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Final Scholarly Project: Clinical Guidelines for the Perioperative Management of Patients with Opioid Use Disorder Requiring Anesthesia

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Clinical Guidelines for the Perioperative Management of Patients with Opioid Use Disorder Requiring Anesthesia

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Abstract

Opioids have highly addictive properties that allow for high levels of misuse. Since the early 1990s, the misuse and deaths rates related to narcotics have steadily risen in the United States. Efforts to identify individuals using opioids prior to surgery have proven difficult. The number of patients misusing opioids and reporting for surgery can only be estimated due to under-reporting related to fear and self-stigma. With 50 million surgeries in the U.S. annually and 3.32 million people misusing opioids monthly, the chances of a patient with Opioid Use Disorder (OUD) presenting for anesthesia are exceptionally high. Moreover, patients who rate pain higher throughout their hospital stay are more likely to have longer stays and be readmitted for pain issues. Notably, the average readmission cost is $15,200 for the patient. Issues with anesthetizing patients who chronically misuse opioids include cardiac dysrhythmias, respiratory complications, death from acute intoxication, higher opioid requirements postoperatively, prolonged hospital stays and increased readmission rates. The project serves to evaluate current literature to provide direct guidelines for implementation for OUD. The providers will be given a set of guidelines for adaption into practice. The success of the project will be measured by the outcomes of amount of opioids used, the length of stay, and readmission rates.

Keywords: anesthesia, opioid tolerance, opioid misuse

Clinical Guidelines for the Perioperative Management of Patients with Opioid Use Disorder Requiring Anesthesia

Introduction

The current opioid epidemic has magnified the issue of patients with OUD reporting for anesthesia. Pain is a physiologic process. As medicine has developed, steps have been taken to lessen and alleviate pain. Many medications have become available to interact with the pain stimulus along its pathway. For instance, aspirin was the first Non-Steroidal Anti Inflammatory Drug (NSAID). Aspirin, initially developed in 1897, was a form of salicin, an active ingredient found in willow bark and used for the last 5,000 years to mitigate musculoskeletal pain (Conaghan, 2012). Although aspirin is relatively mild in its approach, other developed medications have not been as modest with many having addictive properties, such as opioids. Opioids are a specific class of pain medication with highly addictive properties. The addictive properties allow for high levels of misuse.

OUD is defined as chronic use of opioids that causes distress or impairment (Dydyk et al., 2023). OUD includes addiction and dependence and does not discriminate based on socioeconomic background or environment. Patients experience withdraw symptoms, tolerance, and cravings as well as periods of exacerbation and remission. Prevalence varies by age and gender. The largest patient population actively seeking treatment ranges between the ages of 20-35 (Dydyk et al., 2023).

Difficulties arise for anesthesia providers when patients report for surgery with a tolerance to opioids or with acute intoxication. Complications of acute intoxication include cardiac arrhythmias, adverse respiratory events, and even death. Tolerance to opioids also predisposes the patient to require higher levels of pain medication postoperatively, longer than

normal hospital stays, and increased risk of postoperative readmission related to pain control. The goal of this EBP is to provide a set of guidelines for anesthesia providers to use when caring for patients with OUD. Use of the guidelines may decrease the amount of opioids used, decrease the length of stay and decrease readmission rates.

Background

Pain is a physiologic process that makes the brain aware of a problem. The International Association for the Study of Pain (IASP, 2020, para 3) defines *pain* as "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage." Pain is an experience that is different for everyone and can range from mild to debilitating (National Institute of Neurological Disorders and Stroke, 2023). Many sensations can be labeled as "pain," including aching, burning, stinging, prickly, and so on. Regardless of the sensation felt, pain takes a specific pathway throughout the nervous system that is very complex. Historically, opioids have been a first line agent for management of acute and chronic pain.

Annual healthcare costs for patients with OUD are $18,000 higher than patients without OUD (Xu et al., 2021). The Affordable Care Act of 2010 enforced insurance coverage for substance use disorders requiring government run and private insurances to cover OUD treatment and addiction services (CMS, 2016). Although addiction treatment is covered, readmission reduction programs and value based purchasing programs may decrease the compensation to the healthcare system related to prolonged hospital stays and readmissions (CMS, 2024).

History of Opioids

The use of opioids extends back to 3400 BC (PBS, 1998). Initially, the Sumerians called the poppy the Hul Gil, meaning the "joy plant," and would pass knowledge through to the Assyrians, the Babylonians, and eventually the Egyptians. In 1300 BC, the Egyptians began trading harvested opium with the Phoenicians and the Minoans. From there, opium spread across the Mediterranean Sea to Carthage, Greece, and Europe. In 460 BC, Hippocrates acknowledged the usefulness of opium in medicine, and Alexander the Great, in 330 BC, aided opium's travel into Persia and India. In 400 AD, Arab traders took Opium into China. In 1527, opium entered European medical literature and was prescribed for pain control. In 1803, Friedrich Sertuerner identified the main component of opium as morphine. Opium entered America as early as 1812 (PBS, 1998).

PBS (1998) continues to divulge that in 1905, the U.S. banned opium, and in 1923 banned all legal narcotics sales, forcing users to the underground market. From 1950 to 1970, The United States (U.S.) government, by attempting to control communism in the Eastern world, inadvertently increased the amount of underground heroin flowing into the country. In July of 1973, President Nixon created the Drug Enforcement Agency (D.E.A.) in an attempt to mitigate the growing opioid problem. From 1978 to 1984, the U.S. government worked with other governments, such as Mexico, Burma, Peru, and Pakistan, to eradicate poppy fields to stop the influx of opium and heroin with poor results (PBS, 1998).

Opioids in anesthesia began in 1962 with fentanyl (Forget, 2018). Since then, the use of fentanyl in practice has exponentially gained traction and popularity along with its derivatives alfentanil, sufentanil, and, more recently, remifentanil. The chemical makeup of these medications benefit an anesthetic well by creating pain control and aiding the effect of amnesia

with a minimal side effect profile and quick metabolism. Most importantly, when given under direct supervision, the effects of respiratory suppression can be managed.

Current OUD Dilemma

Governing bodies and medical professionals have worked diligently since the early 2000s to make prescription opioids less accessible to curb the current opioid crisis. The Centers for Disease Control (CDC, 2023) states that 2.7 million people in the U.S. report suffering with OUD. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2021) reports that 1% of people in the U.S., ages 12 and older, misuse opioids monthly, which estimates that 3.32 million people in the U.S. misuse opioids monthly (U.S. Census Bureau, 2023).

Hilliard (2018) found that 23% of a 34,168 individual sample group reported taking prescription and nonprescription opioids preoperatively. Efforts to identify individuals using opioids prior to surgery have proven difficult (Thiesset, 2020). The number of patients misusing opioids and reporting for surgery can only be estimated as this population experiences under-reporting related to fear of shaming from healthcare professionals and self-stigma (Ward et al., 2018). With 50 million surgeries in the U.S. annually (Dobson, 2020), the chances of a patient with OUD presenting for anesthesia are exceptionally high. However, specific numbers of patients presenting for anesthesia who are opioid tolerant are elusive due to the population's self-stigma, shame, and dishonesty (Ward et al., 2018). Under diagnoses of opioid tolerance can lead to untreated pain perioperatively.

Significance to Anesthesia

There are several issues with anesthetizing patients who chronically misuse opioids. First, if the patient arriving for surgery is acutely intoxicated, administering anesthesia can create

hemodynamic instability, possibly leading to death (Moran et al., 2015). Second, chronically using opioids builds a tolerance of the central nervous system to anesthetic medication, meaning that chronic OUD patients will require higher than usual doses (Moran et al., 2015). Third, patients with OUD experience prolonged hospital stays and increased readmission rates (McAnally, 2017; Dasinger et al., 2019), which leads to higher costs for the patient and the healthcare system. Weiss and Jiang (2021) state average readmission cost is $15,200. Hernandez-Boussard et al. (2017) found that 14% of 211,231 surgical patients within a Veterans Affairs (VA) hospital were readmitted within 30 days related explicitly to pain control noting the population to have a high incidence of drug dependence.

Anesthesia providers have a fundamental duty to manage acute and chronic pain in the perioperative setting to decrease the amount of opioids used, decrease length of stays, and decrease the risk of readmission (Yaster, 2017). Opioids are effective for pain management, but the benefits must outweigh the risks. Literature now suggests a combinations of medications, including ketamine, lidocaine, NSAIDS, and acetaminophen as adjuncts to lessen the requirement of opioids while the traditional approach to anesthesia remains heavily opioid-based. Anesthesia providers must be educated in evolving treatment of the opioid tolerant patients including alternative modalities for pain control and medications used to treat opioid dependence.

PICO Question

This project aims to address the current opioid crisis as it relates to anesthesia. The PICOT format establishes a framework for examination and provides solutions for a question. In patients with OUD requiring anesthesia (P), would the development and implementation of evidence-base guidelines related to anesthesia management (I) in comparison to a traditional approach (C)

affect the amount of opioids required perioperatively, the length of hospital stay, and the readmission rate (O)?

Objectives

The guidelines discussed within this project will provide the opportunity to more adequately control pain in the opioid-tolerant population to mitigate the adverse outcomes of higher opioid requirements, longer hospital stays, and readmissions. Evidence Based Practice (EBP) guidelines must be developed as a multimodal treatment plan for patients with OUD that require anesthesia. The objectives are as follows:

- Develop EBP guidelines for patients with OUD requiring any anesthesia
- Develop a comprehensive plan for the implementation of EBP adjunct pain therapy guidelines
- Develop a comprehensive plan for monitoring implementation of the EBP adjunct pain therapy guidelines
- Develop a comprehensive plan for evaluation and adjustment if the outcomes do not meet the expectations of decreased amount of opioid required, decreased length of stay, and decreased readmission rate.

Literature Review

A literature search was completed to assess common themes in anesthesia with opioid-tolerant patients and alternative pain control methods. The databases used to complete the literature search included the PubMed, ScienceDirect, and Google Scholar databases. Initially, keywords such as “opioid-free anesthesia,” “opioid dependence,” and “opioid use disorder” were utilized. This search led to hundreds of articles that were not specific to the direction of this project.

In order to find literature related to the topics of interest for this project, specific keywords were utilized, such as “intraoperative ketamine,” “multimodal pain management,” “opioid use disorder,” and “surgery.” With the help of the Boolean operator “AND,” the search was narrowed down to perioperative interventions to aid anesthetic techniques to minimize the use of opioids. Exclusion of articles was completed through a rapid critical appraisal of the title, abstract, and text. Articles excluded were not specific to anesthesia or focused on only one surgery and excluded opioid-tolerant patients. A selection of 14 articles were isolated for a more in-depth review and analysis. Following are the findings, grouped by specific intervention.

Preemptive Analgesia

Preemptive analgesia is a concept that states that improved analgesia and reduced sensitization can occur if pain receptors are blocked before stimulation occurs (Dahl & Moiniche, 2004). Ahiskalioglu et al. (2017) state that preemptive analgesia supports early mobilization, shortened hospital stays, lower hospital costs, and increased patient satisfaction. Moreover, administering analgesics prior to surgical stimulation has been proven to reduce spinal cord posttraumatic sensitivity and secondary hyperalgesia (Ahiskalioglu et al., 2017). Omitting preemptive medication risks peripheral hypersensitivity and central nervous system hyper excitability (Ahiskalioglu et al., 2017).

Opioid tolerant patients must be at a tolerable level of pain prior to surgery, understanding that “tolerable” does not mean pain is absent. For patients that need surgery to mitigate pain, a “tolerable” level may be achieved via a multimodal approach in lieu of high dose opioids. Patients with OUD requiring surgery must not be kept free of all opioids, otherwise, they will experience withdraw symptoms and hyperalgesia during and after their procedure.

Preemptive analgesia reduces sensitization (Ahiskalioglu et al., 2017). For patients with active OUD, this may require a higher "baseline" of medications than in patients without OUD.

Multimodal Adjuncts

Ibuprofen

Ibuprofen decreases inflammation by blocking the cyclooxygenase enzymes COX-1 and COX-2 (Mazaleuskaya et al., 2015). Ibuprofen also acts as an antipyretic and analgesic. Ahiskalioglu et al. (2017) found that a single preprocedural dose of IV ibuprofen decreased opioid consumption for 24 hours postoperatively. Furthermore, ibuprofen decreased the doses of breakthrough medication required to maintain analgesia and decreased the episodes of postoperative nausea and vomiting (PONV). A known risk of ibuprofen is that inhibiting the COX-1 pathway inhibits the production of prostaglandins responsible for creating prostacyclin, which maintains an anti-coagulant state within the body. While this is true, inhibiting prostaglandins also inhibits the formation of thromboxane A2, a procoagulant. Ahiskalioglu et al. (2017) found no difference in bleeding after a single dose of IV ibuprofen compared to the group receiving a placebo. Ibuprofen must be considered to support patients with OUD requiring anesthesia (Mazaleuskaya et al., 2015).

Gabapentinoids

Gabapentinoids are considered antiepileptic medications used to treat neuropathic pain (Chincholkar, 2020). This group includes the medications gabapentin and pregabalin. These medications have proven decreased consumption of opioids and reduced postoperative pain (Harrison et al., 2018). Furthermore, when used in conjunction with other nonopioid medications, patients experienced significantly lower pain scores postoperatively up to 10 days, required zero doses of breakthrough opioid analgesia, and there was no significant difference in

side effects such as constipation, drowsiness, or dizziness (Jildeh et al., 2021). Wang et al. (2017) suggested a significant reduction in PONV with perioperative pregabalin. Notably, gabapentin is contraindicated in patients with myasthenia gravis and myoclonus.

Dexamethasone

Dexamethasone is the most common glucocorticoid given intraoperatively. Glucocorticoids block prostaglandin and cytokine production leading to an anti-inflammatory state (Johnson et al., 2023). Like gabapentinoids, when used with other nonopioid medications, patients experienced less postoperative pain, fewer side effects such as PONV, and required zero breakthrough opioid dosing (Jildeh et al., 2021). Dexamethasone was most efficacious when given preoperatively (Harrison et al., 2018). A single dose of intraoperative dexamethasone can decrease opioid consumption for 24 hours postoperatively (Samona et al., 2017). Monitoring blood glucose levels must occur when administering steroids to diabetic patients as there may be a transient increase. Lower dose steroids in diabetic patients allow for the advantages of the medication while mitigating an increased glucose level.

Ketamine

Ketamine acts by antagonizing the N-methyl-D-aspartate (NMDA) receptor creating a state of anesthesia in which the patient experiences dissociative sedation (Rosenbaum et al., 2023). Traditionally ketamine has been used in a dose of 2-4mg/kg for induction of anesthesia; however, as the opioid-free anesthesia technique has gained popularity, anesthesia providers have found that low-dose ketamine also works as an excellent analgesic (Rosenbaum et al., 2023). Loftus et al. (2010) found that patients receiving ketamine at 0.5mg/kg with induction of anesthesia followed by a ketamine infusion at 10mcg/kg/min until wound closure had less opioid consumption for 48 hours postoperatively. Receiving ketamine intraoperatively decreases the

amount of intraoperative narcotics while not posing any side effect risks (Loftus et al., 2010). Blocking the NMDA receptor makes ketamine an excellent alternative for patients with OUD.

Local Anesthetics via Regional Techniques

Regional anesthesia (RA) utilizes anesthetic medications via injections to block a specific nerve or group of nerves. RA includes peripheral blocks (more specific nerves) and spinal/epidurals (groups of nerves) (Folino & Mahboobi, 2023). RA for surgical procedures has been proven to reduce pain levels postoperatively and facilitate early physical therapy participation (Folina & Mahboobi, 2023). RA decreases acute and chronic pain, reduces the length of hospital stay and cost of procedures, and reduces pulmonary complications and PONV (Hutton & Macfarlane, 2018). Continuous peripheral nerve blockade boasts lower systemic opioid requirements, improved pain control, and greater patient satisfaction than single-dose blockade (Harrison et al., 2018). Education and training for RA techniques would be minimal as these techniques are already widely used.

Treatment Medications for Opioid Dependence

Rehabilitation and treatment for OUD is on the rise to attempt to combat the growing numbers of opioid misuse. Several treatment medications have been deployed for OUD such as methadone, buprenorphine, and naltrexone. It is vital that the anesthesia provider be educated on these medications so that dose adjustments can be made for patients utilizing this treatment.

Methadone

Methadone is a mu receptor agonist for treating opioid use disorder (Harrison et al., 2018). Notably, there is some NMDA receptor antagonism. Patients already taking methadone should continue a home dose on the day of surgery and throughout the perioperative process (Harrison et al., 2018). If a patient is unable to continue a home dose, it should be halved and

given in divided doses, intravenous (IV), every six to eight hours (Harrison et al., 2018). If the patient has not taken home dose methadone for more than five days, the primary methadone provider should be consulted. It is vital to confirm the patient's dose with the prescribing treatment program (Ward, 2019). Moreover, due to the upregulation of receptors in patients suffering from OUD, additional opioids will likely be required perioperatively (Ward, 2019). The addition of fentanyl or hydromorphone for breakthrough pain management is acceptable. Additional stimulation of multiple mu receptors may cause respiratory suppression.

Buprenorphine

Buprenorphine is a mu receptor partial agonist used to treat OUD. Buprenorphine is a partial agonist meaning it does not induce respiratory suppression like other opioids (Harrison et al., 2018). Buprenorphine has a high affinity for mu receptors making treatment of additional surgical pain with addictive opioid doses difficult. To combat this increased affinity, more potent opioids such as sufentanyl may be necessary. Another way to ensure adequate pain management for the OUD patient on buprenorphine therapy is using other multimodal therapies in conjunction with buprenorphine (Harrison et al., 2018). Research is mixed as to the most advantageous option for patients taking buprenorphine. Some suggest discontinuing the medication for two to five days prior to surgery, while others suggest only omitting a dose on the day of surgery. To best decide, the patient must have equal decision-making ability (Ward et al., 2018). If discontinuation occurs, a follow-up appointment with the buprenorphine provider should be established for the patient as soon as possible at discharge (Ward et al., 2018).

Naltrexone

Naltrexone is an opioid receptor antagonist used to treat OUD. The antagonism of the mu receptor blocks the effects of opioids (Ward et al., 2018). The half-life of naltrexone is 10 hours

(Harrison et al., 2018). In some animal studies, opioid dosage had to be increased by six to 20 times to manage pain after naltrexone therapy. Therefore, postoperative pain management is more complex with highly variable reactions to additional opioids for the patient treating OUD with naltrexone (Ward et al., 2018). Discontinuation of naltrexone is recommended two days prior to the surgical procedure to forgo unpredictable pain control. Patients taking naltrexone should receive more diligence in monitoring due to a more variable response to additional doses of opioids (Harrison et al., 2018). If the patient does not discontinue naltrexone two days prior to surgery, pain control may not be attainable as the opioid receptors would still be blocked by the medication.

Summary

There are many non-opioid adjunctive therapies in the literature for use in managing OUD in patients requiring anesthesia. Just as anesthesia is highly variable based on the patient's situation, these alternative therapies must be applied to clinical situations at the discretion of the anesthesia provider with the support of the surgeon and the patient to ensure maximum compliance. Patients with OUD have variable responses to anesthesia, and postoperative pain management can seem intimidating. Current research provides multiple alternatives to aid in managing the population at all levels of OUD.

Framework

The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model (Appendix A) is the project's framework. The JHNEBP Model is a systemized technique that supports active clinical governance, ensuring the implementation of EBP research into clinical practice (Dang et al., 2022). Healthcare and medical knowledge are ever-changing. Changes to clinical practice must be made based on the most up-to-date EBP knowledge to ensure optimum patient safety

and care. Embedded within the JHNEBP model is the PET process which is a three-part process: Project planning, Evidence review, and Translation.

Practice Question and Project Planning

The first phase in the JHNEBP model is the practice question and project planning phase. In this phase, the model requires the development of a practice question to describe the issue (Dang et al., 2022). Steps within the project planning phase include determining the need for an EBP project, developing a team, and deciding the team leader's responsibilities. The following steps include clarifying and describing the problem, developing and refining an EBP question, and identifying stakeholders.

While developing the practice question, one must ask "What is the problem?", "Why is the problem important?" and "What is current practice?" These questions aim to establish a practice question using the PICO design. The PICO question is, In patients with opioid tolerance requiring anesthesia (P), would the development of evidence based guidelines (I) in comparison to a traditional approach (C) affect the amount of opioids required preoperatively, the length of hospital stay, and the readmission rate (O)?

Anesthesia is highly variable, with the ability to be personalized to each patient. Variability must be encouraged to ensure safety and better outcomes, such as shorter stays, fewer readmissions, and fewer opioids required for patients with OUD. Historically, anesthesia care included high dose opioids (Boysen et al., 2023). Guidelines must be created to aid providers in planning anesthesia for OUD patients without the excessive use of opioids in order to prevent longer hospital stays and increased readmissions.

These EBP adjunct pain therapy guidelines should have an impact on the patient as a stakeholder. Guidelines that help to provide knowledge of alternative anesthetic techniques

ensure an optimal patient experience. Another stakeholder is the surgeon. The surgeons have an influence on the guidelines related to medication preferences for the patients. The surgeon's priority is providing a safe procedure that will benefit the patient's health and can contribute to the case by discussing the patient's health status with the anesthetist. The surgeon can potentially impede the project by objecting to alternative medication therapies if not educated about these techniques. The guidelines benefit the surgeon by decreasing patient complications, decreasing length of stay, and decreasing readmission complications.

The anesthesia providers are stakeholders in this project. Anesthesia providers are responsible for understanding the new guidelines and implementing the changes into their practice. This project significantly influences practice because it directly impacts the medications used perioperatively. The most important thing to an anesthetist is providing a safe and effective anesthetic to patients. Anesthetists can contribute to the project by implementing the guidelines and reporting on their experiences. The guidelines benefit the anesthetist by offering alternative medications to smooth the anesthetic process for opioid-tolerant patients. The guidelines will be useless without compliance from providers.

The hospital stands may benefit from the guidelines by increasing revenue from decreased opioid consumption, decreased length of stays, and decreased readmission rates. The health system has a significant influence over the project by approving the guidelines for practice. The pharmacy is also a stakeholder. The pharmacy benefits if the guidelines decrease the cost of additional opioids required. The pharmacy will also be in charge of ordering and stocking the medications as well as helping to identify any contraindications. The pharmacy can create barriers to this project via untimely reporting of outcomes or through mismanagement of medications within the guidelines. Once the stakeholders are identified, a team is assembled.

The manager of anesthesia must be involved in the team because the guidelines are specifically for anesthesia providers. The anesthetist must ensure that the guidelines are easy to follow. Another important team member is the chief surgeon to ensure the established guidelines are communicated to all of the surgeons and to ensure the practicality of the medication guidelines from a surgeon's perspective. A third important team member is a pharmacist. Having a pharmacist on the team will ensure required medications are available to facilitate the guidelines. The team also requires a member from the quality department to assess outcomes.

Evidence Review

The second phase of the JHNEBP model is the evidence review phase. The goal of this phase is a critical evaluation of the current literature (Dang et al., 2022). The first step is to search the literature for evidence related to the practice question developed in the project planning phase. After finding the evidence, an appraisal of the quality of the evidence is conducted (Appendix B). Once quality evidence is found, one must summarize and synthesize the evidence in order to support the practice question. Once the evidence is established, EBP guidelines are developed to answer the practice question. The current literature supports opioid-sparing anesthesia via alternative therapies for patients suffering from OUD, and alternative therapies include the use of RA and non-opioid analgesic medications. Refer to the literature review section for a thorough assessment of the current literature.

Once the team is assembled, along with a thorough literature review, the guidelines can be approached. Current literature supports many alternative medications for treating pain. Some alternatives are given with opioids to reduce the intraoperative amount of opioids required. Other alternatives are utilized instead of opioid therapy, such as RA (Hutton et al., 2018). Education related to the guidelines will be provided to the anesthesia department.

Translation

The third phase of the JHNEBP model is the translation phase to determine if the suggested clinical practice changes are effective and practical for implementation (Dang et al., 2022). The first step in the translation phase is to identify guidelines specific to different practice settings. The other steps include creating an action plan, securing support and resources for implementation, and enacting the changes. Another essential step within the third phase is to analyze the outcomes to determine if changes to the implemented guidelines are required.

Once guidelines are trialed in clinical practice, outcomes will be assessed every quarter via chart reviews. Information will be assessed for any specific patterns. If outcomes worsen, meaning increased narcotics are used, postoperative hospital stays lengthen, or the readmission rate increases, meetings will be held to inform providers to stop utilizing the guidelines for OUD undergoing anesthesia until adjustments can be made. Encouragement will be sent to anesthesia providers via email if the level of complications decrease.

Guidelines for OUD Patients Requiring Anesthesia

Patients experiencing OUD are actively taking prescription or nonprescription opioids, have built a tolerance, and require higher than average doses of opioids to maintain analgesia. Therefore, it is essential to be educated on management of OUD perioperatively. The guidelines within this EBP project will offer alternatives for pain management to anesthesia providers. The guidelines are not meant to be a one size fits all approach, but allow the anesthesia providers to make clinical decisions personalized to patient need (Appendix C).

Implementation

Education sessions regarding the anesthesia management of patients with OUD will be conducted with anesthesia providers. These sessions will be one hour long and will educate on

the prevalence of OUD with an overview of the guidelines used to manage them. The guidelines will also be distributed via flyers and pamphlets to each provider to read at leisure (Appendix C). A copy will also be placed in the anesthesia office, at the preoperative nurses' station, and in each operating room for quick reference.

Compliance specific to the guidelines will be assessed through chart reviews via the quality department. Charts will be reviewed specifically for the amount of opioids used, the length of stay, and readmission rates. These data points will provide quantitative data for examination. Adjustments will be made based on the findings of the chart reviews. Unacceptable findings include increased amounts of opioids required postoperatively, longer than average hospital stays, and higher than average readmission rates related to pain control.

Timeline

The first chart review will occur two weeks after the education sessions. Chart reviews will be completed by the quality department and will occur every two weeks. The chart reviews will provide qualitative data. Assessing the outcomes through chart reviews every two weeks allows the opportunity to adjust the guidelines if the outcomes are unacceptable. Continuing this project for six months allows ample opportunity to understand the patterns of outcomes concerning the guidelines.

Budget

A significant expenditure will be the time commitment of the anesthesia educator. The current hourly rate for the anesthetist is $105 per hour. If the educator works Monday through Friday from 6 a.m. to 4 p.m. to educate, the cost to provide a replacement anesthetist in the operating room would be approximately $5,250. Additionally, if the primary educating anesthetist works for two hours every two weeks for six months to analyze the data and make

any adjustments, that will cost $2,520. The anesthesia providers receiving the education will attend a session during working hours, which will accrue no additional cost for the project.

The cost of medications varies widely between institutions and manufacturers. Moreover, the price of individual medications is private. For this reason, the pharmacy will be responsible for monitoring the cost of opioids and adjunct medications. The cost of changing or adding medications to the anesthetic plan may be higher than using opioids alone. However, the revenue gained through less opioid administration, shorter hospital stays, and lower readmission rates may far exceed the cost difference. The pharmacy, billing, and quality departments already keep track of the data points listed above, such as the length of stay, readmission rates, patient complications, and the cost of medications. The data will be accessed every two weeks for six months and requested via email. Once data is synthesized, the project will be taken to hospital administration for permission to become a permanent program.

Data Analysis

The outcomes for analysis will include the number of inpatient days, the amount of opioids required, and readmission rates specifically related to pain. The quality department will monitor the outcomes of inpatient stays and readmission rates. The pharmacy will monitor the amount and costs of opioids and adjunct medications used. The billing department will monitor the cost versus revenue savings of the implemented guidelines as a secondary outcome.

Successful implementation of the guidelines will have evidence of fewer opioids consumed during the perioperative period. Shorter inpatient stays and lower readmission rates will further legitimize the use of the guidelines. Undesirable outcomes will appear as a higher cost of medications in the presence of fewer opioids administered. Other adverse outcomes of the guidelines include extended hospital stays and increased readmission rates. If the inpatient stays

become longer compared to pre-guideline implementation or the readmission rates increase, then compliance with the guidelines will be evaluated, and the guidelines will be adjusted.

The outcomes of implementing the guidelines will be presented to the facility via meetings involving the head of the anesthesia department. Presenting the anesthesia department with the outcomes will allow the anesthesia providers to appreciate their participation and encourage compliance. The outcomes will also be presented to the pharmacy, the quality department, and the billing department to ensure complete project perspective. Finally, the summary of the project and outcomes will be sent to the chief of surgery to ensure appreciation of the work of the anesthesia department toward patient safety in the interest of the facility.

Limitations and Barriers

The anesthesia providers' participation in learning the multimodal guidelines and implementing them into personal practice is an anticipated barrier to this project. The anesthetists must be encouraged by the necessity for EBP by updating practice methods to mitigate a lack of participation. Additionally, smooth implementation of the guidelines is required to ensure processes related to drug availability do not create barriers to the use of the guidelines. To mitigate this risk, the pharmacy will stock all medications within the guidelines at the exact times that all other medications are stocked. Patients also pose potential barriers. The risk of false reporting or omission is high within the population misusing opioids. The provider may not know to use the guidelines, if the patient is not forthright in explaining misuse. Future projects may include evaluation of the education sessions or implementation of preoperative screening for OUD patients.

Conclusion

The misuse of opioids is extensive and dates back thousands of years. OUD in patients requiring anesthesia is a serious concern for contemporary anesthesia providers. Anesthetizing patients with OUD can be difficult to appropriately medicate and costly due higher medication requirements, extended hospital stays, and increased readmission rates. Literature suggests the use of multimodal adjunct therapy to better serve the OUD community. The EBP guidelines outlined along with the implementation process offer an opportunity for providers to augment current practice to care for a volatile population in the most efficacious ways. Incorporating these EBP multimodal pain therapy guidelines for OUD surgery patients into practice will improve the outcomes of less opioid use, shorter hospital stays, and less readmissions. The guidelines offer adjuncts and alternatives to opioid use that may mitigate pain control and provide higher satisfaction for the patient and the anesthesia provider.

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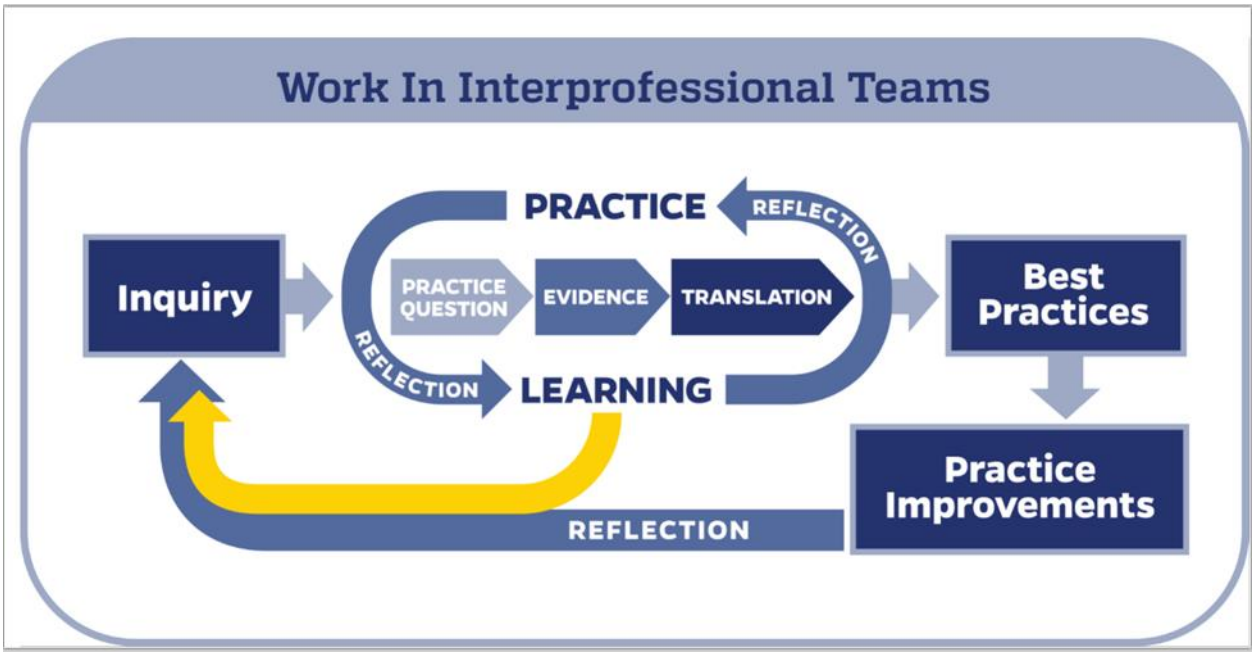
Appendix A

Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model

https://www.hopkinsmedicine.org/evidence-based-practice/model-tools



Appendix B

Evidence Review Table

Citation	Conceptual Framework	Design/ Method	Sample /Setting	Major Variables Studied and Their Definitions	Outcome Measurement	Data Analysis	Findings	Level of Evidence	Quality of Evidence: Critical Worth to Practice
Keeper Article 1									
Ward et al., (2017) Opioid Use Disorders: Preoperative Management of a Special Population County: NR Funding: NR	Examine literature for guidelines to treat OUD periop	-Systemic Review -Meta Analysis	-Searched PUBMED and OVID Medline from 1982-Sept. 2017. -82 references including case reports, reviews, cross-sectional and controlled studies, guidelines and editorials	Management for OUD pts: in remission, currently abusing, and taking: methadone, buprenorphine, injectable naltrexone	NR	NR	-Continue Methadone -Continue Buprenorphine -Stop naltrexone -Preop inpt option for current OUD.	Level I	Strengths: Thorough content r/t major treatment modalities for OUD. Limitations: Did not include data analysis of the research used.
Keeper Article 2									
Loftus et al., (2010) Intraoperative Ketamine Reduces	To see if perioperative ketamine reduces amou	Double Blinded Randomized Control Trial	Attrition-NR N=101 Inclusion: opioid use for 6 wks,	IV1 = Dose of ketamine DV1= less intraoperative opioids	-38% less morphine use in control group during	-CI -Student T Test -Fisher Exact Test	Statistical findings or qualitative findings	Level II	Strengths: Strong evidence to use ketamine

Perioperative Opiate Consumption in Opiate-Dependent Pts with Chronic Back Pain Undergoing Back Surgery	nts of opioids needed		back pain for 3 mo, undergoing lumbar sx, requiring admission Exclusion: allergy to ketamine, increased IOP or ICP, uncontrolled HTN, Hx of psychosis, pregnancy		48 hrs postop -VAS Pain Score		-Intraop opioids: placebo 67±44 mg, control group 51±27 mg -48hr postop morphine intake: placebo 309±341mg, control 195±111mg		No changes to induction other than adding ketamine Limitations Specific to lumber sx.
Keeper Article 3									
McAnally (2017) Rational for and Approach to Preoperative Opioid Weaning: A preoperative optimization tool. County-NR Funding-NR	Discuss the effects of opioid use disorder and develop preop weaning guidelines based on literature	Systemic Review	-23 articles referenced	IV1 = Decreasing preop opioid dose by 10% per week DV1= LOS, readmission rates, financial costs	NR	NR	preop "wellness program" that creates an environment outpatient to achieve a lower dose of narcotics at a rate of 10% less per week	Level I	Strengths: Guidelines support outcomes like LOS, surgical outcomes, and financial burdens of OUD. Limitations: Limited statistical analysis of studies

									reviewed.
Keeper Article 4									
Jildeh et al., (2021) Multimodal Nonopioid Pain Protocol Provides Equivalent Pain Control Vs Opioids Following Arthroscopic Shoulder Labral Surgery: A Prospective Randomized Control Trial County-NR Funding-NR	Compares postop pain between opioid vs nonopioid anesthesia types	Randomized Control Trial	N=48 - Inclusion: at least 15 years old, undergoing arthroscopic labral repair - Exclusion: Hx of PUD, recent or current pregnancy, substance abuse, allergy to medication, renal impairment use of blood thinners, GI bleeding, same-joint surgery within	IV1 = nonopioid pain management IV2 = opioid pain management DV1= Pain control DV2= Pt satisfaction DV3= Reaction profile	-VAS Pain Score - PROMIS	-Fisher Exact Test - Wilcoxen Rank Sum Test - Tukey - Kramer P Value Correction	A nonopioid pain regimen provided equivalent pain control, equivalent adverse reaction profile, and equivalent patient satisfaction when compared with a standard opioid management	Level II	Strengths: Strong statistical analysis Limitations: excluding substance abuse

			the previous year, and use of opioids within 3 months prior to surgery						
Keeper Article 5									
Nguyen et al., (2016) Year Preoperative Reduction of Opioid Use Before Total Joint Arthroplasty County-NR Funding-NR	To identify if preop opioid weaning affected surgical outcomes	Retrospective Cohort Study	N=123 - Matched 1:1:1 based on age, sex, BMI, Diagnosis, at same institution over same period of time	IV1 = Weaned down preop opioids IV2 = Did not wean down IV3= Did not take preop opioids DV1= LOS DV2= Postop pain	- WOMAC Pain Scale - SF12v2 Pt Survey	-T Test -1-Way Repeated Measures Analysis of Variance	Opioid users who successfully weaned had greater improvements in outcomes than patients who did not wean	Level III	Strengths: Large sample size, opioid use vs weaned & opioid use vs naïve Limitations: Year Published, Specific to hip & knee arthroplasty
Keeper Article 6									
Ahiskalioglu et al., (2017) Effects of single-dose preemptive intravenous ibuprofen on postoperative opioid	To assess preop IV ibuprofen on postop opioid consumption	- Double Blinded - Randomized Control Trial	N=60 Inclusion: Between 18-65 y.o., scheduled for laprascopic cholecystectomy Exclusion: ASA 3 and up,	IV1 = Preop Ibuprofen DV1= Postop Pain DV2= Postop Opioid Consumption	-VAS Pain Score	- Kolmogorov–Smirnov - Histogram tests -Chi Square Test - Student T Test	Lower VAS scores thru 24 hours in control group. Less postop opioid consumption	Level II	Strengths Results at 30min up to 24 hours. Limitations: small sample size, excluding

consumption and acute pain after laparoscopic cholecystectomy County-NR Funding-NR			ibuprofen allergy, hepatic or renal failure, hx of long-term NSAID and opioid use, hx of GI bleeding, PUD, IBS, DM or other neuropathic diseases, weight less than 40 kg, and patients incapable of using a PCA device Attrition: excluded 5 d/t reverting sx to open						opioid use
Keeper Article 7									
Vincent et al., (2022) Prospective Randomized Study Examining Preoperative	To assess if preop opioid counseling will decrease postop	Randomized Control Trial	N=188 ➡ 131 Attrition: 32 decided not to participate, 25 lost during study.	IV1=Preop Counseling DV1=Postop Opioid consumption DV2=Opioid stop date	-VAS Pain Score	-Chi Squared Test -Student T Test	Counseling group pts took 11.8 pills vs uncounseled pts took	Level II	Strengths: Adequate sample size Limitations: Exclud

Opioid Counseling on Postoperative Opioid Consumption After Upper Extremity Surgery County-NR Funding-NR	opioid consumption		Inclusion: between 18-89 y.o., English speaking, undergoing outpt upper extremity sx. Exclusion: Sx with only local anesthetic, preoperative opioid use, and inpt sx.				17.4 pills. Counseled pts stopped opioid intake 2 days earlier than uncounseled group.		es preoperative opioid use.
Keeper Article 8									
Hutton et al., (2017) Regional Anaesthesia and Outcomes County-NR Funding - NR	To discuss uses of RA to decrease postop opioid consumption	Systemic Review	19 articles referenced	IV1= Regional Anesthesia DV1= Postop Opioid Consumption DV2=PONV DV3= LOS DV4=Cost	-NR	-NR	RA decreases Postop opioid consumption, PONV, LOS, & Cost	Level I	Strengths: supports many of the outcomes Limitations: Does not specify Opioid Use Disorder. Does not give statistical details

									related to articles referenced.
Keeper Article 9									
Harrison et al., (2019) Perioperative Considerations for the Patient with Opioid Use Disorder on Buprenorphine, Methadone, or Naltrexone Maintenance Therapy County-NR Funding-NR	To discuss different periop therapies for pts with OUD	Systemic Review	-88 Articles referenced	IV1= RA IV2=Ketamine IV3=NSAIDS IV4=Acetaminophen IV5=Dexmethasone IV6=lidocaine IIV7=magnesiu IV8=gabapentinoids IV9=dexmedetomidine DV1=opioid use DV2=postoperative pain.	-NR	-NR	All IVs decrease the DVs in OUD.	Level I	Strengths: Discusses acetaminophen, ketamine, steroids use Limitations: Does not expound upon statistical data in reference articles.

pt=patient, NR= Not Reported, IV= Independent Variable, DV= Dependent Variable, OUD= Opioid Use Disorder, r/t= related to, Sx=surgery, VAS=Visual Analog Scale, CI= Confidence Interval, PROMIS=Patient Reported Outcomes Measurement Information System, PONV=PostOp Nausea & Vomitting

Note. Source: © 2012, Adapted with permission from Evidence-based practice in nursing and healthcare. (p. 520), by Melnyk, Bernadette Mazurek, and Ellen Fineout-Overholt. Lippincott Williams & Wilkins, 2011

Appendix C

Reference for Anesthesia: Opioid Tolerant Patients Guidelines

OUD- Opioid Use Disorder

- Patients actively taking prescription OR nonprescription opioids with a built tolerance.
- Patients with OUD may require higher than normal doses of opioids to maintain analgesia.
- Do not withhold opioids as this can trigger withdraw and hyperalgesia.

For Patients ACTIVELY MISUSING Opioids:

- (Multimodal Techniques) Consider adding:
    - PO lyrica: 150mg preoperatively once prior to surgery
    - IV ketamine: 25-50mg once intraoperatively (blocks NMDA pathway)
    - IV magnesium: 2G of Mg added to IVF intraoperatively (facilitates muscle relaxation)
    - IV ibuprofen: 400mg in 100mL NS x1 intraoperatively (enhances pain control; no evidence of increased bleeding)
    - IV acetaminophen: 1G intraoperatively (blocks prostaglandin synthesis)
    - IV dexamethasone: intermediate dose (0.2mg/kg) x1 intraoperatively
        - Caution with DM
    - Regional: consider blocking the site, up to 24 hours postop, if necessary
    - Follow up with pain management specialist

For Patients on OUD TREATMENT Medications:

- **Methadone**
    - Mu receptor agonist with some NMDA receptor antagonism
    - Continue home dose of methadone DOS and throughout perioperative period
    - If cannot take PO, halve dose and give in divided doses IV Q6-8 hours
    - If not taken for more than 5 days, consult primary methadone provider
    - Confirm patient's dose with prescribing treatment program

    - Upregulation of receptors in OUD patient, additional opioids will likely be required for pain management perioperatively

- Buprenorphine
    - Mu receptor partial agonist- does not induce respiratory suppression
    - Makes postoperative pain management difficult
    - More potent opioids such as sufentanyl may be necessary
    - Use alternative pain control therapies (see above)
    - Consider stopping 2-5 days prior to surgery, or at least DOS.
    - If stopped, patient will need a follow up appointment ASAP.
- Naltrexone
    - Opioid receptor antagonist, blocks effects of opioids
    - Postoperative pain management more complex with highly variable reactions to additional opioids
    - Discontinue two days prior to the surgery
    - More diligent monitoring due to variable response to additional doses of opioids

For Patients in OUD REMISSION

- STRONGLY consider regional/neuraxial anesthesia
- Attempt opioid free anesthesia using multimodal techniques (see above)
- Use lowest dose possible for short periods
- Discuss relapse prevention and strategies to manage anxiety
- Assess need for follow up with pain specialist