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Opioid Free Anesthesia

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Opioid Free Anesthesia Executive Summary

Introduction

Patients undergoing surgery are often given opioids intraoperatively. Administration of opioids is associated with untoward side effects that include nausea, respiratory depression, constipation, ileus, hyperalgesia, prolonged length of stay, and the potential for dependence (Garimella & Cellini, 2013). Emerging research on the topic of opioid-free anesthesia (OFA) is available; however, before this quality improvement (QI) project, no OFA guideline was approved for use within the target anesthesia group. This QI project aimed to advance anesthesia providers' understanding of OFA by creating an OFA guideline and educating providers on its use. Expected outcomes of this project included the creation of an OFA guideline, educational resources, increased provider understanding of OFA, and increased provider comfort with providing OFA to patients.

Literature Review

The literature review contained 20 articles that helped identify OFA's history, adjuncts used in OFA, benefits related to OFA, and OFA guidelines.

History and Adjuncts. The practice of delivering general anesthesia has changed over the years. Before the 1960s, high doses of thiopental sodium and volatile anesthetics were used to achieve immobility, amnesia, and hypnosis during surgery (Thota et al., 2019). In more recent years, the term "balanced anesthesia" has gained popularity. Lundy introduced this term in 1926. However, Lundy did not include opioids in his idea of balanced anesthesia. It was not until 1989 when Kehlet revolutionized the concept of balanced anesthesia and included opioids and non-opioids in addition to anesthetics to achieve balanced anesthesia (Thota et al., 2019). In 2012, Mulier proposed OFA for obese patients, and since then, several other studies have been

performed to assess different adjuncts that should be used when conducting OFA (Thota et al., 2019). When OFA was introduced in 2012, combinations of dexmedetomidine, ketamine, and lidocaine were used intraoperatively to achieve general anesthesia for surgery without opioids (Thota et al., 2019). Results of opioid-sparing adjunct studies indicate that intravenous medications like dexmedetomidine, ketamine, magnesium, lidocaine, and dexamethasone reduce opioid requirements by about 20-50% (Thota et al., 2019; Siu & Moon, 2020).

Benefits. The literature review found emerging research indicating several benefits of OFA, including reduction in postoperative pain, reduction in postoperative nausea and vomiting (PONV), reduction in postoperative shivering, and improved oxygen saturation levels (Mulier et al., 2018). In terms of postoperative pain reduction, results show statistically significant reductions in pain scores at all measured intervals from zero hours postoperative to 24 hours postoperative (Farran et al., 2020; Mulier et al., 2018). Farran et al. (2020) found that 68% of patients receiving opioid anesthesia (OA) required postoperative opioids, whereas only 20% of patients receiving OFA required postoperative opioids ($p = 0.001$). Mulier et al. (2018) found that the amount of postoperative morphine needed was significantly reduced for patients receiving OFA when compared to patients receiving OA ($p = 0.004$).

Postoperative nausea occurs in approximately 30% of all patients after surgery and as high as 80% in high-risk groups (Stallings-Welden et al., 2018). A consistent finding in OFA literature is a reduction in PONV. Mulier et al. (2018) found a statistically significant decrease in PONV when looking at patients receiving OFA compared to OA ($p = <0.001$). Elsaye et al. (2019) also found a statistically significant reduction in postoperative nausea and postoperative vomiting ($p = <0.001$ and $p = 0.006$, respectively). Additionally, significant reductions in shivering were found by Mulier et al. (2018) and Elsaye et al. (2019) with p-values of 0.013 and

0.009, respectively. Furthermore, Mulier et al. (2018) found that only 9.5% of patients receiving OFA had a SpO2 level lower than 94% in PACU, but 100% of patients having received opioids intraoperatively had an SpO2 level lower than 94% ($p = 0.002$).

OFA Guidelines. Though the literature review aimed to determine best practices in OFA and which adjunct medication regimen leads to the best outcomes, that level of research does not yet exist. At this time, each study shows either a reduction in postoperative pain or no difference in postoperative pain when opioids are not used intraoperatively. Therefore, this evidence suggests that opioids are not essential in all general anesthetics. However, there are no studies that compare all the adjuncts and types of OFA to determine which guidelines should be used when implementing OFA. Further research is indicated to determine the best practice when it comes to OFA.

Project Methods

The purpose of this QI project was to introduce an OFA guideline into the target anesthesia group and educate providers on its use. After conducting a thorough literature review, the author of this QI project created the OFA guideline that promotes the use of preoperative adjunct medications and an intraoperative OFA infusion. It is important to note that the literature review concluded that no superior guideline for the implementation of OFA exists. Therefore, this guideline was created based on adjunct medications found in the literature, and an emphasis was placed on speed and ease-of-use for providers. Thus, the guideline utilized allows for mixing all adjunct agents into one syringe so that providers can run one infusion during their anesthetic, rather than multiple infusions.

This QI project's primary goal was to increase anesthesia provider knowledge and comfort with administering OFA to patients. A learning session was created in order to educate

providers and achieve the aforementioned goal. The Adult Learning Theory was used to identify methods of selecting providers to attend the learning session. The project's target anesthesia group included Certified Registered Nurse Anesthetists (CRNAs) and Physician Anesthesiologists employed by a sizable private anesthesia group in Denver, CO. Employees were sent a survey to gauge their interest in participating in a learning session for OFA. CRNAs and anesthesiologists, who responded and expressed interest in learning about OFA, were invited to a learning session and to participate in a pre-test and post-test. In total, 17 anesthesia providers participated. Exempt Internal Review Board (IRB) approval was obtained through Southern Illinois University. The anesthesia group did not require additional IRB approval for this QI project.

Evaluation

In order to evaluate the QI project, the author created a 10-question question survey. The survey was created to evaluate the learning objectives identified in the methodology. Participants completed the survey prior to the learning session and again following the learning session. Data collection occurred and was evaluated. The overall average of correct answers on the pre-test was 29%, and the overall average of correct answers on the post-test was 96%. The pre-learning session and post-learning session knowledge scores were further calculated, and the assumption of normality was met for each distribution of scores. The results of the repeated-measures *t*-test showed that there was a statistically significant increase in knowledge scores across time from pre-intervention ($M = 28.8$, $SD = 25.6$) to post-intervention ($M = 96.5$, $SD = 4.9$), $t(16) = -11.44$, $p < 0.001$. Given the statistical significance in the results, it can be concluded that a learning session is a successful way to improve anesthesia provider knowledge and comfort with OFA.

There are two limitations evident in these results. 1) The pre-test and post-test were the same. Having the same pre-test and post-test enabled statistical analysis to check for improved knowledge scores. However, it may have also impacted providers' post-test scores by having seen the questions before the learning session and encouraging providers to pay closer attention to certain areas of the learning session. 2) The sample size was small. For the potential future implementation of this QI project, a larger sample size could add more power to the results. However, it is important to note that even with a small sample size, normality was met and confirmed with skewness and kurtosis, as aforementioned.

Impact on Practice

By increasing anesthesia providers' knowledge and comfort with OFA administration, there is the potential to decrease the untoward side effects associated with opioid administration. With the implementation of this QI project, anesthesia providers now have an option to provide general anesthesia without opioids to patients. As discussed in the literature review, OFA is associated with several benefits for patients, such as a reduction in postoperative pain, reduced postoperative nausea and vomiting, reduction in postoperative shivering, and improved oxygen saturation levels (Mulier et al., 2018). This QI project has successfully educated anesthesia providers to afford these benefits to their patients undergoing general anesthesia.

Features to aid in the sustainability of this project have been considered and are twofold. First, the project is based on newly emerging research and has identified an area for further study. The guideline should continue to be updated as more research is conducted. Additionally, a future project to evaluate the effectiveness of the OFA guideline is recommended. Second, the reason for the creation of a handout, in addition to a guideline, is to summarize OFA education onto a document that will be posted on the anesthesia electronic medical record system. Every

provider in the anesthesia group will have electronic access to the handout and the guideline at all times.

Conclusions

Given the statistical significance in the results, it can be concluded that an education session is a successful way to improve anesthesia provider knowledge and comfort with OFA. Additionally, as discussed in the methodology, the author hopes that, given the education session and handouts, OFA will be used and evaluated within the author's anesthesia group. At the current time, anesthesia providers in the target anesthesia group have recently begun using the OFA guideline, and feedback has been positive.

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