

PROMOTING OPIOID STEWARDSHIP IN AN ORTHOPEDIC
AMBULATORY SURGERY CENTER: A QUALITY
IMPROVEMENT PROJECT

by

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ABSTRACT

Overprescribing opioids poses a substantial risk to patients and communities as it may result in patients continuing to use or in-excess pills that can become diverted to others. Postoperative prescribing guidelines address the national epidemic at the local level by reducing the availability of opioids for nonmedical use. This project sought to align the postoperative discharge opioid prescribing practices of a small orthopedic ambulatory surgery center (ASC) in southwestern Montana with best practices. The evidence-based postoperative prescribing guidelines were pilot tested with a targeted surgical procedure over four weeks. Patients meeting inclusion criteria were prescribed an opioid pill quantity within the recommended amount was inconsistent, with the most adherence reaching 25%. Mechanisms within the electronic health record (EHR) system are recommended to improve adherence.

CHAPTER ONE

BACKGROUND AND SIGNIFICANCE

Opioid Epidemic

Over the past two decades, the opioid epidemic has claimed nearly 500,000 lives in the United States (Centers for Disease Control and Prevention [CDC], 2021). Since 1999, overdose deaths involving opioids have quadrupled (CDC, 2021). The rise in overdose deaths began with the increased prescribing of opioids in the 1990s. As overdose deaths steadily rose, the US Department of Health and Human Services declared a public health emergency in 2017. The opioid epidemic also had a substantial economic impact in 2017, costing the United States \$1.02 trillion, of which \$550 billion was attributable to fatal opioid overdose and \$471 billion to opioid use disorders (Luo et al., 2021). Reducing exposure to opioids and preventing misuse is imperative to reverse this epidemic. Improving opioid prescribing practices through clinical guidelines is one approach to safer and more effective pain treatment.

Prescription Opioids

Global medical opioid use has increased since the late 1990s, more than doubling from 2001 to 2013 (Congressional Research Service [CRS], 2021). Australia, Europe, and North America saw the most significant increases, with US healthcare providers writing more opioid prescriptions, for more days per prescription, in higher doses than healthcare providers in any other country (CRS, 2021). Interestingly, there have not been similar increases in prescribing nonopioid analgesics such as acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs)

(Morris & Mir, 2015). However, other countries' health care providers tend to use nonopioid analgesics more often than their US counterparts (CRS, 2021).

Over 153 million opioid prescriptions were dispensed to Americans in 2019 (CDC, 2020). Although the overall national opioid dispensing rate declined in 2019, opioid prescription rates remain high and vary widely across states and counties. In Montana, the opioid dispensing rate per 100 persons is higher than the national rate at 48.2 versus 46.7 (CDC, 2020). Ten out of 51 Montana counties have a higher dispensing rate than the overall state rate, and dispensing rates also vary from 0.3 to 110.3 between counties. See Appendix A for a table of the geographic opioid distribution in Montana.

High-dose, greater than 90 morphine milligram equivalents (MME), opioid prescribing rates are also trending down. However, the amount of opioids in MME prescribed per person remains three times higher than in 1999 (CDC, 2019). MME calculates the total amount of opioids given at a particular time, accounting for drug type and strength differences. The average daily amount prescribed in 2017 was over 45.3 MME per prescription (CDC, 2019). Even relatively low dosages of 20–50 MME per day increase the risk of overdose and death (CDC, n.d.). Conversely, the average number of days per prescription continues to rise. The average duration prescribed in 2017 was 18 days per prescription (CDC, 2019). After the third day of supplied opioids, the chance of chronic use begins to increase and rises rapidly after that (Shah et al., 2017). Regional data for Montana are unavailable.

Acute Pain

Despite the risks of opioid-related adverse events, including nausea, vomiting, ileus, urinary retention, delirium, and respiratory depression, healthcare providers commonly prescribe opioids to treat acute pain. Acute pain is the sudden onset of pain that lasts less than 90 days, such as after surgery (Chua & Kimmel, 2020). Surgical procedures are often associated with postoperative pain, and opioids are typically the first-line therapy. Orthopedic surgery, in particular, is a key driver of acute pain development and opioid utilization.

Orthopedic surgeons are the third-highest prescribers of opioids in the United States, behind primary care physicians and dentists, accounting for 7.7% of all opioid prescriptions nationwide (Volkow et al., 2011). Although opioids can effectively control postoperative pain, which is integral to recovery, opioid prescribing practices for patients undergoing orthopedic procedures are under scrutiny considering the rising morbidity and mortality related to prescription opioids. The CDC recommends that “when opioids are used for acute pain, clinicians should prescribe the lowest effective dose of immediate-release opioids and should prescribe no greater quantity than needed for the expected duration of pain severe enough to require opioids” (Dowell et al., 2016). The goal of postoperative pain management is to facilitate recovery and improve function.

Prescribing Patterns

Orthopedic surgeons frequently prescribe more opioids for home use than necessary for adequate postoperative pain control. For instance, the median number of unused pills among patients undergoing total joint arthroplasty was 32 for knee replacement and 50 for hip replacement (Huang & Copp, 2019). Similarly, a study on shoulder reconstruction revealed an

average excess of 20 pills (Kumar et al., 2017). Furthermore, almost one-half of all prescribed opioids were unused among patients undergoing a hand surgical procedure (Rodgers et al., 2012). Additionally, 73% of patients reported unused opioid pills one month post a spinal surgical procedure, with most receiving no instructions on how to store or dispose of leftover medication (Bicket et al., 2019).

Practice Implications

Overprescribing opioids poses a substantial risk to patients and communities as it may result in patients continuing to use or in-excess pills that can become diverted to others. For instance, one-half of those who misuse prescription opioids, obtain the drugs from a friend or relative for free (Lipari & Hughes, 2017). The second most common source is from a single doctor. Consequently, various institutions have implemented postoperative prescribing guidelines, demonstrating subsequent declines in the number of opioids prescribed at discharge without compromising pain control (Delaney et al., 2020). Clinical practice guidelines such as these work to address the national epidemic at the local level by reducing the availability of opioids for nonmedical use.

Opioid Stewardship

The American Academy of Orthopaedic Surgeons (AAOS, 2015) states, “all physicians and orthopedic surgeons must be accountable for their direct or indirect contributions to the opioid epidemic.” Therefore, American orthopedic surgery centers are responsible for promoting opioid stewardship within their organizations. Opioid stewardship, modeled after antimicrobial stewardship practices, is the judicious use of opioids to treat surgical pain and optimize

postoperative patient outcomes (Hyland et al., 2021). Postoperative prescribing guidelines facilitate opioid stewardship in the following ways.

First, they minimize leftover pills by recommending the appropriate amount (i.e., days duration and pill quantity) of opioids for a given procedure based on the expected degree of postoperative pain and length of recovery. Second, they utilize nonopioid analgesics as first-line therapy. Last, they include patient counseling and detailed discharge instructions on realistic expectations for postoperative pain, indications for taking opioids, how to schedule nonopioid analgesics, timely reduction in opioid use, and safe storage and disposal of opioids as a critical component. See Appendix B for a guidance table on prescribing opioids for postoperative pain.

Project Overview

A small southwestern Montana ambulatory surgery center (ASC) specializing in orthopedics has recognized the need to promote opioid stewardship within the organization. Currently, the ASC has no formal policy on postoperative prescribing guidelines. Therefore, pain management is at the discretion of eight prescribing individuals. Furthermore, patient counseling and discharge instructions do not include specific education on postoperative pain expectations, indications for taking opioids, how to take nonopioid analgesics, tapering opioids, or safe storage and disposal of leftover opioids. Circumstantially, patients are frequently observed refusing a prescription for opioids citing they do not plan to use them, are uncomfortable with the number of pills prescribed, fear of getting addicted, or have leftover opioids at home.

The variation in prescribing combined with patient safety concerns and national guidance has prompted the ASC to implement evidence-based postoperative prescribing guidelines. The purpose of this quality improvement (QI) project is to align the ASC's postoperative discharge

opioid prescribing with best practices. The key aims are to 1) reduce the pill quantity and days duration of opioids prescribed by ASC providers, 2) maintain patient satisfaction with pain level control, and 3) adopt a formal organizational prescriptive policy. Providing patients with safer and more effective pain management strengthens the ASC's commitment to delivering the highest quality, complete orthopedic care.

CHAPTER TWO

LITERATURE REVIEW

Planned Practice Change

The United States is in the midst of an opioid epidemic, drawing interest from the executive government and legislative bodies. However, healthcare providers are also responsible for the provision of opioids. Orthopedic surgeons frequently prescribe more opioids for home use than necessary for adequate postoperative pain control. Overprescribing poses a substantial risk to patients and communities as it may result in patients continuing to use opioids or in-excess pills that can become diverted to others. Improving current postoperative prescribing practices is crucial to ensure patients do not receive more pills than necessary. Organizations can initiate this change via clinical practice guidelines. The planned practice change of this project is the implementation of evidence-based postoperative prescribing guidelines in a small southwestern Montana orthopedic ASC.

Postoperative Prescribing Guidelines

Guidance from the CDC for acute pain recommends not exceeding a seven-day supply of opioids (Dowell et al., 2016). However, this recommendation does not consider the invasiveness, mechanism of pain, or pain intensity between different surgical procedures (Overton et al., 2018). Thus, various institutions have developed postoperative prescribing guidelines that are procedure-specific. Formed by multidisciplinary expert panels, the appropriate recommended amount (i.e., pill quantity, days duration, and MME) of opioids for a given procedure is based on the expected degree of postoperative pain and length of recovery.

Research indicates that these postoperative prescribing guidelines optimize pain relief while minimizing excessive prescribing and the potential for misuse (Dwyer et al., 2018; Gazelka et al., 2020; Holte et al., 2019; Nouraei et al., 2021; Stepan et al., 2019; Wyles et al., 2020). Currently, postoperative opioid prescribing practices are based on an arbitrary number of pills chosen at the treating provider's discretion. Data consistently reveal that opioids are being overprescribed to postoperative patients, especially following orthopedic surgical procedures (Huang & Copp, 2019; Kim et al., 2016; Kumar et al., 2017; Roberts et al., 2019; Rodgers et al., 2012; Sabatino et al., 2018; Saini et al., 2018; Vattigunta et al., 2021; Wojahn et al., 2018). Subsequently, recommendations on the appropriate amount of opioids to prescribe at discharge based on the surgical procedure performed may guide orthopedic surgeons in more responsible postoperative prescribing practices.

Several large institutions, primarily academic, have implemented procedure-specific postoperative prescribing guidelines. The findings demonstrate a significant reduction in opioids prescribed at discharge across multiple orthopedic subspecialties (Dwyer et al., 2018; Gazelka et al., 2020; Holte et al., 2019; Nouraei et al., 2021; Stepan et al., 2017; Wyles et al., 2020). Furthermore, refill rates remained markedly unchanged, suggesting that pain control is comparable to pre-guideline prescribing practices (Dwyer et al., 2018; Holte et al., 2019; Wyles et al., 2020). Similarly, studies on general surgery have demonstrated that postoperative prescribing guidelines reduce opioid prescription amounts without negatively affecting pain control or patient satisfaction (Hill et al., 2017; Howard et al., 2018; Vu et al., 2019).

Procedure-specific postoperative prescribing guidelines have shown initial efficacy, and the early success can inform other surgery centers implementing similar recommendations.

However, further research is needed to evaluate long-term effectiveness. Therefore, institutional approaches should be responsive to continuous refinement as more data become available.

Another limitation is that patients could receive refills from outside providers. Providers could use the Montana Prescription Drug Registry (MPDR) to track patient prescriptions and refill rates before writing prescriptions (Nouraei et al., 2021; Stepan et al., 2019). These guidelines also apply to opioid-naïve, no opioids within the previous 90 days, and adult patients without chronic pain undergoing uncomplicated procedures.

Nonopioid Analgesics

Postoperative prescribing guidelines should utilize nonopioid analgesics as first-line therapy to ensure efforts to minimize overprescribing of opioids are not at the expense of adequate pain control. The goal of postoperative pain management is to facilitate recovery and improve function. Thus, severe pain and not pain itself should indicate opioid use. Unless medically contraindicated, both acetaminophen and NSAIDs can play a role in multimodal pain management (MMPM).

Nonopioid analgesics have been shown to reduce postoperative pain and overall opioid requirements (Dwyer et al., 2018; Højer Karlsen et al., 2015; Li et al., 2021; Wang et al., 2014). Studies comparing MMPM versus opioid-only revealed MMPM is more effective and has fewer side effects (Brattwall et al., 2010; Li et al., 2021; Ottinger et al., 1990; Thybo et al., 2019). Furthermore, when acetaminophen and NSAIDs are combined, they are more efficacious in reducing postoperative pain and minimizing opioid requirements (Derry et al., 2013; Ong et al., 2010; Thybo et al., 2019). Studies also suggest that short-term postoperative NSAID use does not impair bone healing (Brattwall et al., 2010; Marquez-Lara et al., 2016; Soreide et al., 2016).

Organizations should incorporate nonopioid analgesics into postoperative prescribing guidelines as first-line therapy to maximize the therapeutic benefits. However, further research is needed to evaluate the optimal doses of acetaminophen and NSAIDs and if an “around-the-clock” approach is necessary. Additionally, including patient-reported functional ability in future studies could further inform the efficacy of postoperative nonopioid analgesics as some degree of pain is expected. See Appendix C for a reference sheet on using acetaminophen and NSAIDs for postoperative pain management.

Patient Counseling

Every member of the perioperative interdisciplinary team provides valuable knowledge that contributes to opioid stewardship efforts. Nurses well-informed in pain management goals and delivering consistent messaging to patients are an integral component of postoperative discharge pain control. As providers prescribe fewer opioids, all patients should receive counseling to ensure safe and effective pain management at home. In fact, patient counseling has been found to impact postoperative opioid use (Howard et al., 2018; Prabhu et al., 2017). Patients feel reassured when expectations are set that some pain is normal, will gradually get better, and that they have a “rescue” medication (i.e., opioid) for breakthrough pain not adequately covered by around-the-clock acetaminophen and ibuprofen. See Appendix D for detailed patient instructions.

Safe storage and disposal of opioids is also a critical component of patient counseling. Studies have shown that most patients do not dispose of unused opioids, and only a small portion keep opioids in a locked location (Bicket et al., 2019; Hyland et al., 2021; Odom-Forren et al.,

2021. The number one reason patients cite saving unused opioids is for possible future use. Furthermore, many patients deny receiving counseling on misuse, storage, or disposal of opioids.

Leftover opioids kept at home in unsecured places are a significant source of opioids available for diversion. Research suggests written instructions with verbal reinforcement may increase the rate of disposal (de La Cruz et al., 2017; Maughan et al., 2016; Rose et al., 2016). When patients were provided detailed instructions on storage and disposal and that not all opioids prescribed may be needed, disposal of leftover opioids occurred significantly more often than when patients did not receive the instructions (de La Cruz et al., 2017; Maughan et al., 2016; Rose et al., 2016). Future studies should include whether receiving counseling preoperatively further increases the knowledge of patients to be good stewards of opioids in addition to at discharge.

Mechanisms to Improve Adherence

Setting the default number of opioid pills prescribed in electronic health record (EHR) systems is a simple, cost-effective intervention that can influence opioid prescribing practices and responsible pain management. Also referred to as “nudges,” opioid prescriptions written through an EHR can auto-populate the number of pills to prescribe. If deemed necessary, the practitioner can actively replace the quantity with another value. Evidence suggests that default settings in EHRs significantly decrease the number of opioid pills prescribed (Ancker et al., 2020; Chiu et al., 2018; Zivin et al., 2019).

To date, research in orthopedic surgical settings is limited. However, three large academic health systems that included a variety of surgical procedures found that changing default settings toward smaller quantities of opioid prescriptions showed success in decreasing

the mean number of opioid pills prescribed and increased concordance in default-level recommendations (Ancker et al., 2020; Chiu et al., 2018; Zivin et al., 2019). These findings are consistent with studies on default settings and opioid prescribing in primary care and emergency departments (Bachhuber et al., 2021; Delgado et al., 2018; Montoy et al., 2020). Additionally, findings reveal no unintended consequences such as increased refill rates or health service use (Bachhuber et al., 2021; Chiu et al., 2018).

While default settings have demonstrated near-immediate changes in opioid prescribing practices, long-term follow-up is needed to determine whether the impact is lasting. Future studies should also consider including patient-reported pain scores since some patients may not request refills even if they continue to experience severe pain. Some EHR systems may have limited capabilities. However, creating a list of “favorites” with default values is one alternative option that can still influence provider prescribing behavior. See Appendix E for default settings encouraging prescribing within guidelines.

ASC Discussion

This project’s purpose is to align the ASC’s postoperative discharge opioid prescribing with best practice and aims to reduce the pill quantity and days duration of opioids prescribed by ASC providers, maintain patient satisfaction with pain level control, and adopt a formal organizational prescriptive policy. Evidence supports the idea that postoperative prescribing guidelines can effectively reduce the number of opioids prescribed at discharge without decreasing pain control. Furthermore, EHR default settings increase concordance with prescribing recommendations. Evidence also supports that nonopioid analgesics reduce

postoperative pain and overall opioid requirements. Additionally, patient counseling and detailed instructions impact postoperative opioid use and the disposal rate of leftover opioids.

Implementing postoperative prescribing guidelines is appropriate for the ASC because it is a relatively simple and cost-effective intervention that could have a significant and widespread impact. Some institutions have published recommendations on opioid amounts based on the surgical procedure performed, making it feasible for the ASC to develop their guidelines with surgeon input. Initial results also indicate that following appropriate prescribing guidelines do not have any unintended consequences. Furthermore, ASC providers would still maintain their autonomy and could prescribe more based on individual patient needs. However, the EHR system may lack the capabilities needed to set procedure-specific default amounts.

CHAPTER THREE

SETTING AND METHODS

ASC Description

A three-operating room ASC in southwestern Montana recognized the need to promote opioid stewardship within the organization. A variation in postoperative discharge opioid prescribing and counseling, patient safety concerns, and national guidance prompted the ASC to implement evidence-based postoperative prescribing guidelines. The ASC, specializing in nonemergent orthopedic procedures, served approximately 7,000 pediatric and adult patients who met appropriate same-day surgery criteria in 2021. There are eight physician associates (PAs) responsible for prescribing postoperative opioids at discharge and 15 registered nurses (RNs) responsible for counseling patients on home pain management with written discharge instructions.

A board of directors governs the ASC and meets quarterly. A clinical director, who is also an RN, is responsible for the clinical operations of the ASC, while a charge RN is responsible for the operation of the recovery room. The PAs have practice privileges at the ASC alongside eight subspecialty orthopedic surgeons, who are investors. Additionally, 23 anesthesiologists also have practice privileges at the ASC. In combination, there is an average of 18 years of clinical experience.

This project began in September 2021 to align the small orthopedic ASC's postoperative discharge opioid prescribing with best practice. As depicted in Appendix F, there was an eight-month project timeline. The project aimed to 1) reduce the pill quantity and days duration of

opioids prescribed by ASC providers, 2) maintain patient satisfaction with pain level control, and 3) adopt a formal organizational prescriptive policy. Together, the postoperative prescribing guidelines provide patients with safer and more effective pain management, strengthening the ASC's commitment to delivering the highest quality complete orthopedic care.

The QI team consisted of this author as project lead and the ASC's clinical director and recovery room charge nurse as project champions. A systematic approach was used by applying concepts from the CDC's replicating effective programs (REP) framework to design, implement, and evaluate the evidence-based postoperative prescribing guidelines intervention. Montana State University's (MSU) Institutional Review Board (IRB) approved this project and qualified it exempt. The ASC does not have an internal IRB and abides by the MSU IRB requirements.

Replicating Effective Programs (REP) Framework

Grounded in Rogers's diffusion of innovation and Bandura's social learning theories, this student selected REP because of its effectiveness in promoting evidence-based practices in various community-based, nonacademic-affiliated settings (Kilbourne et al., 2007). This project considered all four phases of the REP framework, including 1) pre-conditions, 2) pre-implementation, 3) implementation, and 4) maintenance and evolution. Specific strategies within the four phases served as a roadmap and were adapted to fit the local needs of the ASC. See Appendix G for a figure outlining the REP process.

Phase 1: Pre-Conditions

The pre-conditions phase occurred from September to November 2021 and involved identifying the need for the new intervention, selecting an evidence-based intervention that fits the local setting, identifying barriers to implementation, and drafting an intervention package. A variation in postoperative discharge opioid prescribing and counseling practices and patient safety concerns prompted the ASC to promote opioid stewardship within the organization. National guidance and a review of the literature supported the implementation of postoperative prescribing guidelines as an effective intervention for reducing the number of opioids prescribed by ASC providers without compromising adequate pain control. Next, the QI team conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis and used it to inform the content of the intervention package and foster buy-in. See Appendix H for the anticipated implementation barriers and facilitators.

The QI team agreed the core elements of the postoperative prescribing guidelines should include: 1) prescribing nonopioid analgesics as first-line therapy, 2) recommending an appropriate pill quantity and days duration of opioids, 3) prescribing opioids at the lowest adequate dose strength, 4) looking patients up in the MPDR before prescribing opioids, 5) printed patient counseling for managing postoperative pain at home, and 6) integrating “nudges” into the EHR. To allow flexibility in implementation across different orthopedic procedures, the QI team drafted a menu of options for adapting the postoperative prescribing guidelines based on the expected degree of postoperative pain, length of recovery, and prescriber preference. The QI team also outlined supporting documents, including a staff training curriculum, a technical assistance guide, and intervention materials. The QI team refined the intervention package and supporting documents in the following phase.

Phase 2: Pre-Implementation

The pre-implementation phase occurred from December 2021 to March 2022 and involved convening a community working group (CWG), pilot testing the intervention package, and planning for logistics. Throughout this phase, the QI team and the CWG, a multi-level group of stakeholders, gathered monthly to review the intervention package, advise on the staff training and technical assistance, and plan implementation logistics. The CWG included two surgeon/PA teams, an anesthesiologist, an information technology (IT) specialist, a recovery room RN, the office manager, the medical director, and the CEO. Based on the CWG input, the QI team refined the core elements, menu options, and supporting documents.

Upon approval from the MSU IRB, the prototype intervention package was tested for clarity and functionality within a targeted surgical procedure at the ASC. The QI team based this decision on other organizations' initiatives that demonstrated progress toward safer opioid prescribing by focusing on improvements one procedure at a time. The PAs prescribing postoperative discharge opioids and recovery room nurses counseling patients on home pain management with written discharge instructions participated in an entire four-week intervention cycle. All opioid-naïve adults, aged 18 or older, patients without chronic pain undergoing uncomplicated carpal tunnel release (CTR) procedures between January 31, 2022 and February 25, 2022 were the target population. The prototype intervention package with supporting documents included 1) a prescriptive policy, 2) multimodal pain management order sets in the EHR, 3) a printable postoperative pain handout embedded in the existing discharge instructions, 4) an opioid dosing decision support tool, 5) a prescriber brochure on changing opioid prescribing practices, and 6) nursing scripts for helping patients navigate recovery. See appendices I through N for the prototype intervention package and supporting documents.

This student collected data on the feasibility, acceptance, and problems with the prototype intervention package during the pilot testing process. Changes were suggested and subsequently implemented in this phase's next step. With CWG input, the QI team refined and finalized the intervention package for organization-wide distribution. The QI team developed short-, intermediate-, and long-term objectives using the specific, measurable, achievable, realistic, and timely (SMART) format to reach the project aims discussed earlier.

SMART Goal #1. All CTR patients discharged home with an opioid prescription received no more than 10 pills at discharge.

SMART Goal #2. All CTR patients discharged home with an opioid prescription received comprehensive written postoperative pain counseling at discharge.

SMART Goal #3. All CTR patients who had pain during the postoperative telephone follow-up reported their pain medications helped within 24 hours post-discharge home.

SMART Goal #4. Patient satisfaction with pain level control remained >90% in quarter 1 (January–March 2022).

Measures and Instruments. This student used chart audits for SMART goals one and two to measure whether the provider prescribed within the recommended number of opioid pills and whether the recovery room nurse counseled the patient on home postoperative pain management with written discharge instructions. See Appendix O for an Excel tracking sheet. This student used a retrospective review of the EHR postoperative questionnaire for SMART goal three to measure whether the patient had pain following surgery and whether the pain medications

prescribed helped control it. See Appendix P for a copy. Finally, this student used a retrospective review of the ASC's satisfaction survey for SMART goal four to measure patient satisfaction with pain level control. See Appendix Q for a copy. In keeping with REP, the clinical director and recovery room charge nurse agreed to distribute the finalized intervention package through an orientation meeting. They held this meeting during an already scheduled monthly Zoom staff meeting in April 2022. For those unable to attend, the office manager records staff meetings. The office manager also keeps an attendance log for all staff meetings. Upon dissemination of the intervention package organization-wide, the following phase began.

Phase 3: Implementation

The implementation phase occurred after this project's completion date and involved staff training, technical assistance, and evaluation. As project champions, the clinical director and recovery room charge nurse trained staff using the finalized supporting documents as just-in-time teaching. The clinical director and recovery room charge nurse checked in with the PA and recovery room nurse implementors weekly, either in person or via email, to provide technical assistance and booster training.

The clinical director and recovery room nurse monitored the intervention fidelity and outcomes. They continued chart audits to track provider adherence to prescribing recommendations and if nurses provided appropriate patient counseling to determine the intervention's success. They also continued retrospective reviews of the postoperative questionnaire to count the patients who reported pain and if the pain medications helped to assess the intervention's impact. They also continued retrospective reviews of the satisfaction surveys emailed to all surgical patients to measure if patient satisfaction scores were maintained above

90% to make the business case for the intervention to the board of directors. Once the evaluation was complete, the clinical director and recovery room charge nurse vetted the results to the CWG for input and feedback.

Phase 4: Maintenance and Evolution

The maintenance and evolution phase is ongoing and involves efforts to sustain the intervention and support necessary changes. The clinical director and recovery room charge nurse have QI built into their respective job descriptions, and as such, continuing this QI work poses no additional costs to the ASC. The clinical director and recovery room charge nurse presented the formal prescriptive policy to the ASC board of directors in June 2022 for approval. This student also gave a poster presentation at MSU in May 2022 for broader dissemination to help other organizations.

ASC Discussion

The ASC recognized the need to promote opioid stewardship within the organization and implemented evidence-based postoperative prescribing guidelines. REP was a well-suited framework for implementing the planned practice change because of its generalizability and flexibility. This project sought to align the ASC's postoperative discharge opioid prescribing with best practices, aiming to reduce the pill quantity and days duration of opioids prescribed by ASC providers, maintain patient satisfaction with pain level control, and adopt a formal organizational prescriptive policy. Providing patients with safer and more effective pain management strengthens the ASC's commitment to delivering the highest quality, complete orthopedic care.

A significant barrier to the implementation plan was eight individual providers that prescribed postoperative discharge opioids. The QI team overcame this barrier by identifying the early adopters and laggards. The early adopters participated in the CWG and pilot testing of the prototype intervention package because laggards are more likely to join once the intervention is already being used by others in the organization (Kilbourne et al., 2007).

Another significant barrier encountered by the QI team was the limitations of the EHR. The ASC does not employ the PAs, and they use a different EHR to prescribe medication electronically. The QI team was not allowed to create default settings in this EHR as it would affect other prescribers that do not have practice privileges at the ASC. To mitigate this threat, the QI team worked with the IT specialist to create order sets in the ASC EHR and utilized opioid dosing cards for the prescribers' ASC badges. However, the non-ASC EHR already had an embedded link to the MPDR as a shortcut.

Overall, this project was feasible for the ASC since the postoperative prescribing guidelines were a relatively simple and cost-effective intervention. The QI team utilized a multitude of published recommendations. The ASC also had existing instruments, including the postoperative questionnaire and satisfaction survey. Therefore, the QI team quickly built the intervention package into existing structures and processes. This student also volunteered DNP practicum hours to the organization at no cost to the ASC. Thus, project resources were minimal.

CHAPTER FOUR

RESULTS AND RECOMMENDATIONS

Results

The purpose of this project was to align the ASC's postoperative discharge opioid prescribing with best practices. Nine ASC staff members implemented the postoperative prescribing guidelines over four weeks. This included 7 out of 15 (46.7%) RNs and 2 out of 8 (25%) PAs. 42.9% of the recovery room nurses counseling patients on postoperative home pain management with written discharge instructions had less than five years of experience, 28.6% had 6–10 years of experience, and 28.6% had greater than 10 years of experience. 50% of the providers prescribing discharge opioids had less than five years of experience and 50% had more than 10 years of experience.

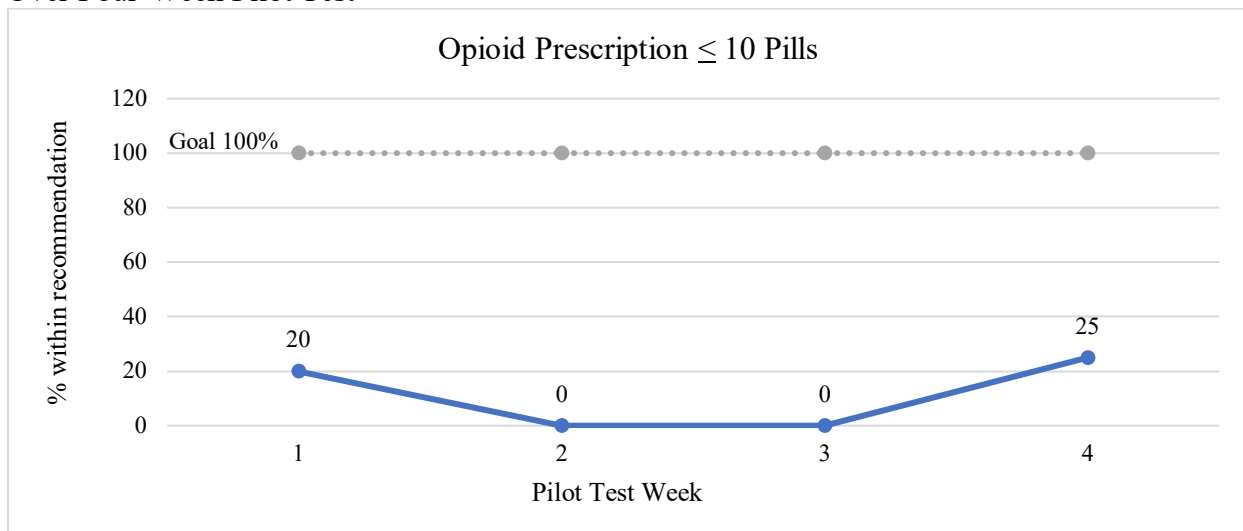
Structure Measures

Changes to the ASC EHR were completed by January 28, 2022. These changes included a provider order set and the structure of any selected opioid and nonopioid analgesics auto-generating into printable discharge instructions for the recovery room nurses. A policy on postoperative prescribing guidelines was created and pilot tested for CWG feedback in late February 2022. A formal organizational prescriptive policy will be voted on by the board of directors at the June 2022 meeting.

Process Measures

The PAs and recovery room nurses completed four weeks of pilot testing over this QI project. Fourteen patient discharges met the criteria for inclusion in evaluating the postoperative prescribing guidelines. CTR patients discharged home (n=14) were prescribed no more than 10 opioid pills was inconsistent, with week four having the most adherence with 25% of discharges that week (n=4) meeting the goal of no more than 10 opioid pills. Week one had the subsequent most adherence, with 20% of discharges that week (n=5) meeting the goal of no more than 10 opioid pills. Weeks two and three had the least adherence, with 0% of discharges in those weeks (n=3 and n=2, respectively) meeting the goal of no more than 10 opioid pills. See Figure 1.

Figure 1. Run Chart of Percentage of Opioid Prescriptions Within Recommendation of ≤ 10 Pills Over Four-Week Pilot Test

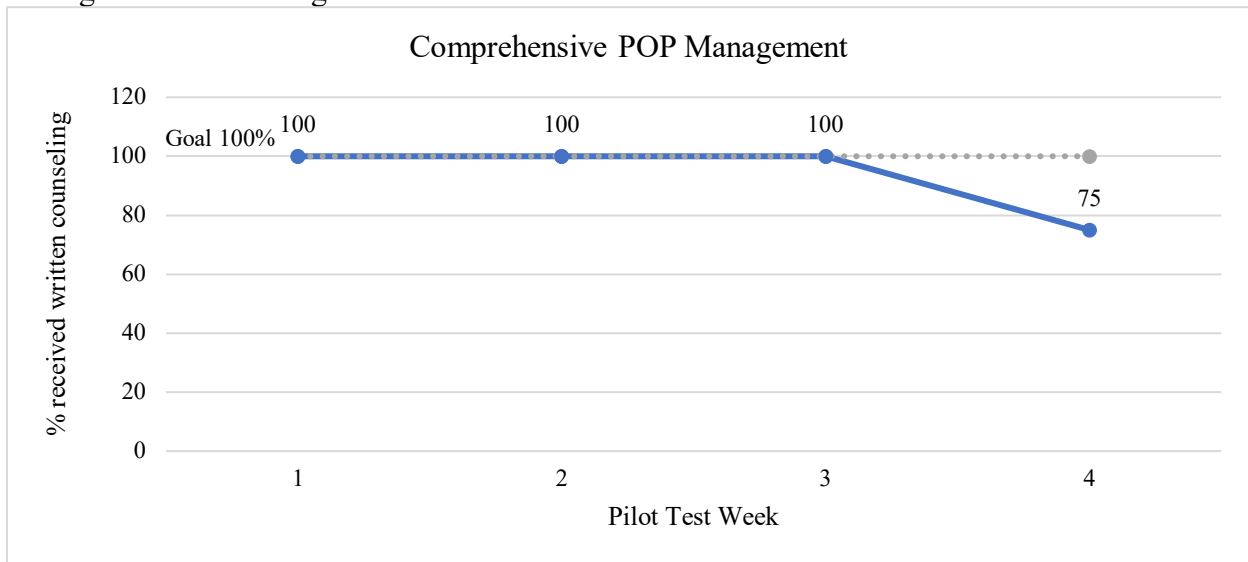


CTR patients discharged home (n=14) who were given written postoperative pain counseling were mostly consistent, with weeks one, two, and three having the highest adherence with 100% of discharges those weeks (n=5; n=3; n=2, respectively) meeting the goal of receiving written postoperative pain counseling. Week four had the poorest adherence, with 75% of

discharges that week (n=4) meeting the goal of receiving written postoperative pain counseling.

See Figure 2.

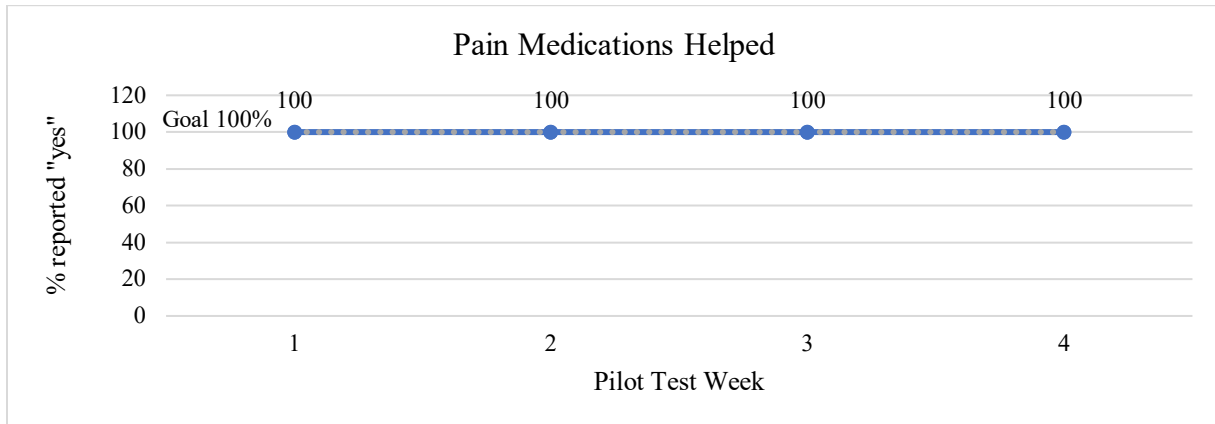
Figure 2. Run Chart of Percentage of Received Written Comprehensive Postoperative Pain Management Counseling over Four-Week Pilot Test



Outcome Evaluation

CTR patients discharged home with pain (n=6) reporting analgesic helpfulness was consistent, with 100% of discharges all four weeks (n=4; n=1; n=0; n=1, respectively) self-reporting “yes” to pain medications helped within 24 hours post-discharge home. See Figure 3.

Figure 3. Run Chart of Percentage of Reported “Yes” to Pain Medications Helped Over Four-Week Pilot Test



Results for quarter one patient satisfaction with pain level control will be available in early April 2022, with the goal of >90%. All surgical patients are emailed or mailed satisfaction surveys post-discharge home, and data is collected quarterly.

ASC Discussion

Two out of 14 (14.3%) CTR patients received an opioid prescription for 10 pills or less. As such, SMART Goal #1, all CTR patients discharged home with an opioid prescription received no more than 10 pills at discharge, was not met. These patients were noted in the EHR refusing an opioid prescription, citing plans to manage their pain at home with nonopioid analgesics. Furthermore, the median number of pills prescribed was 16.8, and the median MME was 95.5.

Thirteen out of 14 (92.7%) CTR patients received written postoperative pain counseling. Consequently, SMART Goal #2, all CTR patients discharged home with an opioid prescription received written comprehensive postoperative pain counseling at discharge, was not met. Likely, the recovery room nurse counseled this patient. However, it is unknown if the nurse printed the

homecare instructions on managing postoperative pain as there was no patient signature in the EHR verifying they received the written counseling.

Seven out of 14 (50%) CTR patients reported they had no pain during their postoperative call. However, it is unknown whether they were currently taking any analgesics. One out of 14 (7.1%) CTR patients did not answer the postoperative call. After two attempts, the postoperative questionnaire was sent via mail but was not returned during this period. Therefore, it is unknown whether they had postoperative pain. Of the six CTR patients reporting they had postoperative pain, six (100%) reported their pain medications helped. However, no details were provided in the EHR as to what they were specifically using to manage their pain. Nonetheless, SMART Goal #3, all CTR patients that had pain during the postoperative telephone follow-up reported their pain medications helped within 24 hours post-discharge home, was met.

SMART Goal #4, patient satisfaction with pain level control remained >90% in quarter one (January–March 2022), was not met during the project implementation period. However, the QI team anticipates it will be met. In the previous quarter (October–December 2021), patient satisfaction with pain level control was 92%. However, this is below the national benchmark of 94.2%. See Appendix R for Q4 patient satisfaction survey results. This project aimed to 1) reduce the pill quantity and days duration of opioids prescribed by ASC providers, 2) maintain patient satisfaction with pain level control, and 3) adopt a formal organizational prescriptive policy. Project aims two and three were not met during the project implementation period as they fall outside the project's timeline. The project results demonstrate there is considerable room for improvement to achieve aim one. The results differed from what the QI team anticipated because the PAs participating in the pilot testing were part of the CWG. Thus, the QI team expected

greater adherence to the postoperative prescribing guidelines, particularly prescribing within the recommended amount. This is consistent with existing knowledge that adherence to guidelines improves over time, with the intermediate post-guideline period significantly greater than the immediate post-guideline.

One reason this might have occurred is because the PAs only practiced at the ASC one or two times per week. Likely, they have a set routine for prescribing that they practice from facility to facility. The structures that were implemented were not sufficient to change the process and create a new workflow. This is consistent with the existing knowledge that default settings in the EHR prescribing interface influence prescribing practices by increasing concordance with prescribing recommendations, thereby decreasing the number of opioid pills prescribed.

Another reason may be a concern for under prescribing and negatively impacting pain control. At the ASC, CTR procedures are typically performed toward the end of the week. The providers may be hesitant to prescribe fewer opioid pills so as not to inundate the on-call provider with refill requests, especially over the weekend. This is inconsistent with the existing knowledge that refill rates remain unchanged following the establishment of prescribing recommendations, suggesting pain control is comparable to pre-guideline prescribing practices.

Lessons Learned

Four key takeaways from implementing this project include the following:

- 1) The importance of working with IT early. The QI team anticipated the EHR systems may have limited capabilities. However, they did not anticipate being unable to make changes to the non-ASC EHR. As such, there was no mechanism in place in the EHR to encourage PAs to prescribe within the recommended guidelines. Working with IT earlier

in the timeline may have allowed both the ASC and the orthopedic clinic to reach a solution that benefited both organizations.

- 2) Maintaining buy-in from frontline staff. The recovery room nurses and providers were chosen for the CWG because they were identified as early adopters. Even though the QI team had buy-in for the planning stages, it was not maintained throughout the implementation stages. In the future, the QI team may be able to maintain buy-in by having the recovery room nurses verify with the PA whether the quantity is correct before giving the prescription to the patient if the provider writes for an amount outside of the recommendations.
- 3) Being on site during critical points of transition. The QI team had conflicting schedules, which made it challenging to have someone on site during the four-week pilot testing. Thus, communication mostly happened via email instead of face-to-face. This was largely in part due to the high staff turnover in the recovery room. Orientation and vacation schedules pulled the QI team away from their dedicated QI roles during this time.
- 4) Engaging other key stakeholders. Most CWG members were in positions of authority. It would be worthwhile for the QI team to explore staff who do not necessarily have authority in the organization but are well respected. These stakeholders could be essential to getting things to run more smoothly and act as liaisons between the two organizations.

Limitations

The small sample size was a limitation of this project. Typically, the ASC sees a decreased volume of surgical procedures at the beginning of a new calendar year because

patients have not yet met their insurance deductible. In addition, the year-over-year volume was down 10% due to COVID-19. The short timeframe coupled with high staff turnover and COVID-19 was another limitation. The project had to fit within an eight-month time constraint. As with many other organizations in the community, the ASC was short-staffed. The implementation was pushed back for several weeks due to staff out with COVID-19 during December and January. The QI team's inability to collect the most valid and reliable measures was a further limitation of this project. The QI team chose to use the postoperative questionnaire and patient satisfaction surveys because they already existed. However, they did not provide the level of detail the QI team expected. Finally, there was also an unexpected competing project during this timeframe. The ASC was required to change another structure and process involving the PAs. This workflow took precedence to comply with regulatory standards for surgery.

Recommendations

Based on the project's findings, lessons learned, and themes identified in the literature, the ASC could identify a single team member to prescribe opioids using the recommendations. If this is not feasible, the QI team should continue to work with IT for a mechanism in the non-ASC EHR to improve adherence. The ASC could also explore adding electronic prescribing within their EHR. This option would ensure that all providers who have practice privileges at the ASC utilize the same EHR and facilitate awareness and adoption of the organization's prescriptive policy. Providers could also prescribe nonopioid analgesics instead of relying on patients to buy them over the counter. Additionally, the ASC should partner with patients in shared decision-making. Patients could play a role in the process, which would enable the ASC

to develop a more patient-centered, procedure-specific approach to postoperative discharge opioid prescribing practices.

Furthermore, the ASC should consider adding additional questions to the postoperative questionnaire. Follow-up assessment could evaluate ongoing postoperative discharge pain, opioid and nonopioid analgesic use, and status of unused opioids. This data may foster buy-in from the providers reluctant to change prescribing practices if they are reassured it will not impede patient care. Last, the ASC could include patient counseling preoperatively so that the recovery room nurses reinforce realistic expectations for postoperative pain, indications for taking opioids, how to schedule nonopioid analgesics, timely reduction in opioid use, and safe storage and disposal of opioids instead of the patients learning this information for the first time upon discharge home.

In conclusion, postoperative discharge opioid prescribing has significantly contributed to the ongoing US opioid epidemic. Overzealous prescribing patterns that are not guided by current evidence represent a clear target for actionable change. Pain is complex, and appropriate pain management is essential to recovery. However, a balance must be struck to allow adequate pain control during the postoperative discharge period without overprescribing.

CHAPTER FIVE

REFLECTION

DNP Essentials

The American Association of Colleges of Nursing (2006) *Essentials of Doctoral Education for Advanced Nursing Practice* provides the foundation for the Doctor of Nursing Practice (DNP) program. Over the past three years, I have worked to develop and strengthen my knowledge and skills that correspond to the eight DNP essentials. During that time, I have grown in my professional role as a nurse by expanding my scope of practice and developing my competency as a nursing leader. As my DNP program comes to a close, I reflect upon the overall experience and achieved growth throughout my DNP educational journey. The DNP essentials that exemplify my role as a nurse practitioner and emerging leader include Essential II, III, IV, VI, and VIII.

Educational Journey

The DNP program has allowed me to meet Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking by ensuring accountability for healthcare quality and patient safety. Reflecting upon Essential II, my financial proposal assignment in the finance/budget course demonstrates my achievement of this essential because I employed business, finance, and economics principles to develop an effective plan for integrating a 23-hour stay protocol within an ASC's existing total joint replacement program. Building upon this financial project proposal, I exemplified my role as a leader during my QI

project at the ASC by using advanced communication skills and processes, such as SWOT analysis, run charts, and conceptual frameworks in this patient safety initiative.

The DNP program has allowed me to meet Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice by offering knowledge application activities. Reflecting upon Essential III, critically appraising existing literature in courses, including Evidence-Based Practice I and II, Informatics, Program Planning, Scholarly Project Seminar, Statistics, and Translational Research, demonstrates my achievement of this essential because I determined the best evidence for practice change using analytical methods. Building upon this coursework, I exemplified my role as a leader during my QI project at the ASC by applying relevant findings from the opioid stewardship literature to develop practice guidelines for the organization. In implementing these postoperative prescribing guidelines, I generated evidence to guide other organizations in improving prescribing practices and patient care outcomes.

The DNP program has allowed me to meet Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care by supporting the use of information and patient care technologies. Reflecting upon Essential IV, my semester-long assignments for the Informatics and Translational Research courses demonstrate my achievement of this essential because I utilized barcode technology and EHR-integrated clinical decision support tools to improve workflows. Building upon the IT project and sleep promotion action plan, I exemplified my role as a leader during my QI project at the ASC by creating new provider order sets within the EHR and extracting data from the EHR for stakeholder evaluation.

The DNP program has allowed me to meet Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes by facilitating collaborative team functioning. Reflecting upon Essential VI, participating in the work of team assignments in several courses, including Evidence-Based Practice I and II, Leadership, Program Planning, Scholarly Project Seminar, Statistics, and Vulnerable Populations, demonstrates my achievement of this essential because I employed effective communication and collaboration strategies to peer review, overcome impediments to interprofessional practice, and produce scholarly products. Building upon these group projects, I exemplified my role as a leader during my QI project at the ASC by establishing an interprofessional group of stakeholders and assuming leadership of the QI team to develop and implement postoperative prescribing guidelines within the organization.

The DNP program has allowed me to meet Essential VIII: Advanced Nursing Practice by providing learning experiences that inform practice decisions and the consequences of patient care decisions in various patient care settings. Reflecting upon Essential VIII, my same-day care clinical rotation demonstrates my achievement of this essential because I exercised advanced levels of clinical judgment to differentiate between bacterial and viral infections, be accountable for the diagnosis and treatment of bacterial versus viral etiologies, and educate patients through this period of acute illness. Building upon this clinical rotation, I exemplified my role as a leader during my QI project at the ASC by using systems thinking to reduce the reservoir of prescription opioids in the community and mentoring other advanced practice providers and nurses in their role.

Career Impact

My QI project is a significant product of my DNP education because it reflects the culmination of my unique skill set and launches me into scholarly practice. By illuminating clinical leaders as agents of change, my experience implementing and evaluating a QI project to address overprescribing opioids will inform and impact my career as a doctoral-prepared nurse practitioner. My first venture into practice scholarship solidified the importance of interprofessional collaboration, translating evidence into practice, applying QI processes, organizational and systems leadership, and utilizing information systems and technology. As a lifelong learner dedicated to my profession, I will continually seek opportunities to communicate and work with stakeholders, incorporate existing knowledge into practice, systematically reduce clinical variation, improve patient outcomes, achieve sustainable change, and evaluate such efforts.

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APPENDICES

APPENDIX A

US COUNTY OPIOID DISPENSING RATES, 2020 (CDC, 2020)

State	County	County FIPS Code	Opioid Dispensing Rate per 100
MT	Beaverhead County	1	34.1
MT	Big Horn County	3	9
MT	Blaine County	5	11.9
MT	Broadwater County	7	13.1
MT	Carbon County	9	13
MT	Carter County	11	0.3
MT	Cascade County	13	56.8
MT	Chouteau County	15	15.4
MT	Custer County	17	77.7
MT	Daniels County	19	0.3
MT	Dawson County	21	29.4
MT	Deer Lodge County	23	52.7
MT	Fallon County	25	5.3
MT	Fergus County	27	32.6
MT	Flathead County	29	66.1
MT	Gallatin County	31	29.2
MT	Garfield County	33	9.6
MT	Glacier County	35	17.3
MT	Granite County	39	18.5
MT	Hill County	41	30.2
MT	Jefferson County	43	15.3
MT	Judith Basin County	45	1.2
MT	Lake County	47	39.5
MT	Lewis and Clark County	49	44.7
MT	Liberty County	51	10.1
MT	Lincoln County	53	56.1
MT	McCone County	55	23.3

MT	Madison County	57	9.4
MT	Meagher County	59	34.4
MT	Mineral County	61	25
MT	Missoula County	63	59.2
MT	Musselshell County	65	25.9
MT	Park County	67	28
MT	Phillips County	71	41.3
MT	Pondera County	73	43.1
MT	Powder River County	75	1.4
MT	Powell County	77	55.7
MT	Prairie County	79	18.6
MT	Ravalli County	81	31
MT	Richland County	83	17.8
MT	Roosevelt County	85	26
MT	Rosebud County	87	13.6
MT	Sanders County	89	44.2
MT	Sheridan County	91	1.9
MT	Silver Bow County	93	51.4
MT	Stillwater County	95	24.6
MT	Sweet Grass County	97	13
MT	Teton County	99	14.6
MT	Toole County	101	110.3
MT	Valley County	105	18.7
MT	Wheatland County	107	3.7
MT	Yellowstone County	111	68.1

APPENDIX B

EVIDENCE-BASED DURATION OF OPIOID PRESCRIPTIONS

ON DISCHARGE FOLLOWING SURGERY

(Dr. Robert Bree Collaborative & Washington State Agency Medical Directors' Group, 2018)

Table 1. Evidence-Based Duration of Opioid Prescriptions on Discharge Following Surgery
(based on data showing that these opioid prescription durations are adequate to treat postoperative pain in >75% of patients without refills)

Type I – Expected rapid recovery	
Dental procedures such as extractions or simple oral surgery (e.g., graft, implant).	- Prescribe a nonsteroidal anti-inflammatory drug (NSAID) or combination of NSAID and acetaminophen for mild to moderate pain as first-line therapy. - If opioids are necessary, prescribe ≤3 days (e.g., 8 to 12 pills) of short-acting opioids in combination with an NSAID or acetaminophen for severe pain. Prescribe the lowest effective dose strength. - For more specific guidance, see the Bree Collaborative Dental Guideline on Prescribing Opioids for Acute Pain Management.
Procedures such as laparoscopic appendectomy, inguinal hernia repair, carpal tunnel release, thyroidectomy, laparoscopic cholecystectomy, breast biopsy/lumpectomy, meniscectomy, lymph node biopsy, vaginal hysterectomy.	- Prescribe non-opioid analgesics (e.g., NSAIDs and/or acetaminophen) and non-pharmacologic therapies as first-line therapy. - If opioids are necessary, prescribe ≤3 days (e.g., 8 to 12 pills) of short-acting opioids in combination with an NSAID or acetaminophen for severe pain. Prescribe the lowest effective dose strength.
Type II – Expected medium term recovery	
Procedures such as anterior cruciate ligament (ACL) repair, rotator cuff repair, discectomy, laminectomy, open or laparoscopic colectomy, open incisional hernia repair, open small bowel resection or enterolysis, wide local excision, laparoscopic hysterectomy, simple mastectomy, cesarean section.	- Prescribe non-opioid analgesics (e.g., NSAIDs and/or acetaminophen) and non-pharmacologic therapies as first-line therapy. - Prescribe ≤7 days (e.g., up to 42 pills) of short-acting opioids for severe pain. Prescribe the lowest effective dose strength. - For those exceptional cases that warrant more than 7 days of opioid treatment, the surgeon should re-evaluate the patient before a third prescription and taper off opioids within 6 weeks after surgery.
Type III – Expected longer term recovery	
Procedures such as lumbar fusion, knee replacement, hip replacement, abdominal hysterectomy, axillary lymph node resection, modified radical mastectomy, ileostomy/colostomy creation or closure, thoracotomy.	- Prescribe non-opioid analgesics (e.g., NSAIDs and/or acetaminophen) and non-pharmacologic therapies as first-line therapy. - Prescribe ≤14 days of short-acting opioids for severe pain. Prescribe the lowest effective dose strength. - For those exceptional cases that warrant more than 14 days of opioid treatment, the surgeon should re-evaluate the patient before refilling opioids and taper off opioids within 6 weeks after surgery.

APPENDIX C

ACETAMINOPHEN AND NONSTEROIDAL ANTI-INFLAMMATORY DRUGS

QUICK REFERENCE SHEET

(Michigan Opioid Prescribing Engagement Network, 2021)

Acetaminophen and Non-Steroidal Anti-Inflammatory Drugs Quick Reference Sheet

Recommend:



+



KEY POINTS

- Use acetaminophen AND non-steroidal medications TOGETHER around the clock for the first 3-5 days, unless contraindicated
- Use either medication or the combination as needed for pain for the days to follow

ACETAMINOPHEN SAFETY AND SIDE EFFECTS

Drug	Usual Dose	Max Daily Dose (mg)	Relative COX Selectivity	
			COX-1	COX-2
Acetaminophen	1000 mg three to four times per day	4000	-	-

- Caution should be observed in patients with liver disease, active alcohol use, and G6PD deficiency
- Consider all sources of acetaminophen including combination products and OTC cough/cold products when recommending acetaminophen
- Acetaminophen overdose may occur with 5-6 grams daily for prolonged use (6-8+ weeks) or acute ingestion of at least 7.5 grams

NON-STEROIDAL ANTI-INFLAMMATORY SAFETY AND SIDE EFFECTS

Drug	Usual Dose	Max Daily Dose (mg)	Relative COX Selectivity	
			COX-1	COX-2
Ibuprofen	400-800 mg three to four times per day	3200	++	
Naproxen	200-400 mg two or three times per day	1375-1500	++	
Ketorolac	10 mg four times per day	40	+++	
Diclofenac	35-50 mg two to three times per day	200		++
Meloxicam	15 mg daily	15		+++
Celecoxib	100-200mg two times per day	400		+++

- Caution should be observed in patients with a history of cardiovascular, gastrointestinal, and kidney disease
- Cardiovascular: avoid use in patients with heart failure. Coronary, vascular, and death are risks associated with long term use. Out of hospital cardiac arrest is associated with short term use
- Gastrointestinal: Risk is low (<2%) but present in long term use and those at risk. Risk may be mitigated with the use of concomitant proton pump inhibitor (PPI, e.g. over the counter omeprazole) during treatment course
 - Increased risk of gastrointestinal complications (all NSAIDs), which remains constant over time
 - Caution in those over 60 years of age, history of peptic ulcers, gastrointestinal bleeds, and Helicobacter pylori infections
- Kidney: acute kidney injury is mostly present in those with other risk factors, including older age. Use with caution in those with chronic kidney disease
- Bleeding: anti-platelet effect is due to COX-1 inhibition, but NSAIDs block COX in a reversible fashion. Normal platelet function returns within 1-3 days depending on the drug (e.g. 1 day for ibuprofen, 2 days for naproxen, diclofenac, and 3 days for piroxicam)

SURGICAL SPECIFIC HIGHLIGHTS

- Pre-operative interruption of chronic NSAIDs may be warranted, but should be patient, procedure, and drug specific
- There appears to be no increased risk of post-operative bleeding with celecoxib or ibuprofen
- Post-operative bleeding may occur with ketorolac, although studies provide conflicting data
- Enhanced Recovery After Surgery (ERAS) protocols commonly include peri-operative use of NSAIDs including just prior to surgery, day 0 and for the several post-operative days without an increased risk of complications

APPENDIX D

MANAGING YOUR PAIN AFTER SURGERY WITHOUT OPIOIDS

(Michigan Opioid Prescribing Engagement Network, 2021)

MANAGING YOUR PAIN AFTER SURGERY WITHOUT OPIOIDS

Recent studies have shown that your surgical pain can be managed using non-opioid, over-the-counter pain medications (acetaminophen and ibuprofen).

How much pain will I have after surgery?

- You can expect to have *some* pain after surgery.
 - This is normal and part of the healing process.
 - Your surgical pain is typically worse the day after surgery, and quickly begins to get better.
- Everyone feels pain differently.
- The goal is to manage your pain so you can do the things you need to care for yourself and heal:
 - Eat
 - Breathe deeply
 - Walk
 - Sleep

How will I manage my pain at home?

You will manage your pain after surgery by taking acetaminophen (Tylenol) and ibuprofen (Motrin or Advil) **around the clock** while you are awake. **Alternating** these medications allows you to get the best pain control.

How do I alternate my medications?

- Take 650mg of Tylenol (2 pills of regular strength, 325mg Tylenol) every 6 hours while awake.
 - ➡ Do not take more than 3000mg of Tylenol in 24 hours.
- **Alternate** with 600 mg of Motrin (3 pills of 200 mg) every 6 hours while awake.
 - ➡ Do not take more than 3200mg of Motrin in 24 hours.
- **Alternating** these medications means you are taking a dose every 3 hours.

- This is an example of how to alternate your medications, if you start at 12pm:

12:00 PM	Tylenol 650 mg (2 pills of 325 mg)
3:00 PM	Motrin 600 mg (3 pills of 200 mg)
6:00 PM	Tylenol 650 mg (2 pills of 325 mg)
9:00 PM	Motrin 600 mg (3 pills of 200 mg)
Continue alternating every 3 hours for 3 days, until no longer needed.	

What else can I do to help manage my pain?

Pain medications are only one part of your pain management plan. While taking your medications, you can also:

- Use ice packs, as directed by your surgeon. Never put ice directly on your skin – use a towel to wrap the ice packs.
- Try non-drug options such as relaxation, distraction (listening to music, reading, talking to others), mindful breathing, or daily reflections.

What if I still have pain?

- You will receive a prescription for a small amount of an opioid pain medication (like Oxycodone or Tramadol).
- You may use your opioid for severe pain in **the first 24 hours** after surgery.
 - Severe pain is pain that does not allow you to function (eat, breathe deeply, walk or sleep) and is not manageable using your scheduled Tylenol and Motrin.
- Do not take more than 1 opioid pill every 4-6 hours, and only if needed for severe pain.
- If you are having trouble managing your pain, call your surgeon or the number you were given at discharge.
 - Never take more opioid pills, more often, than prescribed.
 - Do not use your opioid pills for anything other than your severe surgical pain. For example, do not use your opioids to help you manage anxiety, to help you sleep or for other pain that is not from your surgery.
- Stop taking the opioids as soon as possible.

What is an opioid?

Opioids are strong prescription pain medications with many possible side effects (e.g., dizziness, nausea, vomiting). Opioid use puts you at risk of dependence, addiction or overdose if taken accidentally, or for longer than a week.

How do I safely store my opioids?

- ☐ Store your opioids in private, secure areas out of sight and reach of children, teen or pets. (like a locked drawer or cabinet).
- ☐ Do not store your opioids in places, such as bathrooms, kitchens or purses, where others can easily find them.

Why should I dispose of my unused opioids?

72% of opioids prescribed to surgical patients go unused, creating an opportunity for misuse and diversion.¹ Among those who misused prescription opioids, over 50% got them for free from a friend or relative.² Diversion (sharing or selling) of opioids is a felony in Michigan.

How can I safely dispose my unused opioids?

- ☐ Find a permanent medication drop box near you at:
<https://dojmt.gov/consumer/prescriptiondrugabuse/rx-dropbox-locations/>
- ☐ Find a community Medication Take Back Event
- ☐ As a last resort, use your household trash:
 - Place opioids into plastic bag, mix (do not crush) with used coffee grounds or kitty litter.
 - Throw into your trash.
 - Cross out any personal information on the pill bottle before recycling or throwing away.

APPENDIX E

ELECTRONIC OPIOID ORDERING AND DEFAULTS

(Gazelka et al., 2020)

HYDROcodone-acetaminophen (NORCO) 10-325 mg per tablet

Take 1 tablet by mouth every 4 (four) hours as needed for pain Indication: Chronic Pain/Nonacute Pain. Max 4 tabs/day. Request clinic follow up prior to next refill. Thank you. ✓
 Print, Disp-120 tablet, R-0
 FMR VS 11/27/18

Accept Cancel Remove

Reference: 1. Micromedex 2. Mayo Clinic Formulary 3. Opioid Guidelines - Ask Mayo Expert

Links:

Order Inst.: When opioids are indicated, guidelines for acute pain are for a short duration i.e. 3 days (rarely up to 7 days). Guidelines for chronic pain...

Product: **HYDROCODONE 10 MG-ACETAMINOPHEN 325 MG TABLET**

Sig Method: Specify Dose, Route, Frequency Use Free Text

Dose: 1 tablet 1 tablet

Prescribed Dose: 1 tablet
 Prescribed Amount: 1 tablet
 Maximum MEDD: 60 mg MEDD

Route: oral

Frequency: Every 4 hours PRN Q4H PRN Q6H PRN

PRN reasons: ☒ pain ☐ mild pain or score 1-3 of 10 ☐ moderate pain or score 4-6 of ...
☐ severe pain or score 7-10 of 1...

PRN comment:

Duration: 3 days

☐ Doses ☒ Days

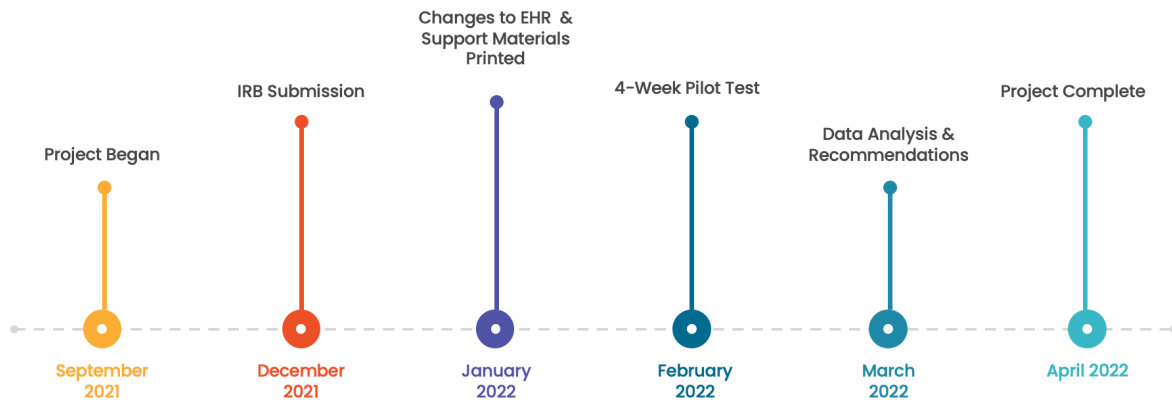
Starting: 12/18/2018 Ending: First Fill:

Mark long-term: ☒ HYDROCODONE/ACETAMINOPHEN

id ordering and defaults. MEDD = morphine equivalent daily dose; PRN = as needed.

APPENDIX F

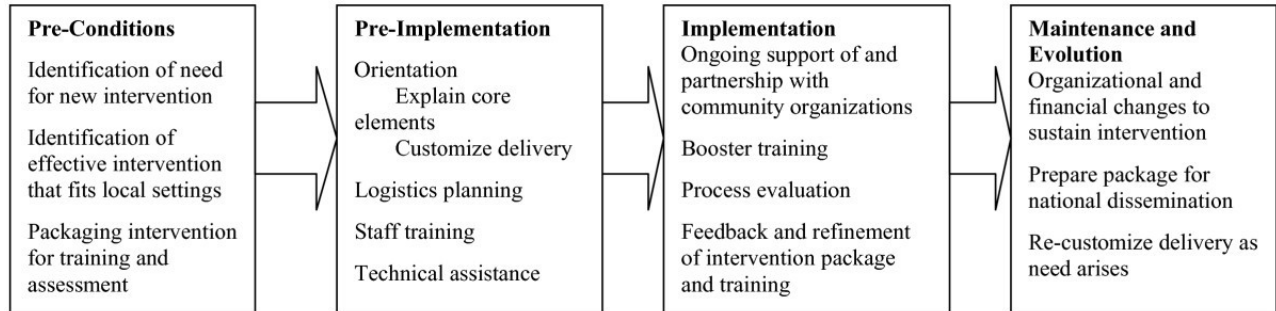
TIMELINE



APPENDIX G

REPLICATING EFFECTIVE PROGRAMS

(Kilbourne et al., 2007)



APPENDIX H

ASC SWOT ANALYSIS

Strengths	Weaknesses
• Leading provider of outpatient orthopedic surgical services • Patient satisfaction scores >90% • Small, independent organization • Prescribing takes place in EHR • Existing structure for new processes • Designated IT support	• No formal policies guiding pain management prescribing • 8 individual prescribers with variable prescribing practices • Discharge instructions lacking in information
Opportunities	Threats
• “Hot topic” issue • Stewardship programs have been successful with antibiotics • Multiple organizations publishing guidance • Patient/family safety concerns surrounding opioid use • Small local changes have shown large impact • Early adopters	• Surgeon/PA surgical teams not employed by ASC • Wide range of surgical procedures performed from minor to major • EHR capability • Concerns for potential unintended consequences • Resistance to giving up complete autonomy • Laggards

APPENDIX I

ASC PRESCRIPTIVE POLICY

Acute Care Opioid Treatment and Prescribing Recommendations:

Summary of Selected Best Practices

These recommendations are to be used as a clinical tool, but they do not replace clinician judgment.

Surgical Department

For patients discharged from surgical department with an opioid prescription

- The prescription drug monitoring program (PDMP) must be accessed prior to prescribing controlled substances schedules 2-5
- Non-opioid therapies should be encouraged as a primary treatment for pain management (e.g., acetaminophen, ibuprofen).
- Non-pharmacologic therapies should be encouraged (e.g., ice, elevation, physical therapy).
- Do NOT prescribe opioids with other sedative medications (e.g., benzodiazepines).
- Short-acting opioids should be prescribed for no more than 3-5 day courses (e.g., hydrocodone, oxycodone).
- Fentanyl or Long-acting opioids such as methadone, OxyContin and should NOT be prescribed to opioid naive patients.
- Consider offering a naloxone co-prescription to patients who may be at increased risk for overdose, including those with a history of overdose, a substance use disorder, those already prescribed benzodiazepines, and patients who are receiving higher doses of opioids (e.g., > 50 MME/Day).
- Educate patient and parent/guardian (for minors) regarding safe use of opioids, potential side effects, overdose risks, and developing dependence or addiction.
- Educate patient on tapering of opioids as surgical pain resolves.

APPENDIX J

ASC ORDER SET

– Z General Medications**PAIN MEDICATION**

- ☐ Acetaminophen (Tylenol) 1,000 mg every 6 hours (max 4,000 mg/day)
- ☐ Ibuprofen (Advil) 400-600 mg every 6 hours (max 3,200 mg/day)
- ☐ Hydrocodone/Acetaminophen 5 mg/325 mg every 4-6 hours as needed for severe pain
- ☐ Oxycodone/Acetaminophen 5 mg/325 mg every 4-6 hours as needed for severe pain
- ☐ Oxycodone 5 mg every 4-6 hours as needed for severe pain
- ☐ Tramadol (Ultram) 25 mg every 4-6 hours as needed for severe pain
- ☐ Hydromorphone (Dilaudid) 2 mg every 4-6 hours as needed for severe pain
- ☐ Celecoxib (Celebrex) 200 mg once daily
- ☐ Methocarbamol (Robaxin) 750 mg every 4 hours as needed for muscle spasms
- ☐ Gabapentin (Neurontin) 300 mg every 8 hours as needed for nerve pain
- ☐ FREE TEXT HERE
- ☐ FREE TEXT HERE

APPENDIX K

ASC PATIENT COUNSELING

Discharge Instructions: Dr. [REDACTED]**POSTOPERATIVE PAIN**

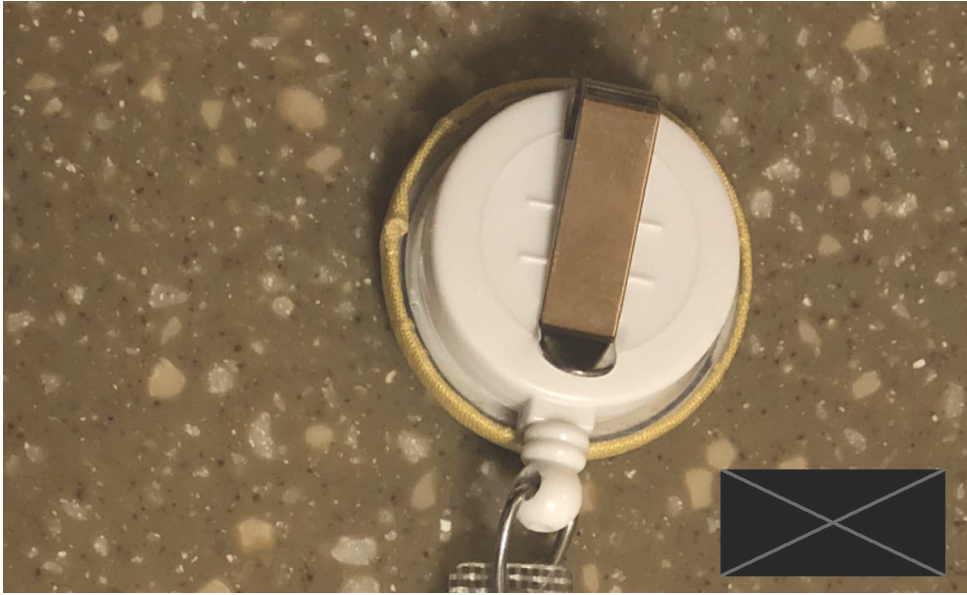
- Pain is a normal and expected part of the recovery process. Pain is typically worse the day after surgery and should improve as you heal.
- To manage your pain at home so you can do the things you need to care for yourself and heal, your surgeon has prescribed the following medications:
 - Acetaminophen (Tylenol) 1,000 mg every 6 hours (max 4,000 mg/day)
 - Ibuprofen (Advil) 400-600 mg every 6 hours (max 3,200 mg/day)
 - Oxycodone 5 mg every 4-6 hours as needed for severe pain
- Acetaminophen and NSAIDs have different mechanisms of action and can be taken together; Alternating these medications (taking a dose every 3 hours) allows you to get the best pain control.
- Not all opioid medication prescribed may be needed. Taper off as pain improves/resolves, typically in 3-5 days.
- Practice safe storage and disposal of unused opioid medication.
 - Find a prescription drug dropbox location at:
<https://dojmt.gov/consumer/prescriptiondrugabuse/rx-dropbox-locations/>

Discharge Instructions

Generated by: [REDACTED]

APPENDIX L

ASC BADGE REFERENCE CARD



APPENDIX M

FLYER FOR POSTING IN PRESCRIBER WORKSPACES (Michigan OPEN, n.d.)

4 reasons

to change opioid prescribing practices

6-10%

of surgical patients become new persistent opioid users
(a significant surgical complication)



correlation

between probability of refill and amount of opioid prescribed

Greater than

70%

of prescribed opioids go unused



correlation

between patient satisfaction and amount of opioids prescribed

Q: How likely is persistent opioid use after surgery?

- Approximately 6–10% of opioid naïve (before surgery) patients continue to use opioids more than three months after surgery.^{7,8,9}
- Many patients continue to use their opioids for reasons other than surgical pain.^{7,9}
- New persistent opioid use after surgery is an underappreciated surgical complication that warrants increased attention.^{7,8,9}

Q: Will patients request more prescription refills if initially prescribed fewer opioids?

- The probability of a patient refilling a postoperative opioid prescription was not correlated with their initial prescription amount.¹⁰
- Prescribers could prescribe smaller opioid prescriptions without influencing the probability of a refill request.¹⁰
- Implementation of evidence-based prescribing guidelines reduced postlaparoscopic cholecystectomy opioid prescribing by 63% without increasing the need for medication refills.³

Q: Why are prescribers being asked to change their opioid prescribing practices?

- Postoperative opioid prescribing varies significantly.¹
- Greater than 70% of prescribed pills went unused by patients.^{1,2}
- Patients who were prescribed fewer opioids reported using fewer opioids with no change in pain scores.³
- Evidence-based opioid prescribing guidelines for the perioperative period are needed to enable tailored prescribing and reduce the excess of opioid pills within patients' communities.⁴
- Prescription size was the strongest predictor of patient consumption.⁵

Q: Will patient satisfaction scores be impacted by prescribing fewer opioids?

- No correlation was found between HCAHPS pain measures and postoperative opioid prescribing.⁶
- Prescribers can feel empowered to reduce their initial opioid prescription without impacting patient satisfaction.⁶

APPENDIX N

SCRIPT FOR HELPING PATIENTS NAVIGATE RECOVERY (AAOS-ASA, n.d.)



Physician-Patient Script: Inadequate Pain Control

A script for dealing with this common pain relief scenario

This resource is part of the AAOS-ASA Pain Alleviation Toolkit, strategies for safe and effective alleviation of pain and optimal opioid stewardship. AAOS and ASA partnered to develop the toolkit, recognizing that empathic communication between the surgical team, patients, and families helps prepare patients for the pain of recovery from injury or surgery.

Empathize, normalize the pain, rule out problems, affirm signs of resilience, strategize, be available.

- ❑ Ask "Does the surgery hurt more than you expected?" then pause to listen to the patient's answer. Pain feels like something is wrong. Remembering why there is pain can be helpful. Give people space to make sense of things. Be comfortable with silence.
- ❑ Acknowledge that "Pain can feel like something is wrong." (Rule out compartment syndrome)
- ❑ Remind them that "Your body needs time to heal, but let's figure out what's going on and find ways to reduce your pain to manageable levels."
- ❑ Ask "Are you using all of the pain management strategies we discussed?" then listen to the strategies they have tried, affirm them, and suggest those they have not.
- ❑ Then run through this script: "If you are having trouble getting comfortable the night after your surgery, try one or more of these strategies:
 - Add acetaminophen if it's not in the medication you are already taking.
 - Add ibuprofen or naproxen.
 - Stagger the acetaminophen and ibuprofen so that you're taking one or the other every 3 hours.
 - Elevate the surgical area.
 - Apply ice (bag of ice wrapped in a towel; 10 minutes on, 5 minutes off, repeat)."
- ❑ "Which one of those strategies do you think you'd like to try?" Listen for their response and validate their choice.
- ❑ "Do you have someone who can help you while you get over this bump?"
- ❑ "We'll call you later today (or in the morning) and see how you're doing. Call us if you think something is wrong."
- ❑ "Can you repeat back our plan?" Listen to ensure they know what to do.
- ❑ "Tell me your questions." Listen with patience and repeat any instructions that were missed.

APPENDIX O

EXCEL INSTRUMENT

	Yes	No
Was the patient prescribed a number of opioid pills within the recommendations?		
Did the patient receive written postoperative pain counseling?		
Did the patient have pain?		
If so, did pain medication help?		

APPENDIX P

ASC POSTOPERATIVE QUESTIONNAIRE

✓ Do you have pain?

Yes

No

N/A

Add Notes

⦿ If pain medications were prescribed for pain, did they help?

Yes

No

N/A

APPENDIX Q

ASC PATIENT SATISFACTION SURVEY

AFTER MY SURGERY	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
My pain level was as expected and well controlled	☐	☐	☐	☐	☐

APPENDIX R

ASC Q4 PATIENT SATISFACTION RESULTS

Q4 PROGRESS**As of January 11, 2022**

Category	National Avg.	Qtr. 3 - 21	Qtr. 4 - 21	AVG	Difference
Pain level control	94.2	93.9	92	92.43	-1.78