



Short Communication

Evaluating the Impact of Opioid-free Anesthesia Protocol on Provider Utilization: A Pilot Study at 2 Southeastern US Hospitals

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Abstract

Objective: Perioperative opioid medications are implicated as contributors to the opioid crisis and associated with significant negative side effects that complicate recovery, leading to increased hospitalization and healthcare costs. Implementation of opioid-free anesthesia (OFA) hospital protocols may be an effective strategy to familiarize healthcare providers with non-opioid strategies for treating perioperative pain.

Methods: An exploratory, descriptive pilot study was conducted at 2 Southeastern US Hospitals with a preexisting OFA policy. An electronic survey was developed and distributed to the anesthesia departments with an OFA protocol for bariatric surgical procedures. The responses ($n=14$) were analyzed, and the qualitative data thematically categorized.

Results: Two major and one minor theme emerged. Theme 1: utilizing an OFA protocol led to increased familiarity and a desire to utilize OFA in other surgical populations. Theme 2: implementation of regional anesthesia into a multimodal OFA plan improves pain management and perioperative team support. Minor Theme: opioid sparing may be preferable to OFA techniques among a minority of anesthesia providers.

Conclusion: OFA protocol promoted familiarity and favorable attitude towards OFA techniques. Participants reported an increased willingness to utilize OFA beyond protocol requirements. Therefore, hospital protocol may be a useful tool to drive evidence-based anesthesia and pain management practice change.

Keywords: opioid-free anesthesia, anesthesia protocol, multimodal analgesia, opioid alternatives, opioid crisis

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1 INTRODUCTION

Opioid medications have been a mainstay of pain management for centuries and continue to be routinely utilized by anesthesia providers during the perioperative period^[1,2]. Despite effective analgesic properties, opioids are not without risks. Opioid-related adverse drug events (ORADEs) are significant and can complicate patient recovery and well-being. These negative effects encompass postoperative respiratory compromise, ileus, constipation, nausea / vomiting, urinary retention, oliguria, rash/itching, dizziness, falls, altered mental status, and delirium^[3]. Detailed by Shafi et al.^[4], ORADEs are implicated in increased inpatient mortality, 30 days readmission, length of stay (LOS), and cost of hospitalization. These adverse events can be further exacerbated in opioid vulnerable patient populations with comorbidities, such as obesity, obstructive sleep apnea, and advanced age^[5,6]. An estimated 42% of patients have one or more comorbidities which complicates the widespread use of opioids in the perioperative period^[7]. The perioperative period presents complex challenges for pain management requiring solutions.

Medical overuse of opioids is a significant contributor to the opioid crisis in the United States (US). Opioids kill an estimated 90 people per day and cost society approximately 80 billion dollars (or about \$250 per person in the US) annually^[8]. According to Brummett et al., around six percent of opioid-naive surgical patients developed persistent opioid use, defined by filling an opioid prescription between 90 and 180 days after surgery^[9]. Further, patients with new-onset persistent opioid use disorder had increased healthcare utilization and costs in the year after surgery^[10]. An overall reduction in the medical use of opioids has been identified as a central strategy to combat the opioid crisis. For that reason, understanding anesthesia providers' attitudes toward non-opioid pain management and alternative anesthesia techniques is vital^[8].

Despite the growing literature on the negative effects of opioids and the utility of non-opioid pain management techniques, it takes an average of 17 years for research evidence to reach clinical practice^[11]. Hospital protocol, utilizing current evidence-based guidelines and research, maybe a useful tool in driving evidence-based change in anesthesia practice. A literature search was performed in the PubMed, Scopus, and CINAHL databases yielding no relevant studies evaluating the impact of opioid-free anesthesia (OFA) protocol on anesthesia providers' practice preferences. The literature examines barriers to implementation of OFA technique^[12,13], however, the effect of the implementation of an OFA protocol on

anesthesia providers' practice has not been evaluated and/or established.

With the negative implications of opioids and the heavy societal costs of the opioid crisis, the utility of multimodal analgesia is an increasingly explored topic in healthcare. Anesthesia techniques eliminating the use of opioids during the perioperative period, known as OFA, have the potential to manage pain effectively without opioid-associated adverse events and complications. Theoretically, adoption of OFA practices could reduce the contribution of anesthesia practice to the opioid crisis. Over the past five years, there has been a surge in OFA studies published annually^[14]. There is growing evidence towards the utility of OFA to reduce opioid-related adverse events and opioid consumption while still providing adequate pain control^[15,16]. Soffin et al.'s research concluded that the perioperative period is often an initial source of opioid exposure in patients with opioid use disorder. Therefore, anesthesia providers have a unique position to manage pain effectively while also pursuing alternatives to limit or eliminate opioid use^[8].

2 MATERIALS AND METHODS

This exploratory, descriptive pilot study evaluated how the implementation of an OFA protocol may influence anesthesia providers' attitudes and familiarity with OFA techniques and their willingness to utilize OFA outside of protocol requirements. The aims of the project were threefold: (1) summarize the existing literature on healthcare professional attitudes and OFA protocols, (2) educate and guide anesthesia providers as they learn OFA techniques and transition to practicing OFA, and (3) promote further investigation into OFA. To accomplish the project aims, an IRB Quality Improvement (QI) / Program Evaluation Self-Certification Tool sponsored by the Institutional Review Board was performed and determined to be quality improvement and is therefore not subject to IRB review or approval. An online survey questionnaire was developed and distributed to a convenience sample of anesthesia departments at two Southeastern hospitals with a bariatric surgery program that utilized an established OFA protocol. The respondents were Certified Registered Nurse Anesthetists (CRNAs) who worked in a team-based environment and performed regional anesthesia regularly. Project leaders formulated the survey, a questionnaire was built utilizing the Research Electronic Data Capture (REDCap) service, and an expert panel of 3 CRNA providers/educators evaluated the tool to improve the reliability and validity. The panel has over 50 years of anesthesia experience including research, writing and publication, and subspecialty training in advanced pain management. The panel included the President and founder

Table 1. Survey Questions

Survey Questions
What is your age? Under 30, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65+
What is your gender? Male, Female, prefer not to answer
How long have you been a CRNA?
Which of the following best describes your employment status at your current facility? Full time, Part time, or PRN/Per Diem
1. Prior to working at my current facility, I had experience with practicing opioid-free anesthesia (OFA). Yes No
2. If No: 1a. Since working at my current, I feel confident performing opioid-free anesthesia.
3. If yes 1b. Prior to working at my current facility, I felt confident performing opioid-free anesthesia techniques.
4. 4-point Likert Questions: Using the options Strongly Agree, Agree, Disagree, or Strongly Disagree please indicate your experience with the following questions.
5. Since working at my current facility and performing opioid-free techniques as indicated by the opioid-free anesthesia bariatric surgery protocol, I have begun to increasingly utilize opioid-free techniques in other cases.
6. The opioid-free anesthesia (OFA) bariatric surgery has increased my desire to try OFA techniques on other cases not required by facility protocol.
7. The opioid-free anesthesia bariatric surgery produces a satisfactory intraoperative anesthetic response for my patients.
8. Opioid-free anesthesia does not provide adequate post-operative analgesia when arriving in the Post Anesthesia Care Unit (PACU).
9. The surgeons seem pleased with the anesthetic response of bariatric surgery patients to opioid-free anesthesia.
10. I have the support of my surgical team, including the Surgeon, to try opioid-free anesthesia techniques with other surgeries where opioid-free anesthesia is not required.
11. I find opioid-inclusive anesthesia to be more superior and consistent than opioid-free anesthesia.
12. I have pharmaceutical medications easily available in the Operating Room to sufficiently provide opioid-free anesthesia.
13. I only perform opioid-free anesthesia when it is required by hospital protocol.
14. There is limited research to show that opioid-free anesthesia is safe and effective.
Qualitative Questions
1. Briefly describe your view of opioid-free anesthesia (OFA) prior to working at your current facility, has your opinion regarding OFA changed?
2. How has the bariatric surgery opioid-free anesthesia protocol impacted your view of opioid-free anesthesia?

Table 2. Summary of Study Participants Characteristics

Participants Characteristics	n (%)
Gender	
Male	4 (28.6%)
Female	10 (71.4%)
Age in Years	
30-34	1 (7.1%)
35-39	3 (21.4%)
40-44	4 (28.6%)
45-49	2 (14.3%)
Anesthesia Experience in Years	
<1	0
2-5	3 (21.1%)
6-10	5 (35.7%)
11-20	4 (26.6%)
21-30	0
≥31	2 (14.3%)

of the Society for Opioid Free Anesthesia. Project directors distributed the REDCap electronic survey via email to anesthesia departments at two Southeastern US hospital facilities. The survey was voluntary and anonymous. A reminder email was sent three weeks after the initial survey to bolster the response rate. The responses were collected, analyzed in REDCaps, and qualitative data was thematically categorized.

There are several limitations to the paper. The small sample size and limited geographical area makes it difficult

to generalize results to a wider audience. Additionally, a convenience sample may not be indicative of the larger anesthesia population. Moreover, self-reported data may lead to a response bias. The study does not address long term adoption of OFA techniques.

3 RESULTS

The survey was emailed to 28 CRNAs at two facilities; investigators received 14 completed survey responses ($n=14$) yielding a 50% response rate. The survey is presented in Table 1 and the study demographics are presented in Table 2. Most respondents had 6-10 years (35.7%) of anesthesia experience as a CRNA. Furthermore, 21.4% stated no previous experience practicing opioid-free prior to working at the facility surveyed with an established OFA protocol.

All respondents ($n=14$) participated in Likert-style qualitative questions presented in Table 3. Greater than 70% of respondents, (14.3% strongly agree and 57.1% agree) state that since implementing opioid-free techniques as per the bariatric surgery protocol, they had begun to increasingly utilize opioid-free techniques in other surgical cases outside of the protocol requirements. All participants (50% strongly agree and 50% agree) believe that the bariatric surgery OFA protocol produces satisfactory results regarding patient pain management. Additionally, 13 of 14 participants (93%) stated that the Opioid-free anesthesia provides adequate post-operative analgesia when arriving in the PACU.

The CRNAs report that the surgeons are pleased with the

Table 3. Likert-question Survey Responses

Survey Questions	Strongly Agree	Agree	Disagree	Strongly Disagree
Since working at my current facility and performing opioid-free techniques as indicated by the opioid-free anesthesia bariatric surgery protocol, I have begun to increasingly utilize opioid-free techniques in other cases.	2 (14.3%)	8 (57.1%)	3 (21.4%)	1 (7.1%)
The opioid-free anesthesia (OFA) bariatric surgery has increased my desire to try OFA techniques on other cases not required by facility protocol.	2 (14.3%)	8 (57.1%)	4 (28.6%)	0 (0.0%)
The opioid-free anesthesia bariatric surgery produces a satisfactory intraoperative anesthetic response for my patients.	7 (50.0%)	7 (50.0%)	0 (0.0%)	0 (0.0%)
Opioid-free anesthesia does not provide adequate post-operative analgesia when arriving in the PACU.	1 (7.1%)	0 (0.0%)	11 (78.6%)	2 (14.3%)
The surgeons seem generally pleased with the anesthetic response of bariatric surgery patients to opioid-free anesthesia.	9 (64.3%)	5 (35.7%)	0 (0.0%)	0 (0.0%)
I have the support of my surgical team, including the Surgeon, to try opioid-free anesthesia techniques with other surgeries where opioid-free anesthesia is not required.	3 (21.4%)	9 (64.3%)	2 (14.3%)	0 (0.0%)
I find that opioid-free anesthesia decreases complications in my patients.	2 (14.3%)	9 (64.3%)	3 (21.4%)	0 (0.0%)
I find opioid-inclusive anesthesia to be more superior and consistent than opioid-free anesthesia.	0 (0.0%)	3 (21.4%)	11 (78.6%)	0 (0.0%)
I have pharmaceutical medications easily available in the OR to sufficiently provide opioid-free anesthesia.	3 (21.4%)	6 (42.9%)	5 (35.7%)	0 (0.0%)
I only perform opioid-free anesthesia when it is required by hospital protocol.	0 (0.0%)	3 (21.4%)	9 (64.3%)	2 (14.3%)
There is limited research to show that opioid-free anesthesia is safe and effective.	0 (0.0%)	0 (0.0%)	13 (92.9%)	1 (7.1%)

OFA protocol and their patient outcomes (64.3% strongly agree and 35.7% agree). Moreover, most respondents (64.3% strongly agree and 35.7% agree) reported receiving support from the surgical team to try OFA techniques in surgical populations where it is not required by hospital protocol. Conversely, 35.7% of respondents identified limited access to pharmaceutical medications as a barrier to performing OFA at their facility. Overall, three participants (21.4%) disagreed that OFA does not decrease complications, that opioid-inclusive anesthesia is a superior technique, and OFA is only performed when required by hospital protocol.

3.1 Thematic Analysis

Two major themes and one minor theme emerged in the qualitative analysis (See Table 4). Theme 1: Utilizing an OFA protocol for bariatric surgery led to increased familiarity and a desire to utilize OFA in other surgical populations. OFA techniques were historically used in the bariatric population^[17]. An increased positivity towards OFA techniques emerged since CRNAs started working at a facility that implemented an OFA protocol for bariatric surgery patients. 21.4% of respondents stated that they did not have previous experience with practicing opioid-free anesthesia prior to working at the facility surveyed. One respondent noted, “I did not use OFA as much as I do now, and I see a huge difference in post-op recovery as do the PACU nurses.” Of that population, 66% stated that they

felt more comfortable performing OFA after working at a hospital with an OFA protocol. Additionally, 71.4% agreed that following the opioid-free anesthesia bariatric surgery protocol, CRNAs increased desire and utilization of opioid-free techniques in other surgical cases and populations not required by facility protocol. Participants indicated that the formal structure of a protocol aided in the development of a routine, and the ability to explore other types of OFA techniques. The data concludes that increased familiarity with practicing OFA techniques may increase providers’ confidence and desire to utilize OFA in other surgical cases and populations where it is not required by hospital protocol.

Theme 2: Implementation of regional anesthesia into a multimodal OFA plan improves pain management and perioperative team support.

The use of regional anesthesia and peripheral nerve blockade can enhance postoperative analgesia and improve patient satisfaction^[18]. Moreover, local anesthetics and regional anesthesia may prevent persistent postoperative pain^[19]. A common theme echoed by the survey participants was the effectiveness of regional anesthesia when combined with the OFA protocol. Specifically, adding the erector spinae block (ESP) for bariatric surgery increased the protocol’s perceived effectiveness. It was noted that patients had a decreased incidence of post-operative pain

Table 4 Themes and Illustrative Quotes from Qualitative Survey Questions

Major Themes	
Increased familiarity with OFA and has a positive anesthesia provider response	<p>"I now use the technique for many patients due to my increased familiarity. I often incorporate opioid-free/sparing techniques into most cases."</p> <p>"It was not new for me. It works well. Some patients still require opiates, but we are certainly giving less"</p> <p>"I did not use it before, but more likely to use it in other cases now"</p> <p>"It has helped me to build a routine and increase my ability to administer various recipes of OFA"</p> <p>"My opinion has slightly changed to lean towards more opioid-free techniques"</p> <p>"I did not use OFA as much as I do now, and I see a huge difference in post-op recovery as do the PACU nurses"</p> <p>"Yes... more comfortable using this technique"</p>
OFA application to other case types	<p>"I like it and have had great results in other areas"</p> <p>"I think OFA is very doable for other cases"</p> <p>"Used OFA in pediatric cases prior... I like it. "</p> <p>"OFA is effective as long as protocols are in place. This would help in the consistency of better outcomes."</p> <p>"My first time working with bariatric cases. Have done a lot of ERAS cases in the past. We have seen good outcomes with OFA case management"</p>
Implementation of regional blocks (ESP) into multimodal OFA plan	<p>"Once ESP blocks were added to the bariatric the patients did much better. I think to truly be opioid-free you needed to add some sort of regional anesthesia technique. Prior to the blocks ERAS was opioid-free for intraop period but the patients woke up in pain and a great many of them required some sort of pain medications/intervention in PACU."</p> <p>"ESP blocks changed so much for me to feel like I can do opioid-free anesthesia because the blocks work so well."</p> <p>"My opinion has not changed preferring opioid-sparing. But at St. Francis we give blocks to the bariatric patients which is significant when choosing to use OFA."</p>
Minority Theme	
Preference for opioid-sparing Vs opioid-free techniques	<p>"I believe in opioid-sparing anesthesia and certainly it is opposed to opioid-free. My opinion has not changed."</p> <p>"My opinion has not changed preferring opioid-sparing. But at St. Francis, we give blocks to the bariatric patients which is significant when choosing to use OFA."</p>

and less need for pain management rescue in the PACU with ESP block as a part of the bariatric OFA protocol. The implementation of an ESP block to the OFA protocol for bariatric surgery demonstrated the significant role of regional anesthesia in extending the benefits of OFA into the postoperative period. The use of regional anesthesia increased the anesthesia provider's confidence and satisfaction with OFA, as one respondent described, "ESP blocks changed so much for me to feel like I can do opioid-free anesthesia because the blocks work so well."

Minor Theme: Opioid sparing may be preferable to OFA techniques among a minority of anesthesia providers. 28.6% of respondents do not desire or utilize OFA techniques outside of the OFA protocol. There is an active movement to reduce opioid use in the perioperative period, but not completely exclude their use. Opioid-sparing techniques fulfill these requirements^[20,21]. However, most respondents (78.6%) believe opioid-inclusive anesthesia is not superior to OFA. Furthermore, OFA is a consistent anesthetic technique. Moreover, a participant who preferred opioid-sparing anesthesia versus OFA, had a favorable view of the role of regional anesthesia in the OFA bariatric surgery protocol.

4 DISCUSSION

The increasing application of OFA protocol at healthcare facilities, especially in specific surgical populations like bariatrics, presents an opportunity for anesthesia providers to gain greater exposure to OFA techniques. There is a

learning curve for OFA techniques, specifically medication regimen, timing, and indications^[13]. The increased adoption of OFA protocols has provided an opportunity to examine how OFA protocols influence anesthesia provider practice. Specifically in this study, the recent onboarding of a new anesthesia group at the facilities surveyed was beneficial in providing insight into how OFA protocols impacted anesthesia provider practices and perceptions of OFA with less or no exposure to OFA at previous healthcare facilities. The convenience of the electronic survey methodology allowed for a seamless distribution of the survey tool as well as a reminder to encourage participation achieving a 50% response rate. In a meta-analysis conducted by Wu et al, the average online survey response is 44.1% making our survey response above average^[22]. The response to the OFA project could be due to many factors including the topic of non-traditional anesthesia techniques, the increased academic engagement of advanced healthcare providers, and the 3-week reminder email to increase participant survey completion.

The analysis of the survey data provided useful insight into how protocol can shift provider practice preferences. The implementation of OFA protocol promoted the desire and willingness to utilize OFA techniques outside of protocol requirements. Overall, a majority of the CRNAs surveyed had a positive view of the effectiveness of OFA and reported that they felt more comfortable with OFA techniques. CRNAs also highlighted regional anesthesia as an important part of an OFA protocol. Interestingly, the OFA

protocol may have provided useful experience in utilizing OFA techniques, forcing providers out of their previous routines to gain additional tools for the management of perioperative pain. Once providers gain experience, they may feel more comfortable and confident making practice changes. If protocols are rooted in current evidence, they can provide the necessary push for positive changes in anesthesia practice.

However, the project's scope was limited by the sample size of fourteen anesthesia providers and generalizability at solely two healthcare facilities in the southeastern region of the United States. The small sample size is inherent to the proof-of-concept nature of this pilot study. The project survey serves as an initial exploration into the broader implications of OFA protocols' impact on provider's practice as well as a possible perioperative strategy to combat the opioid crisis. As a result, the survey tool was developed without precedent or previous literature to guide survey construction, but with input from an expert panel experienced CRNA providers, educators, and researchers. With survey methodology, the wording of the survey questions may be a source for response bias. Also, the length of the survey was limited to maintain convenience and encourage participation among busy anesthesia providers. The pilot was limited in scope to the general utilization of an OFA protocol for bariatric surgery. Furthermore, the study included CRNA respondents, not physician colleagues, which limits generalizability to all anesthesia providers. Moreover, attitudes towards opioids and OFA may vary regionally across the nation, depending on education, training, anesthesia staff availability, anesthesia care delivery models, and the severity of the opioid crisis in those areas.

This novel investigation is the first to examine the impact of OFA protocol on provider practice preferences. Future exploration should include a wide-ranging inquiry into OFA protocol on a national level with input from more anesthesia providers, both CRNAs and physicians. Investigations into the wider healthcare implications of facilities having OFA protocols compared to those that do not on LOS, ORADEs, respiratory complication, and opioid utilization versus facilities should be examined. Lastly, what is the impact of OFA in treatment bundles, ERAS protocols, and individual hospital OFA protocols on anesthesia provider preferences and benefits to specific surgical populations?

5 CONCLUSION

Addressing the opioid epidemic requires a patient-centered and multimodal approach to manage perioperative pain without the negative implications of opioids. With the emergence of opioid-alternative medications and anesthesia techniques, OFA provides an opportunity for a major shift in current anesthesia practice that may improve the quality of care and patient safety. Although the OFA

literature is rapidly progressing, adoption of OFA is yet to be realized on a large scale. Future studies should include a larger, randomized, more diverse sample to increase generalizability. Utilizing interviews or focus groups could provide more in-depth responses. Hospitals implementation of OFA protocols may serve as a useful tool to drive evidence-based practice change in anesthesia providers and help combat the opioid epidemic.

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Not applicable.

Conflicts of Interest

The authors declared no conflict of interest.

Ethical Statement

An IRB Quality Improvement / Program Evaluation Self-Certification Tool sponsored by the Medical University of South Carolina Institutional Review Board was performed for the pilot project and determined to be quality improvement. Therefore, the project was not subject to IRB review or approval per the institution's guidelines.

Author Contribution

Newton R and Leontyev R were the primary investigators for the doctoral project contributing to all aspects from planning to completion as well as manuscript preparation for submission. Gegel B was the doctoral advisor supervising the project, edited, and submitted the manuscript for publication. Baribeault T was a member of the doctoral project committee, the subject matter expert on OFA, and edited the manuscript for submission.

Abbreviation List

CRNA, Certified Registered Nurse Anesthetist
ESP, Erector spinae block
LOS, Length of stay
OFA, Opioid-free anesthesia
ORADEs, Opioid-related adverse drug events
PACU, Post Anesthesia Care Unit
REDCap, Research electronic data capture
US, United States

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