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A Best Practice Recommendation: Decreasing Perioperative Fentanyl Used Through the Utilization of Dexmedetomidine Prior to Surgical Incision

Shelby Harriel

Amy Houck

A BEST PRACTICE RECOMMENDATION: DECREASING PERIOPERATIVE FENTANYL USE THROUGH THE UTILIZATION OF DEXMEDETOMIDINE PRIOR TO SURGICAL INCISION

by

Shelby Harriel and Amy Houck

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Dr. Nina McLain, Committee Chair
Dr. Mary Jane Collins, Committee Member

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ABSTRACT

Upon anesthesia induction, patients often receive fentanyl, an opioid medication that is linked to addiction, dependence, morbidity, and mortality (Stanley, 2014). The goal of this practice recommendation was to propose an alternative way of managing pain and the increased sympathetic response in the perioperative setting, specifically during the induction phase, through evaluating published research. A possible substitute for fentanyl is a drug called dexmedetomidine (Precedex™). Through a comparison of pharmacology, indications, risks, and benefits, one can conclude that if Precedex™ is given prior to induction, in the place of large doses of fentanyl, it can potentially achieve a smoother intraoperative period through promoting decreased sympathetic stimulation and a maintained respiratory drive (Gaszynski et al., 2014). The goal was to provide a literature-based, relevant practice recommendation for anesthesia providers who are open to changing their daily practice. The hope was that the recommendation will serve as a clear reference regarding the risks and benefits of dexmedetomidine, as well as the benefits and potentially detrimental side effects of fentanyl in their practice.

The proposed practice recommendation was formulated into a three-page handout that detailed the highlights of our research regarding this topic. We presented this handout via email to all CRNAs at a central Mississippi hospital. This handout was read and evaluated by willing CRNAs who subsequently completed a survey consisting of closed-ended questions. These questions inquired about relevance, availability, and willingness to adopt the practice recommendation into clinical practice.

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DEDICATION

The completion of our doctoral project is dedicated to our families and loved ones who continually support and cheer us on. Without the encouragement you all provided during the last three years, we would not have been able to complete this journey with such great memories and experiences.

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LIST OF ABBREVIATIONS

CRNA	Certified Registered Nurse Anesthetist
DNP	Doctor of Nursing Practice
hr	Hour
IRB	Institutional Review Board
kg	Kilogram
mcg	Microgram
MD	Doctor of Medicine
mg	Milligram
min	Minute
OR	Operating Room
USM	The University of Southern Mississippi

CHAPTER I - INTRODUCTION

If a patient is receiving a general anesthetic, the period immediately prior to surgical incision is known as the induction period. During the induction period, patients receive intravenous drugs that aid in sedation, paralysis, amnesia, and attenuated pain responses. Fentanyl is an opioid medication that is commonly chosen to give during induction by anesthesia providers. Ideally, the drug will inflict sedation, hemodynamic stability, and diminished stress responses that occur when the body is stimulated with an endotracheal tube in the trachea or skin incision (Lee & Yeomans, 2014). However, current research provides concerning evidence regarding the side effects related to fentanyl. Fentanyl is linked to addiction, dependence, morbidity, and mortality. Armaghani et al. (2014) conducted a prospective cohort study that demonstrated that greater preoperative use of opioid medications predicted an increasing need for opioids during the recovery period. Armaghani et al.'s (2014) evidence predicts that the independent administration of preoperative fentanyl is merely serving as a short-term solution.

The goal of this doctoral project was to propose a superior way of achieving an adequate depth of anesthesia and reduced operative stress. The proposal included that multimodal drug therapy can diminish or abolish the necessity for opioid medications. Precedex™ is a non-opioid intravenous medication designed to achieve sedation and pain control in patients. If given prior to induction, in the place of large doses of fentanyl, Precedex™ can achieve patient comfort and safety, while also preventing the detrimental side effects of opioids.

Problem Description

Fentanyl was introduced in 1960, more than 50 years ago (Stanley, 2014), and is, therefore, a familiar drug to anesthesia providers. Fentanyl is potent, fast-acting, and inexpensive. Therefore, according to Stanley (2014), fentanyl is now the most frequently administered analgesic given in a surgical setting. Fentanyl is linked to many short-term and long-term adverse effects, including temporary implications, such as pruritus and respiratory depression, as well as life-altering effects, such as addiction.

Dexmedetomidine (Precedex™) is a newer medication that is rapidly acquiring popularity among anesthesia providers. Precedex™ has an advantage over fentanyl "for its sympatholytic, sedative, anesthetic sparing, and hemodynamic stabilizing properties without significant respiratory depression" (Keniya et al., 2011, p. 352). The hope was to suggest and educate anesthesia providers on alternative means of patient comfort and safety by preoperatively utilizing this comparably efficient drug. The formulation of this suggestion was done through a comparison of pharmacology, indications, risks, and benefits. Ideally, anesthesia providers acquired an improved understanding of the risks and benefits of dexmedetomidine, as well as the benefits and potentially detrimental side effects of fentanyl. Further, if the ideas that follow were applied to day-to-day anesthesia practice, patients ideally benefited from enhanced evidence-based care.

Clinical Question

A clinical question was developed to provide an encapsulated objective of the information provided in this doctoral project. This question provided the reader with the targeted population and proposed intervention. For patients undergoing general anesthesia, does the use of dexmedetomidine (Precedex™) before intubation and surgical

incision provide hemodynamic stability, patient comfort, and necessary level of anesthesia, comparable to that of fentanyl, and therefore a decreased or abolished necessity of fentanyl during the interoperative period?

Background and Significance

The opioid crisis in America is a topic that many Americans are becoming increasingly more aware of. This awareness can be attributed to the fact that the number of unintended deaths related to opioids actually exceeds the number of deaths related to motor vehicle accidents. The lesser-known truth is that many of the victim's first encounters with the medication are during the surgical period. The use of opioids in the medical community has risen over the last three decades and continues to do so (Stanley, 2014).

This crisis has paved a route to researching new methods of pain control for patients requiring surgical intervention. These methods are new and continuing to improve with trial and error. Techniques include enhanced recovery pathways, regional anesthesia, and multimodal analgesia. While research supports the use of these alternative pain control methods, these methods often require an increased hospital budget, specialized education for providers, and time constraints on perioperative periods (Velasco, 2019). The goal of this doctoral project was to educate providers and prove the benefits of Precedex™, an alternative preoperative medication. Evidence is provided below that Precedex™ can navigate the barriers of timely care and adverse effects.

Theoretical Framework

For this doctoral project, the Donabedian Quality of Care Framework was utilized. This framework assesses the quality of care through three categories: structure,

process, and outcomes (Ayanian & Markel, 2016). Utilizing the Donabedian framework, the practice guidelines include aspects that affect the context in which health care is given. For the doctoral project, a practice change presentation occurred at a Mississippi hospital among certified registered nurse anesthetists (CRNA) that were willing to entertain new and efficient preoperative care strategies. The process encompassed the actions taken. The change began with the introduction to the recommended use of Precedex™ for anesthesia providers. No patient-provider interaction was required for this doctoral project, but evidence-based practice guidelines were provided and available for consideration. The guidelines included clear and concise benefits of correctly administering the medication preoperatively. The outcome component stemmed from the assessment provided by anesthesia providers who received this information. The provided material and subsequent survey dictated whether this information would, or would not, impact the individual's practice, and positively affect patient surgical outcomes.

Doctor of Nursing Practice Essentials

The foundation for all doctoral projects is the eight Essentials of Doctor of Nursing Practice (DNP). These eight Essentials guided each aspect of this doctoral project. Specifically, every aspect of Essential three was met as it reflects the doctoral project's purpose of using the advanced research of scholarly, evidence-based articles and translates them into a best practice recommendation that has the potential to improve patient care outcomes. Discovery of new-age knowledge and practices related to the uses of Precedex™, along with minimizing the use of fentanyl, allows providers the expertise to integrate these practices into complex anesthetic situations. The best practice

recommendation also met the elements of Essential three by providing an avenue for DNP graduates to engage in the progression of advanced practice nursing and become leaders in evidence-based practices (Curley et al., 2016). One other Essential that the recommendation aimed to achieve was Essential Six: Interprofessional Collaboration for Improving Patient and Population Health Outcome. Through a survey tool, input was sought from seasoned anesthesia providers. This collaboration of experience among students and providers is one that evidence-based research alone cannot provide (Curley et al., 2016). Refer to Appendix F for details on each Essential, as well as how the Essentials were fulfilled by the evidence provided in this doctoral project.

Review of the Evidence

A literature review was performed to provide readers with the most up-to-date and relevant evidence-based information. Articles related to fentanyl given before surgical incision, Precedex™ given prior to surgical incision, and the number of perioperative opioids and pain control that was subsequently needed were collected. Search engines included but were not limited to, Google Scholar, Academic Search Premier, Medline, and EBSCO. Publications were filtered to include only literature that was written in the last seven years (with exclusions for exceptional data without revisions in recent years), full-text and peer-reviewed, and available in the English language. Keywords used in the search included: preoperative fentanyl, preoperative Precedex™, opioid-free general anesthesia, fentanyl substitution, anesthesia, and pain control. Only articles that provided relevant information on the preoperative use of these two medications during general anesthesia were included. Studies that did not meet the criteria were excluded.

Fentanyl Pharmacology and Associated Systemic Effects

Although fentanyl's ability to be administered in multiple formulations (intramuscular, transdermal, intranasal, and intrathecal) is one of the reasons this drug is so widely utilized, this recommendation focuses solely on intravenous fentanyl as it is most frequently delivered via this route during the operative period. Fentanyl was the first drug synthetically designed in a class of mu receptor-stimulating opioids. Its onset of action is dose-dependent and can be achieved in as little as one minute when given intravenously. "Significant analgesia may occur with fentanyl plasma concentrations as low as 0.2 mcg/kg in patients who are opioid-naïve patients" (Stanley, 2014, p. 1217). Its duration of action is usually two to four hours.

Systemic effects of fentanyl are associated with its mu-receptor stimulation in the central nervous system. One must consider opioid-naïve patients and dosage, as the side effects are directly correlated to these two factors. Side effects include fatigue or sedation, vomiting, dizziness, respiratory depression or apnea, bradycardia, and unconsciousness at high doses. If given quickly, life-threatening chest wall rigidity can be obtained with doses as low as 50 mcg (Stanley, 2014). While the mild side effects of fentanyl, such as nausea, fatigue, and constipation are not interpreted as detrimental to patients, these side effects can be paramount to the recovery of post-operative patients.

Fentanyl is metabolized by the human cytochrome P450 isoenzyme. The P450 isoenzyme is important because many other drugs also utilize this enzyme. Therefore, there is the potential for pharmacological interactions to occur when fentanyl is combined with protease inhibitors. such as Fluconazole and Diltiazem. The result is an increased

fentanyl plasma concentration and resultant signs of an opioid overdose, specifically respiratory depression (Stanley, 2014).

Current Use

Clinical use of fentanyl, as stated above, is dose-dependent. Small doses (1-2 mcg/kg) are frequently administered to produce analgesia. Prior to surgery, 2-20 mcg/kg of fentanyl is often given before laryngoscopy or surgical stimulation to blunt circulatory response. The goal of this high dose given immediately prior to surgery is to avoid increased doses of inhaled anesthetic as well as subsequent doses of opioids during the post-operative period for severe pain. Further, it has been found that the dose of isoflurane, desflurane, and nitrous oxide given subsequently is decreased after a patient has received fentanyl. Even larger doses, up to 150 mcg/kg is used as the sole anesthetic for patients who are unable to tolerate the myocardial and/or histamine related effects of other anesthetic drugs. It is important to note that fentanyl will not prevent 100% of sympathetic response to stimuli and there is a potential for postoperative ventilator dependence (Stoelting et al., 2013). The average wholesale price of a 250 mcg vial of fentanyl is $2.15 (Ibinson & Metro, 2012).

Precedex™ Pharmacology and Associated Systemic Effects

Precedex™, a much newer drug compared to fentanyl, was approved for clinical use in 1999 for short-term sedation. Precedex™ is a unique sedation agent as it is classified as an alpha-2 adrenoceptor agonist. Although all of the mechanisms of analgesic actions of stimulation of the alpha-2 receptor have not been identified, it is known that it inhibits adenylate cyclase, hyperpolarizes the cell membranes, and suppresses calcium entry into the nerve terminal, thereby inhibiting the release of

stimulating neurotransmitters. The negative feedback of the presynaptic neurotransmitters terminates pain signals, while inhibition of the postsynaptic neurotransmitters depresses the central nervous system. Since Precedex™ has the ability to work at both of these sites (in a dose-dependent fashion), it can produce analgesia, anxiolysis, and sedation. (Gertler et al., 2001).

Precedex™ is also available in many formulations (intravenous, intramuscular, spinal, epidural, peripheral nerve block, buccal, and intranasal), but this practice recommendation focuses solely on the intravenous administration. Dexmedetomidine has a slower onset than fentanyl of about six minutes. Its peak is fifteen minutes and its duration of action is dose-dependent (Naaz & Ozair, 2014). A loading dose of 0.5 to 1.0 mcg/kg for 10 minutes is recommended (Sim et al., 2014). A dose of 0.2 to 0.7 mcg/kg/hr via IV infusion allows for a steady state of linear kinetics. Precedex™ is 94% protein-bound, there are no active metabolites, and it is excreted mainly in the urine. Biotransformation involves cytochrome P450 and glucuronidation. One should note that the dose should be reduced in patients with hepatic and renal impairment (Nagelhout & Elisha, 2018).

Dexmedetomidine is considered a cardiovascular sympatholytic, although, upon initial bolus, hypertension and bradycardia can occur with rebound hypotension and tachycardia, which can rarely lead to arrhythmias such as AV block. Precedex™ does not cause respiratory depression. Other effects that can be expected from the inhibition of neuronal firing include decreased salivation, decreased gastric motility, inhibited renin release, increased release of both sodium and water from kidneys, decreased intraocular pressure, and decreased insulin release (Haselman, 2008).

Precedex™ is considered a neuroprotectant. Motor and somatosensory evoked potentials are maintained, cerebral metabolism does not decrease, and cerebral blood flow is lower. The anesthetic-sparing techniques allow for improvement in both withdrawal symptoms and brain and spinal cord level trauma. This technique is accepted, yet still undergoing further research (Nagelhout & Elisha, 2018).

Miscellaneous effects that occur with the administration of dexmedetomidine include mild diuresis due to the stimulation of the alpha-2 receptor. Precedex™ is also considered gastroprotective and an anti-inflammatory. In both children and adults, the incidence of emergence delirium is much lower when dexmedetomidine is utilized (Nagelhout & Elisha, 2018).

Current Use

Although the effects of alpha-2 receptor agonists have long been utilized by veterinarians, until 1999, drugs in this class of medication were not used on humans for sedation purposes until the introduction Precedex™ (dexmedetomidine). Dexmedetomidine is useful in that it can provide both analgesia and sedation for entire perioperative periods. Precedex™ has applications as a surgical premedication as it maintains respirations and response to carbon dioxide. It decreases oxygen consumption by up to 8% (Naaz & Ozair, 2014).

Precedex™'s interoperative uses are vast. Dexmedetomidine decreases the stress response to tracheal intubation through its antagonistic sympathetic actions. The sedation is said to be comparable to natural sleep, therefore the patient can be awakened for neuro tests readily. Precedex™ is widely utilized in procedural sedation as it allows improved tolerance and agitation without requiring the need for an established airway. Precedex™

is often administered at the conclusion of major surgery, as it renders the patient sedated, yet cooperative and tolerant upon stimulation (Nagelhout & Elisha, 2018). The average wholesale price of a 2 mg vial of Precedex™ is $78.00, making it one of the most expensive vials of intravenous medication (Ibinson & Metro, 2012).

Another indication for Precedex™, one which fentanyl would not be able to facilitate, is an awake intubation. An awake intubation is occasionally done for patients at high risk for respiratory arrest on induction. A study by Gaszynski et al. (2014), found that dexmedetomidine given before awake intubation allowed a patient to maintain a spontaneous respiratory pattern and decreased sympathetic response to stimulation.

Patient Safety and Efficacy

Patient safety under the care of an anesthesia provider requires the continuation of a patient's homeostatic state. To achieve homeostasis, one must avoid errors that lead to adverse outcomes and provide an anesthetic that not only physically protects the patient but also psychologically leaves the patient unaltered. Opioid medications, including fentanyl, have long been regarded as one of the most high-risk medications administered with almost every anesthetic. Opioids carry negative implications both in the operating room and outside of it, hence the opioid crisis in the United States. Opioid sparing techniques are currently being developed utilizing multimodal therapies that aim to provide patients with a comparable experience that avoids opioids side effects. These effects include, but are not limited to, abuse. Many of these techniques are elaborate and/or expensive. The hypothesis is that anesthesia providers may decide, after reading the provided information, that the utilization of a replacement drug could produce more obtainable daily results.

Anesthesia providers have to balance patient satisfaction and drug side effects daily. Often, the adverse events from effects such as respiratory depression and resultant brain damage outweigh patient comfort. Dexmedetomidine has a unique profile that allows for the degree of sedation and analgesia patients prefer while also avoiding the adverse effects. When compared to other sedatives, Precedex™ has been shown to not only be safer, but more efficient in producing patient satisfaction (Chan et al., 2016). A study by Gupta et al. (2018) found that during a randomized clinical study that compared fentanyl and dexmedetomidine use during induction, for patients who received 1 mcg/kg of fentanyl on anesthesia induction with a laryngeal mask airway, apnea time was significantly longer following induction than it was with dexmedetomidine.

Mortality and Morbidity

The same properties that make fentanyl so useful for hospital use are the same properties that have aided inpatient abuse. Opioids are desirable for addicts due to their central nervous system action, high potency, and quick onset of action. Beginning in 1979, fentanyl derivatives have been used to enhance street drugs, such as Heroin, to make them more affordable and to create and increased potency for abusers (Krenzelok, 2017). The neuroanatomical structures that are stimulated with the drug control Dopamine, the reward center of the brain, which gives the user a feeling of exhilaration and relaxation. This reward center stimulation is the aspect that makes fentanyl even more ideal for the drug abuser (Ramos-Matos & Lopez-Ojeda, 2018). The increase in illicit use and inappropriate prescriptions by physicians has led to a marked increase in opioid mortality in the United States and a necessity to identify its appropriate and inappropriate use of the medication.

Unlike fentanyl, the drug abuse and dependence potential for Precedex™ outside of the hospital environment has not been studied in humans. Animal studies have shown that there is a potential for a withdrawal-like syndrome if abruptly discontinued. The withdrawal syndrome can be attributed to the rapid rise in catecholamines. A drug euphoria comes from the stimulation of the central nervous system. Therefore, because Precedex™ depresses sympathetic activity (unlike fentanyl, which stimulates the CNS), there are minimal, or zero benefits to a drug abuser with the use of Precedex™ (Naaz & Ozair, 2014).

As noted above, Precedex™ promotes a slight decrease in the cardiovascular system. Therefore, it should be avoided in patients with severe heart block or an ejection fraction of less than 30%. If a patient is hypovolemic, this patient will need to return to baseline before starting dexmedetomidine therapy. Bolus doses are cautioned. One should be aware that its amnesic properties are not as strong as drugs such as fentanyl, therefore recall is possible (Naaz & Ozair, 2014).

Specific Aims

The purpose of this doctoral project was to propose an alternative route to achieving a blunted sympathetic response during surgical procedures by developing a best practice recommendation based on literature findings. The specific aim of researching fentanyl and dexmedetomidine was that although both drugs are available for use in most hospital operating rooms, serious complications have arisen from the exponentially increasing use of intraoperative fentanyl. Precedex™ is a newer drug with less research backing its use. It is currently utilized in a multitude of situations successfully but has no established place in the interoperative period. Therefore, the goal

of achieving an increase in Precedex™ use and a decrease in fentanyl use will depend on the validity of the literature contained in the practice recommendation and the recipient anesthesia providers' receptiveness, manor, and setting of practice, and previous experiences. Over the years, drugs have come and gone in order the meet the consistently changing demands of clinical practice. The hope was to streamline the methods that pharmaceutical information has previously been provided to healthcare practitioners into a simple practice recommendation that would eventually result in improved patient safety and quality of care.

Summary

Diminished airway reflexes, a stable cardiovascular system, and a relaxed patient are pertinent to a smooth induction for a general anesthetic. Fentanyl and Precedex™ are two drugs that if appropriately used can provide this for anesthesia professionals. Fentanyl is an older drug with an arguably simpler mechanism of action and is more familiar to most seasoned anesthesia providers. Precedex™ is a newer drug, and while most of its mechanism of action is known and understood, much about its place in the operating room is still being investigated. The hope is to bridge this gap in research by supporting the use of dexmedetomidine (Precedex™) before intubation and surgical incision to provide hemodynamic stability, patient comfort, and necessary level of anesthesia, comparable to that of fentanyl, and therefore a decreased or abolished necessity of fentanyl during the interoperative period.

In summary, fentanyl works through stimulating receptors (mu, kappa, delta) (Stanley, 2014). Precedex™ works through blocking receptors that otherwise would release stimulating neurotransmitters (norepinephrine) utilized (Nagelhout & Elisha,

2018). Fentanyl carries a risk of abuse that Precedex™ does not. Fentanyl is more rapid-acting than Precedex™ and approved for chronic pain (Stanley 2014). Precedex™ is only approved for acute pain (less than twenty-four hours), but useful in maintaining spontaneous respirations (Gertler et al., 2001). Fentanyl has limitations such as respiratory dependence, sympathetic stimulation, histamine release (Stanley, 2014). Precedex™ has limitations such as cardiac depression and cost (Naaz & Ozair, 2014). Each of these two drugs has a place in modern health care. An educated provider should assess individual situations and patients, weigh the pros and cons of each drug, and make an informed choice on which induction medication will provide the best possible care for their patient.

Proposing this pharmaceutical change practice recommendation was done in hopes that patient safety would improve through the help of a guideline related to drug choice. The recommendation supports quicker recovery times, shorter hospital stays, and decreased morbidities and mortalities related to fentanyl overuse. Therefore, the purpose of this doctoral project was to develop a best practice recommendation based on current, relevant knowledge regarding intraoperative pharmacologic measures of decreasing sympathetic stimulation during the intraoperative period.

CHAPTER II - METHODOLOGY

Many steps were taken to create a best practice recommendation and complete this doctoral project. To begin the doctoral project, a project proposal was presented to the project chair and project committee. Following proposal approval, the development of the best practice recommendation began. This best practice recommendation consisted of a three-page, summarized, evidence-based handout. Next, an application for the Institutional Review Board (IRB) approval from The University of Southern Mississippi was completed and approved (IRB-20-236).

After receiving IRB approval, the specific clinical site was given a proposal for the need for change, and approval to acquire participation from employees was given. The hospital site that was chosen is located in central Mississippi. The hospital site is a comprehensive care and surgical center that specialties include cardiovascular, obstetric, oncologic, neurologic, and pulmonic care. Further, this hospital site has been recognized with numerous awards for success in quality and patient safety improvements. The next step was to formulate an expert panel to review the guidelines created for the best practice recommendation and provide crucial feedback. CRNAs and anesthesiologists together are the primary personnel involved in theoretically incorporating the guidelines into practice; therefore, these anesthesia providers are the keys to the success of the practice recommendation. These anesthesia providers are responsible for administering both fentanyl and/or Precedex™ in the surgical setting. In the Mississippi hospital site, CRNAs, in addition to anesthesiologists, all independently make decisions under medical supervision regarding personal usage of these two drugs for patients. Specifically, the panel that this best practice recommendation was proposed to include a chief CRNA,

staff CRNAs, and staff anesthesiologists. The aim was to present to and acquire feedback from a minimum of ten providers.

Construction of the final recommendation guidelines compiled research of current literature related to the best practices in connection with the doctoral project topic, examination of current practices by CRNAs and anesthesiologists within a Mississippi Hospital clinical site, and post-presentation input from participating providers. This research was done by collecting qualitative information in the form of a survey. These results were gathered and formatted into a table. Common ideas and thoughts, both positive and negative, were highlighted. The common critiques and practices that would help to make future recommendations more specialized for this particular hospital site and these particular anesthesia providers were finally identified.

Interventions and Measures

The expectation for this doctoral project was to provide awareness regarding opioid use and abuse. The goal was also to educate anesthesia providers on evidence of a superior means to blunting the sympathetic pathways concurrently supplying perioperative pain management. More specifically, the best practice recommendation includes implementing Precedex™ into practice while synchronously decreasing or omitting the use of fentanyl. Additionally, this recommendation has the potential to be beneficial in establishing an evidence-based practice.

An educational summary containing material and researched evidence pertaining to the practice recommendation was provided to each provider on the expert panel. The best practice was presented to the panel and an evaluation was presented in the questionnaire format evaluating the quality, efficacy, and acceptability to change current

practice. The data gathered from the evaluations formed the basis of the practice recommendation. The data was reviewed and analyzed, the practice recommendation was made, and an executive summary was developed. Key stakeholders received the deliverables and a presentation was made.

Data and Analysis

A questionnaire was used for data collection. After presenting the information concerning the recommendation, each member of the expert panel was asked to complete a questionnaire, providing information and data to make alterations and improve the practice recommendation. Completed questionnaires determined the final structure of the best practice recommendation and executive summary. Question one confirmed that the provider consented to voluntarily agreeing to take the questionnaire. Questions two-five inquired about the provider's current anesthetic practice pre-presentation. Questions six and seven inquired about the information presented to the provider. Questions eight through ten inquired about potential future practice changes based on the information received. Question eleven asked for any comments or suggestions concerning the information. The questionnaire remained completely anonymous, voluntary, and proposed the following questions:

1. Do you give informed consent to voluntarily agreeing to take this questionnaire?
2. Do you currently use Precedex™ as a part of your anesthetic practice? If so, can you describe your current use of Precedex™?
3. Do you currently utilize any other type of multimodal pain management techniques as a part of your anesthetic practice? If so, please briefly explain.

4. Are you aware of the price difference of fentanyl and Precedex™ at your facility?
5. Did this doctoral project presentation bring awareness about opioids or previously unrecognized consequences to the use of opioids?
6. Did this doctoral project presentation provide you with adequate evidence-based information regarding the use of Precedex™ as a part of a multimodal pain management technique?
7. Would you consider changing your practice by administering Precedex™ perioperatively based on the information presented if given the opportunity?
8. Would you consider decreasing or omitting the use of fentanyl and other opioids, by substituting them for Precedex™ or another form of non-opioid pain management based on the information presented if given the opportunity?
9. Would you consider administering Precedex™ or another form of a non-opioid sympatholytic drug in the place of fentanyl during the induction phase in your anesthetic practice?
10. Please provide any comments or suggestions regarding this best practice policy recommendation.

Resistance and Barriers to Change

Potential barriers or resistance to change by not accepting the practice recommendation can result in ethical concern. The proposed practice recommendation reflects evidence-based best practices for the improvement of safe and satisfactory patient outcomes. However, CRNAs or anesthesiologists who reject the practice recommendation, as opposed to those who adopt it into their practice, will be providing

two different standards of care. The resistance to change can stem from internal or individual interference. Precedex™ is a much newer drug when compared to fentanyl and its use in perioperative anesthesia has just recently become more popular. With that being said, providers who have been working for many years can be reluctant about changing their practice. With the proper knowledge, education, and literature reviewed evidence-based data presented with this proposed practice recommendation, this barrier may potentially be broken. The fear of change may also be alleviated with this doctoral project by considering the panels' preferences and suggestions offered by the questionnaire (Timmermans & Mauck, 2005).

Summary

The goal of this proposed practice recommendation was to provide support and current evidence on the use of Precedex™ as an approach to decrease the use of opioids and improve patient outcomes. The proposed recommendation was presented to the panel of experts, providing the evidence and support for the use of Precedex™. Data from the questionnaires were compiled and analyzed and potential alterations to the best practice recommendation were highlighted for future use.

CHAPTER III - RESULTS

Overview

The inclusion criteria for this doctoral project included CRNA's at a hospital site in central Mississippi who provide perioperative care to an extended range of patients including but not limited to, outpatient, vascular, general, neurologic, and orthopedic surgery. Exclusion criteria included any CRNA who did not willingly want to participate in reading the provided material and subsequently completing the attached survey. A sample size of seven CRNA's was obtained. The participants were asked to read a three-page handout detailing our evidence-based data on the use of perioperative opioids and Precedex™. They were asked to reflect on their current, past, and/or present use of both opioids and Precedex™ in clinical practice. They then were asked to evaluate the recommendation by completing a ten-question survey.

The data gathered was from the seven willing participants. The survey used is located in Appendix C. The analysis of each question is located in Table 1. Question one addressed if the CRNA currently uses Precedex™ as part of their current anesthetic practice. Six of the seven participants responded that yes, they do currently use Precedex™, and one of the seven participants responded that they do not use Precedex™. From the data, it was determined that 85.71% had at least minimal prior exposure to Precedex™ utilization and 14.29% did not currently use it. Whether they have or have not ever used the drug in their clinical practice is unknown. Question two asked if the CRNA currently utilizes any other type of multimodal pain management techniques in their anesthetic practice. Six out of the seven, or 85.71%, responded that they do utilize other pain management techniques, while one person, or 14.29%, did not. Question three asked

if they are aware of the price difference of fentanyl and Precedex™ at their facility. Six out of the seven, or 85.71% were not aware, while one person, or 14.29% was.

Table 1

Survey Response to Questions

Question	**Yes**	**No**
Do you currently use Precedex™ as a part of your anesthetic practice?	6	1
Do you currently use any other type of multimodal pain management techniques as a part of your anesthetic practice?	6	1
Are you aware of the price difference of fentanyl and Precedex™ at your facility?	1	6
Did this doctoral project presentation bring awareness about opioids or previously unrecognized consequences to the use of opioids?	6	1
Did this doctoral project presentation provide you with adequate evidence-based information regarding the use of Precedex™ as a part of a multimodal pain management technique?	7	0
Would you consider changing your practice by administering Precedex™ perioperatively based on the information presented if given the opportunity?	7	0

(Table Continued)

Would you consider decreasing or omitting the use of fentanyl and other opioids, by substituting them for Precedex™ or another form of non-opioid pain management based on the information presented if given the opportunity?	7	0
Would you consider administering Precedex™ or another form of a non-opioid sympatholytic drug in the place of fentanyl during the induction phase in your anesthetic practice?	7	0
Please provide any comments or suggestions regarding this best practice policy recommendation.	None	None

Beginning with question four, specific information concerning the provided material began. Question four inquired as to if the presentation brought them awareness concerning opioids that was previously unrecognized. Six out of the seven, or 85.71%, said that it did, while 1 person, or 14.29% said that it did not. Question five asked if the CRNA's thought that the presentation provided them with adequate information regarding the use of Precedex. Seven out of seven participants, or 100%, said that it did. Question six asked if the participants would consider changing their practice by administering Precedex based on the information. Seven out of seven participants, or 100%, said that they would. Question seven inquired as to if they would consider decreasing or abolishing their use of opioids by substituting them with Precedex or another non-opioid pain management technique based on the information. Seven out of

seven participants, or 100%, said that they would. Question eight asked if the CRNA would consider administering Precedex or another non-opioid sympatholytic drug in place of Fentanyl during anesthetic induction based on the information provided. Seven out of seven participants, or 100%, said that they would. The final question, question nine, asked for any suggestions or comments regarding this practice recommendation. There were no comments or suggestions left by participants.

Summary

The responses to each question were either completely, or almost, unanimously answered. All participants would support the practice recommendation that was proposed. Nearly all participants reported they learned something from this information. No participant had comments or suggestions to provide.

CHAPTER IV – DISCUSSION

The goal of this doctoral project was to provide CRNAs with evidence-based, summarized information regarding the use of both Precedex™ and fentanyl during the operative period. The research was focused on the administration during the induction period of anesthesia. Through this, the hope was to either educate, or refresh, providers on the potential benefits of reducing or eliminating opioids, specifically fentanyl, and substituting it with Precedex™ in applicable patient populations. This practice recommendation was presented and evaluated for completeness, relevancy, and readiness to be utilized by the CRNAs at the facility. The CRNA's were to evaluate the practice recommendation by completing a nine-question survey. The practice recommendation was unanimously found to be based on evidence-based practice and effective in persuading providers to consider a practice change.

Implications for Future Doctoral Projects

According to Table 1, participants expressed a willingness to change their anesthetic practice to include non-opioid pain management techniques, specifically Precedex™, based off of the information that was provided. Their positive response warrants the need for a specific protocol based on this central Mississippi hospital site's patient population and surgical services offered. For example, guidelines for the dose to administer during a conscious sedation case where Precedex™ is serving as the sole anesthetic vs. the dose to administer when Precedex™ is used as an adjunct to general anesthesia. Because the availability of the drug has been confirmed, as well as provider willingness, there would be a benefit to continuing the research towards the goal of a protocol. This recommendation focused on its use during the induction period. Other

doctoral projects could focus on Precedex™ use throughout the entire perioperative period. Lastly, this doctoral project could be duplicated but focus on other non-opioid pain management pharmacology, such as Ketamine™.

Limitations

The major limitation of this doctoral project was participation. Participation in reading the information provided and subsequently taking the survey was optional and there were no repercussions for choosing to not participate. A sample size of seven was small. The results would have carried greater accuracy with an increased number of participants. As many of the survey questions were unanimously answered, an increased number of participants could have shed light on different thought processes and given us a wider range of results. Further, no one provided comments or suggestions concerning the information. Specific comments would have provided information that was unable to be communicated through the closed answer survey questions. Another limitation was a combination of both time and the current pandemic health crisis plaguing the world. This information was not able to be presented to the CRNAs through a physical presentation. Rather, the information was emailed in an effort to abide by social distancing protocols. If there had been an extended period to present and receive results, the information could have potentially been delivered in-person and more effectively communicated.

Dissemination

This doctoral project has been presented to anesthesia providers at a hospital site in central Mississippi. The recommendation and evidence-based research obtained during the completion of this doctoral project is available to these anesthesia providers at this facility through a link via email. The practice recommendation will also be presented to

academic stakeholders and other students enrolled in the Nurse Anesthesia Program, in the School of Leadership and Advanced Nursing Practice at The University of Southern Mississippi.

Recommendations

Future investigations into a specific, facility centered, protocol could potentially lead to increased perioperative Precedex™ use and decreased perioperative fentanyl use. The evidence states that this practice recommendation could negate the side effects patients experience related to opioid use. Future doctoral projects related to this should aim to include a larger sample size. If the doctoral project was advanced, more thorough information regarding the CRNA's current use of Precedex™ and fentanyl would be obtained through in-person shadowing and/or interviews. This central Mississippi hospital sites' needs would thereby be assessed. The information provided was found to be successful in persuading an increase in Precedex™ use and a decrease in fentanyl use. Due to this and the willingness expressed by providers to participate in this practice recommendation, guidance through the form of a protocol could be the safest and most beneficial way to incorporate the practice recommendation into the anesthesiologist, CRNA, and patient's operative experience.

Conclusion

The evolution of healthcare research, safety, and efficacy is a mainstay in today's clinical experience. A continued emphasis on this idea is thereby essential to improving patient care and satisfaction. Beneficence mandates anesthesia providers to act in the best interest of the patient. Attempting to circumvent the negative side effects of fentanyl could prove to be monumental to certain patients. Consideration and application of the

information provided in this practice recommendation serve as a potential means of accomplishing not only this, but superior patient satisfaction, pain control, and homeostasis. Healthcare facilities all over are being encouraged to incorporate non-opioid anesthetic techniques into their practice. The options are extensive and often mandate a learning curve. This doctoral project hopes to serve as a starting point for one easily accessible option. This doctoral project presented a recommendation on Precedex™ use through a three-page handout to a hospital site in central Mississippi with the goal of those participating to consider applying the information in their daily clinical setting. Participants expressed their willingness to incorporate our recommendation into their anesthetic practice. Future doctoral projects at this facility could begin to develop a hospital-specific protocol for safe Precedex™ use, ideally using a larger sample size of CRNA participants.

APPENDIX A – Literature Matrix

Author/Year/ Title	Design	Sample/Data Collection	Findings	Recommendations
Armaghani et al., 2014 Preoperative opioid use and its association with perioperative opioid demand and postoperative opioid independence in patients undergoing spine surgery.	Prospective Cohort-Quantitative	583 patients self-reported daily opioid consumption obtained preoperatively and converted into morphine equivalent amounts and opioid use was recorded 12 months postoperatively.	The median preoperative use was 8.75 mg. Younger age, more invasive procedures, and anxiety were found to be associated with increased postoperative opioid demand.	Patients would benefit from preoperative counseling on opioid use and abuse.
Gaszynski et al., 2014 Dexmedetomidine for awake intubation and opioid-free general anesthesia in a superobese patient with suspected difficult intubation.	Qualitative	One 39-year-old female patient with a BMI of 62.3 underwent an awake intubation using topical anesthesia and dexmedetomidine. Subsequent anesthesia difficulty was then assessed.	No additional opioids were required, the patient quickly emerged, and the patient remained hemodynamically stable.	Dexmedetomidine may help minimize or eliminate the intraoperative use of opioids.
Gupta et al., 2018 A comparative evaluation of the use of dexmedetomidine versus fentanyl for anesthesia	Quantitative; a prospective, double-blind, randomized study	140 healthy patients with ASA of I and II were given either Precedex™ or fentanyl prior to LMA insertion. Vitals were	The patients who received Precedex™ showed a decrease in HR, SBP, DBP, and MAP following LMA insertion. Those who	Precedex™ provides a beneficial effect in attenuation of hemodynamic response to LMA insertion as compared to fentanyl.

induction with propofol for insertion of laryngeal mask airway.		subsequently monitored.	received Fentanyl showed an increase. Apnea time was shorter in patients who received Precedex™.	
Naaz & Ozair, 2014 Dexmedetomidine in current anesthesia practice- a review	Review Article	Compilation and review of numerous evidence-based resources.	Precedex™ is a useful addition to anesthesia. It has a wide range of use yet requires vigilance when in use. The high cost is also something to note.	n/a
Stanley, 2014 The Fentanyl Story	Review Article	Compilation and review of numerous evidence-based resources.	Fentanyl has become one of the most important opioids in anesthesia due to its multiple formulations, potency, familiarity, and physical characteristics.	n/a

PRECEDEX

Your New Favorite Anaglesic

DECREASEING PERIOERATIVE FENTANYL USE THROUGH THE UTILIZATION OF PRECEDEX PRIOR TO SURGICAL INCISION.

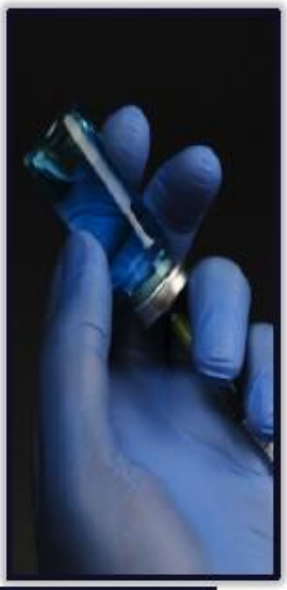
The goal of this newsletter is to inform anesthesia providers.

Objective: After reading this article, participants will have an increased understanding of the use and abuse of opioids, and the superior means of perioperative pain management with the use of Precedex.

The opioid crisis in America is a topic many Americans are aware of and the rapid increase in deaths it has caused. Accidental opioid deaths have now exceeded the death toll of MVAs. These victims first encounter these drugs during the surgical period.

This crisis has paved a route to researching new methods of pain control for patients requiring surgical intervention.. While research supports the use of these alternative pain control methods, they often require an increased hospital budget, specialized education for providers, and time constraints on perioperative periods.

Patient safety under the care of an anesthesia provider requires the continuation of a patient's homeostatic state. This requires you to provide an anesthetic that not only physically protects the patient but also psychologically leaves the patient unaltered.



The question at hand is for patients who are undergoing general anesthesia, does the use of Precedex before intubation and surgical incision provide hemodynamic stabliity, patient comfort, and necessary level of anestheisia, comparable to that of Fentanyl, and therefore decrease or abolish the necessity of Fentanyl during the interoperaitve period?

Lets Begin...

Opioid medications have long been regarded as one of the most high-risk medications and is administered with almost every anesthetic. These effects include but are not limited to, abuse.

Anesthesia providers have to balance patient satisfaction and drug side effects daily. Often, the adverse events from effects such as respiratory depression and resultant brain damage outweigh patient comfort. Opioid sparing techniques are currently being developed utilizing multimodal therapies that aim to provide patients with a comparable surgery experience. Precedex has a unique profile that allows for the degree of sedation and analgesia patients prefer while also avoiding the adverse effects.

Choose Precedex

- ✓ Superior post-op pain control
- ✓ Minimal respiratory depression
- ✓ Treating patients with chronic pain or addiction
- ✓ Minimizes post-op congnitive disorder

1

Fentanyl

Fentanyl was the first drug designed in a class of mu receptor-stimulating opioids. Its onset of action is dose-dependent and can be achieved in as little as 1 min. when given IV. *It is potent.* Its duration of action us usually 30-60mins. Systemic effects include:

- Fatigue
- Sedation
- Vomiting
- Dizziness
- respiratory depression or apnea
- bradycardia
- unconciousness at high doses.
- Chest wall rigidity if given quickly

Clinical use of Fentanyl is dose-dependent. Small doses (1-2 mcg/kg) are frequently administered to produce analgesia.

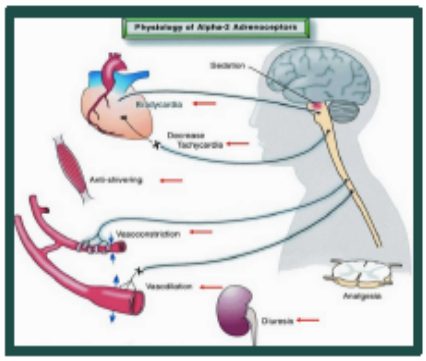
Prior to surgery, moderate doses 2-20 mcg/kg of Fentanyl is often given for example before laryngoscopy or surgical stimulation to blunt circulatory response. Moderate doses given immediately prior to surgery to decrease the need of inhaled anesthetics such as Isoflurane, Desflurane, and Nitrous Oxide, as well as subsequent doses in the post-operative period.

"In both children and adults, the incidence of emergence delirium is much lower when Precedex is utilized."

Precedex *aka. Dexmedetomidine*

Precedex is a much newer drug. It was approved for clinical use in 1999. It is classified as an alpha-2 adrenoceptor agonist. It actually inhibits the release of stimulating neurotransmitters. The negative feedback of the presynaptic neurotransmitters terminates pain signals, while inhibition of the postsynaptic neurotransmitters depresses the CNS. Since Precedex as the ability to work at both of these sites it can produce analgesia, anxiolysis, and sedation.

Dexmedetomidine has a slower onset than Fentanyl of about six minutes. Its peak is 15 min and its duration of action is dose dependent. A loading dose of 0.5 to 1.0 mcg/kg is recommended prior to a 0.2 to 0.7 mcg/kg/hr infusion.There are no active metabolites, and it is excreted mainly in the urine. Biotransformation involves cytochrome P450. The dose should be reduced in patients with hepatic and renal impairment.



Effects of Precedex

- Cardiovascular sympatholytic

Hypertension and bradycardia with initial bolus

Rebound hypotension and tachycardia

- NO respiratory depression
- Other effects: decreased salivation, decreased gastric motility, inhibited renin release, mild diuresis, decreased intraocular pressure, and decreased insulin release.
- Neuroprotectant
- Anti-inflammatory
- Decreased emergence delirium

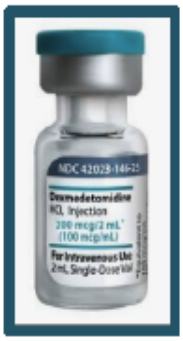
Precedex's spot in the operating room

Precedex provides both analgesia and sedation for entire perioperative periods.

It has applications as a premedication because it maintains respirations and response to carbon dioxide. It acutally *decreases oxygen consumption by up to 8 percent*. Intraoperatively it decreases stress response as an sympatholytic.

Sedation with precedex is comparable to natural sleep, therefore the patient can be awakened for neuro tests. It is widely used in procedural sedation as it allows for improved tolerance and agitiation without requiring an established airway.

Often adminstered at the conclusion of a major surgery to keep the patient sedated, coorperative, and tolerant. An indication for Precedex, that Fentanyl would not be able to facilitate is for awake intubation.



Dexmedetomidine

~ $1.14 per unit in 4mcg/ml concentration

Precedex

~$1.85 per unit in 4mcg/ml concentration

Fentanyl

~$1.08 per unit in 50mcg/ml

All in all..

Fentany and Precedex are two drugs that can achieve a successful induction for a general anesthetic along with perioperative pain management. With this article, the hope is to bridge that gap by supporting the use of Precedex and provide patients with hemodynamic stability, compfort, and a level of anesthesia comparable to Fentanyl in hopes to decrease the necessity of opioids in the perioperative period. Fentanyl carries with it greater risks than Precedex. Precedex maintains spontaneous respirations, unlike Fentanyl. Precedex also accompanies greater cost in the healthcare industry than Fentanyl. There are limitations to both drugs, however unlike Fentanyl, Precedex does not cause dependence, addiction, or abuse. Evidence is provided that Precedex can navigate the barriers of timely care, adverse effects, and budget restraints. Ideally, the policy we create will have the potential to improve patient safety, quicker recovery times, shorter hospital stays, and decrease the morbidities and mortalities related to the over use of opioids such as Fentanyl.

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Publishers

This article was published on the behalf of Amy Houck and Shelby Harriel, students of the University of Southern Mississippi, Doctoral of Nursing Practice project.

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APPENDIX C – IRB Approval Letter

Office *of*
Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

118 COLLEGE DRIVE #5125 • HATTIESBURG, MS | 601.266.6576 | USM.EDU/ORI

NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.
- FACE-TO-FACE DATA COLLECTION WILL NOT COMMENCE UNTIL USM'S IRB MODIFIES THE DIRECTIVE TO HALT NON-ESSENTIAL (NO DIRECT BENEFIT TO PARTICIPANTS) RESEARCH.

PROTOCOL NUMBER: IRB-20-236
PROJECT TITLE: A Best Practice Recommendation: Decreasing Perioperative Fentanyl Use Through the Utilization of Dexmedetomidine Prior to Surgical Incision
SCHOOL/PROGRAM: School of LANP, Leadership & Advanced Nursing
RESEARCHER(S): Shelby Harriel, Nina Mclain, Amy Houck

IRB COMMITTEE ACTION: Approved
CATEGORY: Expedited
7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: May 6, 2020

Donald Sacco

Donald Sacco, Ph.D.

APPENDIX D – Panel of Experts Survey

A BEST PRACTICE RECOMMENDATION: DECREASING PERIOPERATIVE FENTANYL USE THROUGH THE UTILIZATION OF DEXMEDETOMIDINE PRIOR TO SURGICAL INCISION

1. Do you give informed consent to voluntarily agreeing to take this questionnaire?
2. Do you currently use Precedex as a part of your anesthetic practice?
3. Do you currently utilize any other type of multimodal pain management techniques as a part of your anesthetic practice? If so, please briefly explain.
4. Are you aware of the price difference of Fentanyl and Precedex at your facility?
5. Did this project presentation bring awareness about opioids or previously unrecognized consequences to the use of opioids?
6. Did this project presentation provide you with adequate evidence-based information regarding the use of Precedex as a part of a multimodal pain management technique?
7. Would you consider changing your practice by administering Precedex perioperatively based on the information presented if given the opportunity?
8. Would you consider decreasing or omitting the use of Fentanyl and other opioids, by substituting them for Precedex or another form of non-opioid pain management based on the information presented if given the opportunity?
9. Would you consider administering Precedex or another form of a non-opioid sympatholytic drug in the place of Fentanyl during the induction phase in your anesthetic practice?
10. Please provide any comments or suggestions regarding this best practice policy recommendation.

The survey presents no more than minimal risk of harm to subjects and involves no procedures for patients or participants. Data being collected is confidential and anonymous, and 100% voluntary with no repercussions for non-participation

APPENDIX E – Facility Permission Request

Dear Anesthesia Providers,

On the behalf of the University of Southern Mississippi Doctoral Anesthesia Graduate Program, Amy Houck, SRNA and Shelby Harriel, SRNA would appreciate your volunteered time to participate in our project by reading the following material and providing feedback to aid in the execution of our study. This study has been approved by the IRB (#IRB-20-236).

The project is based on a Best Practice Recommendation for decreasing the perioperateive use of Fentanyl through the utilization of Dexmedetomidine (Precedex) prior to surgical incision. Specifically, asking the question, for patients undergoing general anesthesia, does the use of Precedex before intubation and surgical incision provide hemodynamic stability, patient comfort, and necessary level of anesthesia, comparable to that of Fentanyl, and therefore a decreased or abolished necessity of Fentanyl during the interoperative period?

The expectation for this project is to provide awareness on opioid use and abuse and educate anesthesia providers while providing evidence for a superior means to blunting the sympathetic pathways and concurrently supplying perioperative pain management with Precedex.

The following information attached to this email, contains researched material through valid evidence based literature along with a questionnaire. After reading the attached material, we would ask that you fill out a short *anonymous* questionnaire related to the material provided and your own practice. The data from these surveys will help provide us the information and advice needed to create guidelines for our Best Practice Recommendation. Once constructed, a final copy of the guidelines for the Best Practice Recommendation will be provided to the participants in this project to use at your own preference.

Thank you for your time and effort while participating in our study. We look forward to reading your feedback. Have a great day!

Shelby E. Harriel
Amy Houck

APPENDIX F –DNP Essentials

DNP Essentials		**Clinical Implications**
Essential One: Scientific Underpinnings for Practice		Identification of the current use of fentanyl and Precedex™ during anesthesia induction
Essential Two: Organizational and Systems Leadership for Quality Improvement and Systems Thinking		Interaction with anesthesia providers to produce a more standardized utilization of Precedex™
Essential Three: Clinical Scholarship and Analytical Methods for Evidence-Based Practice		Literature analysis to gather and compile relevant data regarding potential pharmaceutical use
Essential Four: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care		The literature included in this doctoral project was retrieved through the utilization of technology. The aim was to project positive patient outcomes by compiling this data.
Essential Five: Health Care Policy for Advocacy in Health Care		This doctoral project advocated for increased patient safety and patient satisfaction. The results include but are not limited to aiding the opioid crisis and decreasing recovery times.
Essential Six: Interprofessional Collaboration for Improving Patient and Population Health Outcomes		Through the survey tool, input was sought from seasoned anesthesia providers. This is a collaboration of experience among students and providers is one that evidence-based research cannot provide.
Essential Seven: Clinical Prevention and Population Health for Improving the Nation's Health		Long term goals of this doctoral project include decreased opioid overuse/abuse along with

		sentential events associated with it.
Essential Eight: Advanced Nursing Practice		Evidence and literature review, data synthesis, evaluation of data, and assessment of data post-presentation.

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