includes a review of systems and relevant physical examination, as well as laboratory investigations. At HSS, preoperative pain management consultations ideally occur a minimum of 2 weeks before surgery to allow for toxicity screen results to be returned before the surgery date. Urine drug screening is a useful tool to monitor patients on chronic opioid therapy, and may help identify patients with risk factors for drug abuse or diversion.³⁹ Abnormal results—including the absence of prescribed opioids and presence of drugs of abuse or addiction—should prompt a review of underlying causes, including self-treatment of uncontrolled pain, psychological issues, or diversion.⁴⁰ Assessment of the patient's personal and family history of alcohol or drug abuse and relative risk for medication misuse or abuse is also part of the initial evaluation, and ideally completed before deciding whether to prescribe opioid analgesics.

During the preoperative assessment, plans for post-discharge care can be initiated. A key aspect of successful postoperative care is the involvement of the community pain management provider. The HSS pain management consultant identifies the outpatient prescriber early in the preoperative phase and establishes direct communication. In addition to confirming the preoperative home regimen, treatment plans are coordinated and arrangements to

transition postoperative care and prescribing responsibility are made.

For patients deemed optimized for surgery, the surgeon reviews the pain management consultation note and provides acknowledgment that he or she has reviewed the note. On occasion, the pain management consultant deems the patient not optimized for surgery due to high opioid requirement, aberrant behavior, or other factors. If the recommendation is to postpone surgery for medical optimization or opioid tapering, surgery will not be scheduled until these tasks are completed. For a subset of highly complex patients, it may be necessary to convene a multidisciplinary group to decide whether the surgery should proceed at all, be postponed, and, if so, how to best prepare the patient.

Tapering Baseline Opioid Consumption

Traditionally, the surgical literature and pain consensus guidelines have not recommended routine preoperative opioid reduction. The rationale is that continuation of usual doses will minimize the risk of withdrawal or pain crisis immediately before surgery. However, there is evidence in the orthopedic literature that links preoperative opioid reduction with superior outcomes after surgery in opioid-tolerant patients.^{21,27–29,41} A tapering strategy may also help to limit OIH.²⁴

Given these data, HSS pain management specialists supervise careful opioid dose reduction before elective procedures. Although the optimal tapering regimen (amount and duration) are unknown, evidence suggests weaning to 50% of baseline is associated with improved outcomes.⁴¹ Patients are instructed not to stop their opioid analgesics “cold turkey,” and not to attempt dose reductions without a plan made in conjunction with their pain management specialist.

Preventing Opioid Withdrawal

On the day of surgery, the history should include the date and time of last opioid administration. The baseline dose of home opioid should be taken at the regular time; however, patients often omit their daily dose(s) because of confusion regarding preoperative fasting requirements.⁴² Approximately 50% of the baseline dose is required to prevent withdrawal symptoms.^{42,43} If the patient has omitted the expected dose, this should be provided before the procedure.

Maximizing Opioid Alternatives: Multimodal Analgesia

The concept of multimodal analgesia refers to the use of 2 or more analgesic interventions with different mechanisms of action. Multimodal analgesia was first proposed in the early 1990s with dual goals of providing analgesia and minimizing opioid-induced adverse effects.^{44,45} High-quality evidence to support the routine use of component therapies is abundant, and covers both pharmacologic- and nonpharmacologic-based tools. A complete review is beyond the scope of the current article, but typical agents include acetaminophen, nonsteroidal anti-inflammatories, ketamine, regional anesthetic techniques (peripheral nerve blocks and epidural catheters), and cryotherapy.⁵ The opportunities

to use nonopioid analgesics are plentiful, since they can be used preoperatively (as part of a preemptive/preventive regimen), intraoperatively (to block surgical nociception), and postoperatively (the major role for multimodal strategies).

The benefits of multimodal analgesia are compelling, particularly regarding the opioid-sparing effect. Recommendations from multiple pain and anesthetic societies repeatedly endorse the use of multimodal analgesia wherever possible.^{4,5,46} Contrary to these recommendations, data suggest that multimodal analgesia has yet to be widely incorporated into clinical practice. Emerging data describing trends on adoption suggest multimodal therapy is used in just 25%–50% of surgical patients.^{47,48} National studies on the use of regional anesthesia and analgesia indicate similar low rates of uptake, with approximately 20% of joint arthroplasty patients receiving neuraxial and peripheral nerve blocks.⁴⁹

Postoperative Transition of Care

According to recent data, patients on chronic opioid therapy before surgery may be discharged on up to 3 times their baseline dose of opioid, with little or no accompanying advice for weaning.⁵⁰ Primary (community) pain medication prescribers may be placed in a difficult position caring for patients on new, higher doses of opioids after surgery. It has long been recognized that there is a gap between supervised in-hospital pain management and ongoing care in the community.

There are limited data regarding how best to manage this key transition in care. However, multidisciplinary, collaborative approaches are being described in the literature. In these models, 1 hospital-clinician oversees pain management decisions, but teams encompass expertise from anesthesiology, nursing, pharmacy, and social work. The goals are to manage postsurgical and chronic pain, optimize the analgesic regimen while minimizing opioids, and provide education and liaison between the hospital and community.^{51,52}

EDUCATION

Patient Education

Education initiatives have been repeatedly demonstrated to change patient behaviors, empower patients to actively participate in their own care, and improve clinical outcomes in a host of medical and surgical conditions.⁵³ In last year's guidelines for opioid prescribing, the Centers for Disease Control and Prevention called for clinicians to educate patients regarding the risks of opioid therapy when initiating treatment.³ Recommended topics included the dangers of sharing medications, risk of long-term dependence or addiction, and methods for safe storage and disposal. The authors noted that, at the time of writing, there was no evidence to evaluate the effectiveness of patient-education or risk-mitigation strategies for prescription opioids. Few reports have been published in the interim, but data thus far suggest that providing structured education to patients is associated with lower rates of patient-reported “pill saving,”⁵⁴ opioid sharing, and unsafe storage, as well as improved knowledge of the risks of opioid misuse.⁵⁵

An allied opportunity to educate patients can be created during the preoperative period. At the time, expectations for pain after surgery and boundaries for appropriate opioid prescribing can be set. The importance of patient reassurance and expectation setting is highlighted by a report in which preoperative counseling was provided to an orthopedic trauma cohort.²⁰ Structured sessions including advice and information regarding the role of opioids in recovery were associated with lower rates of opioid use at 6 weeks postsurgery.

More evidence is clearly needed to support the use of educational interventions and to identify best practices for implementation. The main drawbacks of patient-education programs are that provision is resource-intensive and currently requires the use of incompletely validated methods and content. However, we decided that these disadvantages were outweighed by the potential benefits for safety and patient satisfaction. Thus, we incorporated new content into existing preoperative patient-education classes, across service lines. All patients who attend a preoperative class now receive education about expected pain burden, multimodal analgesia, and appropriate opioid use and risks. Of course, attendance at the classes determines whether patients receive this information. A nurse will discuss the material with any patient who does not attend the class, and document the discussion in the electronic medical record. To reinforce the information, patients are provided with a Prescription Drug Fact Sheet for Surgical Patients at

discharge (Figure 6). The Fact Sheet outlines how to safely use, store, and dispose of controlled substances; describes the risks associated with misusing controlled substances; and provides links to further resources, sources of information, and advice.

Prescriber Education

Most physicians receive little or no training during medical school regarding evidence-based opioid prescribing, SUDs and pain management, and only 5 states require continuing medical education (CME) on these topics.⁵⁶ Up-to-date CME programs that present the evidence for safe opioid prescribing may help reduce associated morbidity and mortality. Educational interventions have demonstrated effectiveness for changing prescribing habits, particularly those which use a structured method for choosing and monitoring medications.⁵⁷

To address potential deficiencies in background and training, we have developed a mandatory education program for all HSS prescribers. Although the program incorporates the learning objectives mandated by New York State, the content has been customized to reflect our own specialized practice caring for orthopedic surgery patients. The program comprises a combination of classroom (lecture)-based and online (self-directed) modules. Topics covered include: (1) a review of evidence-based best practices for pain management, addiction, and palliative care, with emphasis on patient risk assessments and documentation;

WHAT YOU CAN DO TO STAY SAFE:

- **USE:** Take your medications only as directed by your doctor. **DO NOT** share your medications with anyone. **DO NOT** mix opioid medications with alcohol.
- **STORE:** Store your prescriptions securely in their original containers. Keep them out of sight and out of children's reach, preferably in a locked cabinet or high shelf.
- **DISPOSE:** Dispose of medications immediately after your pain has resolved. Unused medications are best disposed of at a take back facility or pharmacy. For public disposal locations: <https://apps.deaddiversion.usdoj.gov/pubdispsearch/spring/main?execution=e1s1>

MISUSE AND OVERDOSE RISKS:

- Prescription drugs may be just as dangerous as illegal drugs if they are misused
- Misusing your medications may have serious consequences, including confusion, weakness, nausea, vomiting, and suppressed breathing to the point of death. If you think you have taken more medication than was prescribed, or you have any of these symptoms, go immediately to an emergency room.
- Misusing your medications may also lead to addiction: take your medications **ONLY** as prescribed.
- As you recover from surgery, your opioid use should decrease. If severe pain persists or your opioid requirements increase, please notify your surgeon

FOR YOUR SAFETY, WE DO NOT ROUTINELY:

- Prescribe long-acting opioids, except in special circumstances
- Prescribe more than a short course of short-acting opioids
- Refill lost, stolen, or destroyed prescriptions

ADDITIONAL RESOURCES:

- National Institute on Drug Abuse: <http://www.drugabuse.gov>
- Substance Abuse & Mental Health Services Administration: <http://oas.samhsa.gov/prescription.htm>
- FDA recommendations: <http://www.fda.gov/Drugs/ResourcesForYou/default.htm>

Figure 6. Excerpts from the Hospital for Special Surgery Prescription Drug Fact Sheet for Surgical Patients. At discharge, a copy is provided to all patients, and the content is verbally reviewed as part of the discharge process.

(2) training in safe and competent use of opioids; and (3) instruction on state and federal requirements for prescribing controlled substances. The course has been certified for CME accreditation. The materials are stored in an online, accessible format so they remain available for review at any time after completion of the course. Formal re-education and recertification will be undertaken every 3 years (in accordance with New York State Department of Health requirements). All HSS prescribers attest to completing this required training through the New York State Department of Health Commerce System.

ECONOMIC CONSIDERATIONS

A key question for practices considering an opioid management program is the cost. Referrals to pain management, routine urine testing, and administrative support for education and compliance are undeniably expensive. Depending on the size and type of practice setting, individual cost impact analyses may be required to determine the scope and components of an opioid management program. However, several general financial arguments can be made that the short-term costs of an opioid management program are offset by longer-term savings. First, multifaceted, multidisciplinary programs have been successfully used to achieve cost and clinical savings in many other chronic diseases. For example, interventions that optimize diabetes mellitus are associated with reductions in length of hospital stay, fewer complications, and cost savings.⁵⁸ Second, opioid users consistently have higher costs per hospital admission, longer length of stay, more complications, and more readmissions after surgery.⁵⁹⁻⁶¹ These data suggest that interventions targeting the opioid-tolerant patient may represent a useful tool to improve the value of surgical care. Third, as care and outcomes are improved, the capacity to increase surgical volume may help to offset the cost of opioid implementation programs. When developing our program, we used these arguments to advocate for resources from the hospital administration to support implementation.

OUTCOMES AND RESEARCH

The approach to opioid management described here has only recently been put into place at HSS. Thus far, few data exist regarding the effectiveness of these measures. A full evaluation of efficacy is currently hampered by 3 main factors: (1) we are unable to ensure that all measures have been systematically implemented (for example, we lack a mechanism to evaluate whether all opioid-tolerant patients are detected and optimized before surgery); (2) the program is too recent to demonstrate trends toward improved clinical and financial outcomes; and (3) as described above, some components have not been individually studied for their effectiveness in improving outcomes and minimizing opioid use. All 3 represent areas of ongoing evaluation at our institution. To determine whether the program has a positive effect on the problem, data regarding length of hospital stay, complication and readmission rates after surgery, quantitative measurement of opioid prescribing, and physician and patient attitudes before and after implementation of the program need to be evaluated.

As the current article highlights, there are few studies exploring perioperative pain and analgesia in the

opioid-tolerant patient. Pro- and retrospective studies that determine the average pain burden after surgery compared to the amount and duration of opioid prescribed are needed in this population. Likewise, data regarding the optimal analgesic technique are lacking in the opioid-tolerant patient; for example, how opioid-tolerant patients may benefit from peripheral nerve catheter techniques or blocks with adjuvants to extend duration. Finally, it is unknown how preoperative opioid use contributes to poor postsurgical outcomes and whether opioid use is a marker of more severe or different underlying pathology.

CONCLUSIONS

Opioids are essential for effective analgesia after most orthopedic procedures. However, prescribing disproportionate doses and quantities of opioids for perioperative pain will only perpetuate the epidemic. Despite significant advances toward understanding the dangers of opioids, rates of addiction, overdose, and death continue to rise. Coordinated efforts by patients, physicians, administrators, and legislators are essential to combat the crisis—and are starting to be proposed. The HSS program described here focuses on integrating evidence-based data (where they exist), with best practice into an opioid management model that also conforms to applicable laws and regulations. The efforts described here focus on the supply side of the prescription abuse crisis. Of course, halting the epidemic is not as simple as controlling a single contributor. Reducing access is clearly important, but efforts to reduce demand, understand and treat addiction, and ensure the humane treatment of acute and chronic pain are essential components too. Ultimately, we intend that the initiatives described here will contribute to a balance between effective analgesia for patients, while limiting the availability of opioids in the community.

Generalizability of the HSS Opioid Management Program

Orthopedic surgery plays a prominent role in the opioid prescription epidemic, and the authors practice at a specialty orthopedic hospital. Thus, the development of our opioid management program is likely to influence local clinical and social outcomes. However, the interventions described here may not apply universally to other practice settings, particularly nonacademic centers, those without an electronic medical record, locales that do not participate in PDMPs, and where surgery is less often indicated for painful conditions, or causes less pain. Additionally, we care for a predominately urban patient population, so some components may not be generalizable to rural or suburban settings. However, we advocate that similar interventions could be adapted as appropriate by considering the local patient population, prescribing habits, and available resources. ■■

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DISCLOSURES

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Contribution: This author helped extensively to this study. This author helped research and write the main drafts of the manuscript; discussed, revised, and edited the final version; and approved the final version for publication.

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Conflicts of Interest: Seth A. Waldman is the Chair of the Hospital for Special Surgery Controlled Substances Task Force. Seth A. Waldman led Hospital for Special Surgery's response to the opioid epidemic, and developed much of the content described herein.

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