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Development and Implementation of an Enhanced Recovery After Surgery Screening Tool for Orthopedic Patients

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Executive Summary

Introduction of the Problem

Enhanced Recovery After Surgery (ERAS) protocols are being implemented in operating room settings in an attempt by anesthesia providers to improve patient satisfaction, decrease hospital length of stay, and lessen opioid administration to patients in the perioperative setting. Enhanced Recovery After Surgery protocols were created in response to the ongoing national opioid crisis in attempts to decrease patient exposure to opioids, thereby lessening associated side effects and risk of addiction. Although the implementation of these protocols is becoming commonplace for abdominal and gastrointestinal operations, many facilities are not utilizing them for other surgical specialties such as orthopedics. However, with over 850,000 hip and knee replacements occurring annually in the United States, the need for non-opioid analgesic options is a great one.

A 460-bed hospital in Missouri identified the need for the creation and implementation of an ERAS protocol for elective orthopedic patients, and a screening tool to identify which patients can safely receive each component of the protocol. Utilizing the literature to find relative and absolute contraindications to each ERAS intervention and creating a tool to assess which patients are eligible for each intervention quickly t for each intervention will assist the hospital with safely providing each patient with only the ERAS components appropriate for them.

Literature Review

In an attempt to identify the most common, evidence-based components of ERAS protocols, a literature review was completed. The results showed that Acetaminophen, Gabapentin, Celebrex, and regional anesthetic administration are the most common ERAS components utilized to diminish perioperative pain through the blocking of multiple pain receptors, resulting in a reduced need for opioid administration.

Acetaminophen is the most commonly administered non-opioid analgesic in the perioperative setting and is thought to produce analgesia through inhibition of prostaglandins and cyclooxygenase (COX) synthesis. It is available for administration either orally or intravenously and decreases side effects associated with opioids such as nausea and respiratory depression (Oseka and Pecka, 2018). Acetaminophen should not be administered to patients who have cirrhosis, liver disease, elevated liver enzymes, or those who have undergone a liver transplant (Smyth, 2016). Celebrex is a COX-2 inhibitor that has few systemic side effects compared to traditional COX inhibitors and has been shown to reduce intraoperative blood loss during orthopedic procedures. The addition of Celebrex to ERAS protocols has been associated with the highest postoperative levels of analgesia and decreased opioid consumption for hip and knee arthroplasty patients (Memtsoudis et al., 2018). Patients with a history of peptic ulcer disease, severe cardiovascular disease, or patients who are currently anticoagulated should use caution when taking Celebrex (Babul, Sloan, & Lipman, 2006). Gabapentin is an anticonvulsant that decreases pain through the inhibition of excitatory neurotransmitters. It has also been shown to decrease opioid administration, postoperative nausea and vomiting, and pruritis, but can cause dizziness in elderly patients so they may require a decreased dose (Yao, Shen, & Zhong, 2015).

The implementation of regional anesthesia in elective orthopedic procedures can significantly decrease opioid administration, postoperative pain levels, and hospital length of

stay for patients, all of which increase patient satisfaction (Kumar et al., 2017). Utilizing ultrasound techniques, regional and neuraxial anesthetic techniques can be very safe and straightforward to perform. The use of regional anesthesia can decrease the risk of malignant hyperthermia through the avoidance of general anesthesia, allergic reactions associated with muscle relaxants, and the reduction of Postoperative Cognitive Dysfunction in elderly patients (Le-Wendling et al., 2012). Not all patients are candidates for regional anesthesia, including those with coagulopathy, burns, or infections at the insertion site, or those patients who refuse, but patients that do receive regional anesthesia receive fewer opioids in the perioperative setting (Nicholson et al., 2018).

The use of multi-modal anesthetic techniques has changed the way that anesthesia providers approach perioperative analgesia. Since the deadly side effects and highly addictive nature of opioids have become known, their exclusive use has fallen out of favor with providers, with the approach of treating multiple pain receptors through multi-modal analgesic medications increasing in popularity (Schwenk & Mariano, 2018). Memtsoudis et al. (2018) note the correlation between the number of non-opioid analgesic modalities applied to each patient inversely correlates with both perioperative patient comorbidities and opioid prescription rates. Evidence such as this, and the negligible list of side effects associated with preoperative Celebrex, Acetaminophen, and Gabapentin administration and regional anesthetic techniques suggests that their combined use is safe and should be implemented to all eligible patients in an attempt to decrease perioperative opioid consumption and related side effects.

Project Methods

The goal of this project was to research and design an assessment tool to assist Same Day Surgery staff with identifying which ERAS interventions are appropriate for each patient. If

appropriately utilized, the use of this tool would decrease perioperative opioid administration to patients undergoing elective orthopedic procedures, minimize the occurrence of opioid-related side effects, and increase patient satisfaction with their perioperative experiences. An education session initiated the implementation of this project for staff in regards to the ERAS screening tool, the advantages, mechanism of action of all components, and the contraindications of each multi-modal analgesic intervention included.

Quality Improvement Project approval was granted for this project on May 1, 2019, through Southern Illinois University Edwardsville since it does not constitute human subjects research. Similarly, since no patient data was collected during this project, neither IRB request nor approval was necessary from the Missouri hospital where the project was being implemented.

Evaluation

On June 3, 2019, an educational ERAS PowerPoint was presented to Same Day Surgical staff, and staff knowledge was evaluated utilizing a five-question post-test. The screening tool was also introduced to the staff at that time, followed by a three-question survey. All three project components were anonymously collected and analyzed one month later. The total collected data contained four post-tests, 27 completed screening tools, and three post-implementation surveys. The collected data was used to evaluate the effectiveness of the education and the screening tool.

Of the four completed post-tests, three of the participants scored 100%, with one participant scoring an 80% having answered four of five True or False questions correctly. These results demonstrate that 75% of participants understand the orthopedic ERAS protocol

components and appropriate patient selection. The question that was missed had to do with the maximum daily dose of Acetaminophen, implying that further education on Acetaminophen may be needed.

Of the collected screening tools (n = 27), only 29.6% (8/27) of patients received all four interventions. The fact that less than one-third of orthopedic patients received all four available interventions indicates that there exists a need for the tool to assess which patients are eligible for each intervention and ensure appropriate medication administration. An assessment tool for individualization of preemptive medications will prevent patients from receiving medications or interventions which could compromise their postoperative recovery. The assessment tool is a concise reference for ERAS information and is located in one central location to promote ease of use.

The three collected surveys evaluated the screening tool's ease of use, the effectiveness of pain control with the ERAS protocol, and opioid use in the perioperative setting, and the results were reasonably diverse. Of the collected surveys, 66% (2/3) stated that the screening tool was easy to use and understand. However, only 33% (1/3) of participants thought that the orthopedic ERAS protocol delivered adequate pain control to patients. However, 50% (1/2, as one participant did not answer question 3) saw decreased opioid consumption in the perioperative setting, which is the primary goal of the ERAS protocol.

Limitations of this project include the limited sample size, lack of employee participation, and a short study timeframe. With sample sizes of only four, 27, and three, the results do not convey an adequate representation of the population and could produce inaccurate results. Low employee participation can also produce skewed results by reducing the validity and increasing the margin of error in the study. Lastly, the four weeks allotted for data collection may not have

been long enough to produce an adequate sample size. Had the period of the study been longer, any variable decrease in operations (surgeon sick or on vacation) that may have occurred could have been accounted for, and a larger sample could have been collected? The continuation of this project would produce larger sample sizes, further evaluation of opioid administration, and postoperative pain scores. A future student could assess the continued use of the assessment tool, along with patient and staff satisfaction with the tool.

Impact on Practice

Due to the small sample sizes, along with limited data collection and varied responses on the surveys collected by participants, there is little evidence showing whether the screening tool was a helpful tool for staff members. Low levels of staff buy-in and participation, as well as a perceived decrease in individualized care are barriers associated with small scale evidence-based projects such as this (Goldman & Shih, 2011). However, with varying levels of patient eligibility for each component of the ERAS protocol, utilizing a screening tool to ensure that a patient is receiving the appropriate interventions is an added safety measure. The tool has the potential to reduce medication errors or prevent the administration of interventions that could compromise a patient during the perioperative period. When utilized for every patient, this screening tool could improve patient safety and decrease medication errors. The tool provides Same Day Surgery staff with a streamlined preoperative checklist which could decrease perioperative opioid administration. Checklists such as this are one more safeguard used decrease human error (Koetser et al., 2013), which is likely to increase patient satisfaction, and both of those objectives would have a positive impact on practice.

Conclusions

Although participation was not as high as anticipated and staff reviews were mixed, this screening tool can assist with the safe administration of ERAS components to elective orthopedic patients. Through the administration of safe multi-modal analgesic adjuncts for each patient, opioid administration can be significantly decreased, lessening the risk of opioid addiction and associated side effects. If the duration of data collection for this project could be increased, the long-term effects of this ERAS protocol and the correlating rates of opioid administration and prescriptions after elective orthopedic surgeries could be monitored.

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