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Impact of Best Practice Guideline Statement on Anesthesia Practice in Rural Mississippi Hospitals with Obese Patients Undergoing Total Knee Arthroplasty

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IMPACT OF BEST PRACTICE GUIDELINE STATEMENT ON ANESTHESIA
PRACTICE IN RURAL MISSISSIPPI HOSPITALS WITH OBESE PATIENTS
UNDERGOING TOTAL KNEE ARTHROPLASTY

by

Steven Porter Hodnett

A Doctoral Project
Submitted to the Graduate School,
the College of Nursing and Health Professions
and the School of Leadership and Advanced Nursing Practice
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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ABSTRACT

The aim of this best practice guideline (BPG) was to be a resource for anesthesia providers practicing with obese patients undergoing total knee arthroplasty (TKA) and to measure the knowledge of these providers. After dissemination of an executive summary to anesthesia providers in two hospitals in rural Mississippi, an anonymous online survey was provided via Qualtrics software for voluntary participation. The survey consisted of 10 questions. The data collection period was five weeks. Respondents are noted at N=2, and the data was reviewed and categorized into one of three domains (i.e., knowledge, practice, and safety). In the domain of knowledge, respondents indicated a need for a BPG with one indicating insufficient knowledge. In the domain of practice, both respondents indicated the use of various neuraxial techniques; however, one indicated their facility had no standardized screening for obstructive sleep apnea, difficult intubation, or antibiotic prophylaxis for the obese patient population. One provider also indicated a lack of standardized practice concerning the obese patient population. In the domain of patient safety, one provider indicated that their facility does not currently meet the needs of patients undergoing TKA and the other indicating “somewhat.” As indicated by respondents, the BPG did improve their knowledge of the evidenced-based practice for obese patients undergoing TKA. Furthermore, this project can be used to identify future areas of research concerning provider knowledge, practice, and patient safety.

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DEDICATION

I would like to dedicate this work to my family and friends for their never-ending support and dedication to my goals to pursue my education and career. I would also like to dedicate this paper to Brian Bulla, without his hours of guidance and support this would not have been possible.

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LIST OF ABBREVIATIONS

AAOS	American Academy of Orthopedic Surgeons
ACCP	American College of Clinical Pharmacology
AHA	American Heart Association
ASA	American society of Anesthesiologists
BMI	Body Mass Index
BPG	Best Practice Guideline
CHF	Congestive Heart Failure
CRNA	Certified Registered Nurse Anesthetist
DMARDs	Disease-modifying anti-rheumatic drugs
DVT	Deep vein Thrombosis
EBP	Evidenced-Based Practice
FFA	Free Fatty Acid
FiO ₂	Fraction of Inspired Oxygen
HDL	High-density Lipoproteins
JC	The Joint Commission
LDL	Low-density Lipoproteins
MS	Mississippi
NYSORA	New York School of Regional Anesthesia
OR	Operating Room
OSA	Obstructive Sleep Apnea
PCV	Pressure Controlled Ventilation
PEEP	Positive End Expiratory Pressure

SIGN	Scottish Intercollegiate Guidelines Network
THA	Total Hip Arthroplasty
TKA	Total Knee Arthroplasty
USM	The University of Southern Mississippi
VLDL	Very-low-density Lipoproteins
V/Q	Ventilation-perfusion
Vt	Tidal Volume
VTE	Venous Thromboembolism

CHAPTER I – Introduction

Problem Description

Over one-third of Americans are obese, creating unique challenges during surgical procedures and anesthetics (Adult Obesity Facts, 2017). Total joint replacements are becoming more common in an attempt to return functionality and to provide pain relief to this patient population, specifically through knee and hip operations (Pugely, Callaghan, Martin, & Gao, 2013). As body mass index (BMI) increases, risk for perioperative complications increases (Jung et al., 2017). With such a diverse pathologic profile, obese patients may experience a variety of anesthesia techniques. The variance in the practice of anesthesia with this patient population creates an opportunity for improvement by examining current practice and comparing it to evidence-based practice (EBP) found in the literature to improve patient safety, reimbursement, and quality outcomes.

Purpose and Context

Total knee arthroplasty (TKA) has many potential benefits for the obese population which include increased range of motion, pain relief, and potential weight loss (Fitzgerald et al., 2004). These potential benefits, however, must be weighed against the risks associated with an increased BMI. Reimbursement, patient safety, and quality outcomes have all been connected and have a significant impact on the overall financial stability of a facility, particularly when considering a smaller hospital (Clair et al., 2015; Dimick, Weeks, Karia, Das, & Campbell, 2006). The cost and length of stay associated with a TKA are significantly higher for a patient with a higher American Society of Anesthesiologists (ASA) status, as is often seen in obese patients, than compared to those

with a lower ASA status (Clair et al., 2015). While the argument can be made that the morbidly obese population is growing in the United States, their numbers in the operating room (OR) are low enough to not be statistically significant in conceptualizing the cost burden. Contrary to this, Kiridly, Karkenny, Hutzler, Slover, Lorio, and Bosco, (2014) have noted that in the extreme group (e.g., patients with multiple comorbid conditions and high ASA status) account for 10% of costs and makeup only 1.1% of the patient mix (Kiridly et al., 2014). Further quantifying the costs of increased BMI for TKA, Werner, Evans, Carothers, and Brown, (2014) have calculated an increased cost of \$250-\$300 per 5 unit increase in BMI above 30 for primary TKA, as well as an increase of \$600-\$650 per 5 unit increase in BMI above 30 for revision TKA (Werner et al., 2014). Along with an increased cost, obese patients have increased perioperative risks with TKA, owing to the complex pathology found in obesity. Areas affected by an increased BMI include increased infection, congestive heart failure (CHF), obstructive sleep apnea (OSA), postoperative pulmonary complications, decreased effectiveness of antibiotic prophylaxis, and coagulopathies. These pathologies require that anesthesia providers practice a vigilant eye to avoid untoward complications. This Best Practice Guideline (BPG) aims to serve as a summary of the existing literature and a guide for current anesthesia providers to administer anesthesia to this patient population and to improve patient safety, reimbursement, and quality outcomes.

Stakeholders and Departments

Identified stakeholders for this BPG include anesthesia providers, surgeons, nursing staff, administration, patients, and the facility. These groups all have the best interest in mind when caring for patients and can have their practice impacted by the

content in this BPG. Guiding change, improving outcomes, patient safety, and increasing the efficiency of resource utilization are the objectives of disseminating the information in this document.

Accreditation and Compliance

The Joint Commission (JC) requires hospitals attempting to reach the disease-specific care: advanced program, or maintaining this credential, to now report at least 10 TKA cases per month, these cases be sampled via simple random sample, and all of these patients to have regional or neuraxial anesthesia (The Joint Commission, 2018). If the facility performs less than 10 TKA per month, then the collection of data from the available cases is sufficient. This data collection became mandatory on January 1st, 2018 as part of a new performance measure for both inpatient and outpatient operations (The Joint Commission, 2018). Using the information found in this BPG, anesthesia providers will be better equipped to meet these expectations by using current evidence-based practice (EBP) to guide the planning of their anesthetics.

Patient Safety

Expanding anesthesia providers' knowledge of current EBP guidelines will improve patient safety by increasing awareness in several categories including infection, peri-operative risks, and post-operative risks. As explained later, obese patients have an increased risk for wound infection during TKA when compared with other patients (Adhikary, Liu, Memtsoudis, Davis, & Liu, 2015). Peri-operative risks are also outlined later, and these include difficult intubation, cardiac risks, and pulmonary deficiencies (Littleton, 2012; Nightingale et al., 2015; Poirier et al., 2006). Post-operative risks (e.g., an increased risk for falls) are associated with this patient population (Wasserstein,

Farlinger, Brull, Mahomed, & Gandhi, 2013). The Joint Commission (2018) has newly required, as a performance measure, the use of regional anesthesia in patients undergoing TKA to improve outcomes, pain control, and functionality following surgery. While there are certainly benefits to neuraxial anesthesia techniques, it invites an increased risk for patient falls following TKA when a femoral nerve block is used to provide post-operative pain relief (Kandasami, Kinninmonth, Sarungi Baines, & Scott, 2008; Wasserstein et al., 2013). Wasserstein and colleagues (2013) found obesity and a femoral nerve block were independent risk factors for patient falls following TKA (Wasserstein et al., 2013). Awareness of this prior to surgery allows for anesthesia providers to alter their technique and to educate patients that they are at an increased risk in the immediate post-operative period for falling.

Efficiency

As outlined above, the costs associated with patients undergoing a TKA with higher ASA status, a measurement of patient complexity based on comorbidities, and greater BMI are higher than average. The etiology of this inflated cost is an increased risk profile found in this patient population. Briefly, Werner and colleagues (2014) found an increased cost of \$250-300 per 5 units above 30 BMI for patients undergoing TKA with an additional \$600-650 per 5 unit increase above 30 BMI for revision procedures (Werner et al., 2014). These costs can theoretically be applied to a known readmission rate of 8% for all patients undergoing TKA with a projected cost of \$27,979 per readmitted patient (Clair et al., 2015). These costs associated with increased BMI reflect an additional need for anesthesia providers, surgeons, and nurses to be diligent while planning the care for this patient population to assure their facility's financial success.

Available Knowledge

Increased Risk for Wound Infection

Prior studies concerning the super-obese, or class 3 obesity, >45 BMI, patient population undergoing TKA found this population was nearly twice as likely to develop a wound infection following both TKA and total hip arthroplasty (THA) (Adhikary et al., 2015; Defining Adult Overweight and Obesity, 2016). The odds for any major complication were increased nearly 45% higher than the control group leading to a claim of a positive correlation with BMI, particularly above 45, and 30-day postoperative complications (Adhikary et al., 2015). Echoing the above, Murray and colleagues (2012) outlines a worse functional outcome for patients with a high BMI undergoing unicompartmental knee replacement as well (Murray et al., 2012). In their meta-analysis, Sun and Li (2017) found patients with high BMI suffered from an increased rate of complications and propose this population would benefit from additional pre-operative examination (Sun & Li, 2017). Examining the integumentary system, Jung and colleagues (2017) build upon prior research finding that obese patients have an increased infection risk due to less effective antibiotic prophylaxis and an impaired immune response (Jung et al., 2017). Bratzler and colleagues (2013), published clinical guidelines for surgical antibiotic prophylaxis recommending 3G of Aneef within 60 minutes of incision for patients above 120kg undergoing TKA (Bratzler et al., 2013). Obesity has also been linked to the acceleration of atherosclerotic disease processes, as well as insufficiency seen in the endocrine system leading to insulin resistance and hyperglycemia that can lead to poor wound healing (Jung & Choi, 2014). An increase in adipose tissue leads to greater amounts of circulating free fatty acids (FFA), eventually

leading to an abnormal production of low-density lipoproteins (LDL), high-density lipoproteins (HDL), and very-low-density lipoproteins (VLDL) which increases the risk for cardiovascular disease as a result of atherosclerosis (Jung & Choi, 2014). This increase in circulating FFA also plays a key role in insulin resistance in the liver promoting dyslipidemia (Jung & Choi, 2014). These pathological deviations can create an opportunity for infections, which contribute to an increased cost and ultimately a poorer outcome for patients.

Increased Cardiac Risk

Obesity and its pathologic implications for the human heart have been well studied and documented. Work done by Poirier et al. (2006), extensively outlines the impact of obesity on the cardiovascular system by highlighting the pathologic changes on the heart: obesity increases the heart's chamber sizes, stiffness, circulating blood volume, and cardiac output leading to hypertension and left ventricular hypertrophy which is eventually unsustainable with body size and will lead to increased wall tensions and inevitable failure, along with conduction abnormalities with dysrhythmias (Poirier et al., 2006). These pathologic changes from the increased workload on the heart are compounded by an acceleration of atherosclerotic changes in coronary vasculature in obese patients as a consequence of increased FFA metabolism leading to dyslipidemia (Jung & Choi, 2014).

Increased Pulmonary Risk

Concerning pulmonary physiology, obese patients are more likely to suffer from sleep apnea and right heart failure as well and are at high risk for underdiagnoses of sleep apnea and related diagnosis such as obesity hypoventilation syndrome (Brown, 2015). These cardiac abnormalities can be masked in an obese patient until under anesthesia requiring an increased level of vigilance and a thorough preoperative assessment. Littleton (2012) states obese patients have an increased respiratory pattern, are at risk for micro atelectasis, have a decreased expiratory reserve volume, an increased airway resistance, lower lung volumes with closure of smaller airways, ventilation perfusion (V/Q) mismatch, and a decreased exercise tolerance (Littleton, 2012). Anesthesia providers can increase functional residual capacity by the use of positive pressure ventilation and the reverse Trendelenburg position during induction in patients suspected to be difficult airway or with known pulmonary compromise (Couture et al., 2018). Fernandez-Bustamante et al. (2015) outline a strategy involving protective ventilation with lower tidal volumes (Vt), 8ml/kg of predicted body weight, positive end-expiratory pressure (PEEP) 8-15cmH₂O, early deep breathing post-op, and limited fraction of inspired oxygen (FiO₂) to 80% to prevent reabsorption atelectasis, as well as the use of pressure-controlled ventilation (PCV) (Fernandez-Bustamante et al., 2015). These pulmonary pathologies may increase costs and are associated with poorer outcomes.

Increased Risk for Difficult Intubation

Induction is one of the most critical times for any anesthetic and obese patients require additional expertise and equipment to maintain safety during this phase.

According to Nightingale et al. (2015), obese patients have a 30% greater chance of difficult or failed intubation with a neck circumference greater than 60cm being an easy measure to predict 35% chance of difficult laryngoscopy (Nightingale et al., 2015). In their study, Jong et al. (2014) determined by univariate analysis that assessment of “increased mallampati score, previous difficult intubation, limited mouth opening, reduced mobility of cervical spine, and obstructive sleep apnea syndrome” were indicators of difficult intubation in the ICU and OR (Jong et al., 2014, p. 299). These findings are more common in higher BMI patients increasing the risk for complications, costs, and poorer outcomes.

Increased Risk for Thromboembolism

In the obese population, the importance of anticoagulation prophylaxis is highlighted by the fact that obesity creates a hypercoagulable state creating an increased risk of up to twice that of control according to one study and another found a five-fold increase in risk for patients with a BMI greater than 50 for venous thromboembolism and pulmonary embolism during surgery (Donohoe, Feeney, Carey, & Reynolds, 2011; Werner et al., 2014). While the risk for venous thromboembolism (VTE) and deep vein thrombosis (DVT) is known, it is less clear how to best prevent these complications. The American College of Clinical Pharmacy (ACCP), the Scottish Intercollegiate Guidelines Network (SIGN), the American Academy of Orthopedic Surgeons (AAOS) have published guidelines for patients undergoing TKA based on their clinical risk for VTE. While preventing DVT and VTE is essential in the care of these patients, anesthesia providers must be aware of how the timing and choice of prophylaxis impact their practice as the use of medications impacts the safety profile of common

anesthetic techniques including neuraxial anesthesia. Felvas et al., (2018) recommend prophylaxis be administered either 12 or more hours pre-op or post-operatively with the pre-op timing being a serious concern for anesthesia providers considering a neuraxial approach (Felvas et al., 2018). The New York School of Regional Anesthesia (NYSORA) provides excellent summaries of current guidelines in this regard. An increased risk for VTE and DVT can increase costs and contribute to poorer outcomes.

Increased Risk for Failed Neuraxial Techniques

Orthopedic surgery is often an ideal opportunity to use regional or neuraxial anesthesia techniques either as a sole anesthetic or adjunct for pain control and can be argued as an ideal alternative for an at-risk patient population. However, obesity has been shown as an independent risk factor for peripheral catheter infections with a steady increase with every five unit increase in BMI compared to control groups (Bomberg et al., 2015). Concerning spinal anesthesia, obesity seems to impact the dosage and length of duration of medications chosen. Kim et al. (2015) hypothesize that obesity is a risk factor for a prolonged duration of the spinal block when using hyperbaric bupivacaine when compared to control group (Kim et al., 2015). Obese patients are also more technically challenging to perform nerve blocks on and have a higher risk of block failure with one study finding 1.62 times as likely for a failed block (Donohoe et al., 2011). However, the JC has required, as part of their new performance measures, that patients undergoing TKA have regional anesthesia (The Joint Commission, 2018). Regional techniques offer many benefits, but the pathologies of this patient population incorporate a level of risk that may increase cost and contribute to poorer outcomes.

Increased Risk for Surgical Complications

Surgical complications in the morbidly obese population are higher with one study reporting a local complication rate of 8.8% after primary TKA compared to non-obese patients at 1.5% (Werner et al., 2014). Strategies to reduce surgical complications are numerous and require a team approach; Rezapoor and Parvizi (2015) have suggested delaying surgery with any sign of septicemia, septic arthritis, local cutaneous, subcutaneous or deep infections as well as the cessation of disease-modifying anti-rheumatic drugs (DMARDs) (Rezapoor & Parvizi, 2015). Other recommendations from these authors include smoking cessation up to six to eight weeks ideally, cessation of alcohol consumption up to 4 weeks, limiting traffic in and out of the OR to prevent bacterial counts in the air, a pre-operative shower the night before and morning of, aggressive management of a draining wound to include an I&D with reclosure of the wound if more than five days of drainage is noted (Rezapoor & Parvizi, 2015). The increased risks, costs, and resource usage for the obese patient population undergoing TKA require special consideration for this subgroup to determine risk vs. benefit.

Summary

As BMI increases so do the risks from surgery and anesthesia. Examining wound infections, obese patients are at near twice as likely as their smaller counterparts to experience a post-op infection and have the disadvantage of less effective prophylactic antibiotics (Adhikary et al., 2015; Jung et al., 2017; Rezapoor & Parvizi, 2015). The pathologic changes in both the cardiac and pulmonary systems are particularly concerning for anesthesiologists as there is an increased risk for hypertension, CHF, arrhythmias, OSA, atelectasis, high peak pressures, and increased risk for postoperative

pulmonary complications (Littleton, 2012; Poirier et al., 2006). Airway management is crucial for any patient; however, in obese patients, the risk for difficult intubation is 30% greater (Nightingale et al., 2015). Thromboembolisms are a risk for any patient with life threatening consequences, but the risk is two to five times greater in the morbidly obese patient population (Donohoe et al., 2011; Werner et al., 2014). Neuraxial anesthesia is thought to be a great advantage for patients with complicated cardiovascular or respiratory issues, such as obese patients, but can be technically more challenging in this population with an increased risk for infection or failed block (Bomberg et al., 2015). Finally, the risks for direct surgical complications are also increased in the obese population increased from 1.5% to 8.8% (Werner et al., 2014). Applying this knowledge, anesthesia providers can work to improve the quality of outcomes in this complex patient population.

Specific Aims

The purpose of this BPG is to provide a guide for the practice of anesthesia with obese patients undergoing TKA based on current literature. It will also allow for the measure of knowledge and current practice of anesthesia providers by use of a survey allowing for the identification of areas needing improvement related to patient safety, reimbursement, and quality outcomes. Obese, morbidly obese, and super-obese patients require a comprehensive knowledge of their comorbidities to allow for safe patient selection and to develop a thorough anesthetic plan that takes into account the unique challenges of this patient population.

DNP Essentials

This project meets the eight DNP Essentials. DNP Essential I: scientific underpinnings for practice is met as evidenced by the extensive literature review of the pathophysiologic impact of obesity on the human body. This literature review allowed for the creation of a BPG for rural anesthesia providers currently practicing with obese patients undergoing TKA. DNP Essential II: organization and systems leadership for quality improvement and systems thinking is met by examining and interpreting the data derived from the literature review including increased risk factors and impact of financial efficiency. DNP Essential III: clinical scholarship and analytical methods for evidence-based-practice is met by an extensive literature review and dissemination of this information in form of an executive summary. Included with this is also a survey designed to measure current anesthesia practices in rural Mississippi for the obese patient undergoing TKA in comparison to current EBP found in the literature. DNP Essential IV: information systems/technology and patient care technology for the improvement and transformation of health care is met by the extraction of qualitative data from the included survey given to anesthesia providers which was analyzed for thematic data. The interpretation of this thematic data demonstrates an ability to synthesize information, disseminate, and apply this information to areas of future research.

DNP Essential V: health care policy for advocacy in health care is met by identifying stakeholders in the selected facilities and allows them to be provided with information allowing future policies to be written based upon EBP found in the literature. DNP Essential VI: interprofessional collaboration for improving patient and population health outcomes is met by the examination of the literature and creation of a BPG that

was disseminated to multiple anesthesia providers. DNP Essential VII: clinical prevention and population health for improving the nation's health is met by the analysis of population statistics necessary to write the BPG, concerning obese patients undergoing TKA, environmental data, and the ethical considerations taken into account. DNP Essential VIII: advanced nursing practice is met by the critical examination of a patient population, obese patients undergoing TKA, and the application of advanced practice knowledge, in the specialty of anesthesia, in writing the BPG.

Summary

In conclusion, obese patients undergoing TKA have an increased risk profile for poorer outcomes related to the pathologic changes associated with their increased BMI (Jung et al., 2017). Awareness of these pathologic variances, as well as the implications they hold for patient outcomes is important for anesthesia providers. This BPG aims to be a source of information for anesthesia providers, such that they may adjust their practice in accordance with current EBP to promote optimal outcomes and the conservation of resources. Moreover, the BPG will be assessed for success in implementation via the distribution of an executive summary of the literature, as well as a survey administered to current anesthesia providers. The content and distribution of the survey will be discussed in greater detail in the following chapter on Methodology.

CHAPTER II - Methodology

Context

In accordance with prior literature, the benefits of TKA for the obese patient population include increased range of motion, pain relief, and potential weight loss (Pugely et al., 2013). While TKA performed on obese patients has the opportunity to improve the quality of life for patients, this procedure also impacts outcomes and the financial success of a facility. In every hospital, and particularly in smaller rural hospitals, reimbursement is an important consideration. Werner and colleagues (2014) observed an increased cost of \$250-\$300 per 5 unit increase in BMI over 30 for primary TKA and up to \$600-\$650 for revisions (Werner et al., 2014). Additionally, the pathological variances within the obese patient population must be acknowledged. The pathological changes of obesity influence the patient's heart, lungs, and immune system, and they also create anesthetic challenges for airway manipulation, neuraxial techniques, infection control, and safety concerns. The additional costs along with the unique pathological challenges of this patient population highlight a need for a BPG to guide anesthesia providers to ensure optimal quality outcomes. Obese patients seeking medical interventions represent a growing percentage of the population in the United States, and these patients bring unique considerations that will benefit from a BPG (Adult Obesity Facts, 2017).

Interventions

After reviewing previous literature and assimilating available knowledge, an executive summary will be created and disseminated to the anesthesia providers via email and paper distribution. This executive summary will focus primarily on the pathological

variances within the obese patient population, the impact increased BMI has on reimbursement and current accreditation requirements from the Joint Commission. The group of providers for this project will represent a convenience sample from which data will be collected to determine the impact of the BPG in altering their practice. Participation is voluntary and anonymous through a third-party survey site (e.g., Qualtrics).

Study of the Interventions

Impact of the BPG will be assessed by analyzing qualitative data from the surveys submitted by anesthesia providers. The data will be collected through the survey website and will be examined to find themes. A goal of examining the results is to show where and why current practices deviate from the literature. These deviations from current accepted practice found in professional literature can be discovered by the usage of open-ended questions in the survey. Participants will be asked to respond in regard to their practices.

Measures

After reading the information in the BPG, participants will complete a survey which will take no longer than 15 minutes and the online survey link will be emailed to participants. The survey will consist of ten questions for data collection (see Appendix B). These questions will be worded in such a way to assess current anesthesia practice for this patient population and the qualitative impact of the BPG on the anesthesia provider's practice. The selected questions have been stratified into three domains to better expose thematic data. These domains include the measure of knowledge, the measure of current practice, and the measure of patient safety. The measure of knowledge was chosen to

examine the anesthesia providers' current knowledge base regarding the complexities of obese patients (e.g., pathological deviations and disease processes; see Donohoe et al., 2011) undergoing TKA. The measure of current practice was chosen to identify areas in practice that may deviate between individual practitioners in the same facility and as a way to determine variance from standard practices (e.g., required use of neuraxial anesthesia in patients where it is not contraindicated; see The Joint Commission, 2018). The measure of patient safety was chosen to help determine where and if patient safety can be improved based upon the practitioners' answers compared to national standards (e.g., increased risk of falls; Wasserstein et al., 2013).

Analysis

The data collected from the current project will be exploratory and qualitative in nature. As mentioned above, thematic data will be assessed from the questions in the survey. Once results have been acquired from the surveys, evaluation of the data will show themes in the answers that can be interpreted. The responses from these questions will be coded in such a way as to quantify the themes that arise from the survey. The structuring of this thematic data into quantitative numbers will aid in determining and analyzing the results. Moreover, data will be analyzed further to examine the impact of the BPG on anesthesia practice within this convenience sample. Should the current BPG prompt a practice change in the anesthesia providers of the sample, this change could indicate that future research can be used to determine the impact within a larger population and the overall generalizability of these results.

Ethical Considerations

Ethical considerations must take into account the possible change in practice resulting from the BPG. These changes of practice could impact patient care for obese patients or those perceived to fit into this category undergoing TKA. While all changes are intended to be positive, it must be acknowledged that there is a risk in the change of practice from what an anesthesia provider is accustomed to. Interventions mentioned in the BPG for the obese patient undergoing TKA should not be excluded or included in other patient populations based on BMI alone but should rely on the anesthesia provider's clinical judgment.

Summary

While TKA for obese patients has been indicated to improve mobility, provide pain relief, and a potential for weight loss, this procedure is not without risks (Pugely et al., 2013). Increased cost to a facility is only one concern for this patient population for which pathologic variances must be taken into account prior to anesthesia. To provide a safe anesthetic, providers must take into account the multiple pathologic changes associated with the obese patient population. The creation of a BPG based upon EBP will help guarantee the safest anesthetic techniques or chosen for this complex patient population. Concordantly, the practice of anesthesia can be studied to identify areas of improvement and for future research via the use of a short survey. Should any change in practice take place as result of the BPG the anesthesia provider's clinical judgment should determine which interventions are appropriate for each patient.

CHAPTER III - Results

Responses were collected over a period of five weeks to allow for adequate opportunities for participants to read, review, and respond to the BPG survey. Responder data ($N=2$) for open-ended survey questions were reviewed. These data were collected using Qualtrics software through anonymous email survey to a convenience sample including CRNAs from two rural hospitals in Mississippi. Survey questions were categorized into one of three domains (i.e., knowledge, practice, and safety). Responses were analyzed and interpreted in accordance with these domains.

Regarding the domain of knowledge, two responders reported an observed need for a BPG for the obese patient population undergoing TKA. Prior to reviewing the provided BPG, one responder reported insufficient knowledge regarding the obese population undergoing TKA and one responder reported having sufficient knowledge for this population. The responder who reported insufficient knowledge further specified that the provided BPG informed them of the importance to elevate the head of the bed on induction.

In the domain of practice, both responders reported utilizing neuraxial anesthesia techniques for obese patients undergoing TKA. These neuraxial techniques included “frequent spinals, SAB+Adductor Canal or Femoral blocks.” One responder reported no screening procedures (e.g., OSA, difficult intubation, antibiotic prophylaxis) for obese patients undergoing TKA and one responder reported using screening procedures. At the facility level, one responder reported standardization of practice for this patient population and one responder reported no standardized mechanism with “everyone do[ing] their own thing.”

In the domain of patient safety, two responders reported regularly providing services to obese patients undergoing TKA. At the facility level, one responder reported that their facility does not currently meet the needs of obese patients undergoing TKA and one responder reported that their facility “somewhat” meets the needs for this patient population. Further specific information was not provided from responders to describe the patient safety needs in their facility.

Summary

After five weeks of data collection, results were examined. Two respondents participated in the study after reviewing the BPG and answered all survey items. In the domain of knowledge, both respondents indicated a need for a BPG for obese patients undergoing TKA. One reported having sufficient knowledge while the other reports insufficient. In the domain of practice both respondents indicated using neuraxial techniques for obese patients undergoing TKA including spinals, “SAB+ adductor canal or femoral blocks.” One respondent indicated not using screening tools for OSA, difficult intubation, or antibiotic prophylaxis while the other did. There were also conflicting reports for standardized practice at the facility level with one responder indicating a standardized approach and the other, “everyone do[ing] their own thing.” In the domain of patient safety, both respondents indicate a frequent practice with obese patients undergoing TKA. However, one provider reported their facility does not currently meet the needs of this population while the other reports their facility “somewhat” meeting the needs of the patient population. The responses, categorized into the domains, can be used to discover areas of future research and starting point for new policies written to address concerns and needs of patients based on EBP.

CHAPTER IV – Discussion

Obese patients represent a growing percentage of the American population and often present to the OR with multiple comorbidities (Adult Obesity Facts, 2017); therefore, anesthesia providers must be aware of the implications an increased BMI may have upon their practice. Participants were provided with an executive summary of the BPG to read and review prior to completing the anonymous email survey and resulted in two responders. Qualitative data has been analyzed and filtered into three domains: the measure of knowledge, the measure of current practice, and the measure of patient safety.

In the measure of knowledge, both responders indicated a need for a BPG for the obese patient population undergoing TKA. One of the respondents reported a sufficient knowledge of the patient population, but the other indicated insufficient knowledge. No further information is known to differentiate the two opinions (e.g., years of experience and location of practice) and self-report bias must be taken into account when considering these responses. Also noted under the domain of knowledge, the respondent that indicated an insufficient knowledge for this population indicated an area of potential practice change by increasing the head of the bed during induction.

In the domain of patient safety, both respondents reported regular experience with obese patients undergoing TKA; however, both responded negatively when asked if their facility was meeting the needs of this patient population. One responder indicated their facility “somewhat” met the needs while the other indicated “no” to their facility meeting the needs of this patient population. These answers could potentially indicate a need for further research into patient safety concerns. When asked if the facility has procedures in place to screen obese patients for increased risk factors (e.g. OSA, difficult intubation,

antibiotic prophylaxis), one respondent indicated “yes” and the other “no.” Conflicting responses could indicate an area of future educational opportunities for the CRNAs at these facilities and an opportunity for future research.

In the domain of practice, both responders indicate the use of neuraxial anesthesia as part of their practice for this patient population. When queried about the types of regional/neuraxial anesthesia, one responder mentions “spinal” only while the other indicated both “spinal” and “adductor canal or femoral” blocks. These responses are positive as current literature suggests regional/neuraxial techniques provide multiple benefits to this patient population and have been accepted by the joint commission as a performance measure (The Joint Commission, 2018). An opportunity for future research and an educational opportunity is noted from the response of “femoral” for regional anesthesia as this is a known safety concern for quadricep muscle weakness following TKA and can lead to patient falls (Wasserstein et al., 2013). When questioned if the anesthesia providers at this location were using a standardized approach to their practice for the obese patient population undergoing TKA, one respondent indicated yes while the other mentions “everyone doing their own thing.” These conflicting reports outline an area of future study as it could be an area for improvement among the CRNAs in these locations.

Limitations to Current Project

Notable limitations to this project include small sample size and the questions asked and timeframe. The convenience sample chosen for this project represents two rural hospitals in Mississippi that frequently provide care for obese patients undergoing TKA. The response rate ($N=2$) limits the generalizability of the results to a larger

population. The questions provided via the survey, while stratified into domains to further aid qualitative analysis, are open-ended and cannot be applied to a larger population. Rather, the data collected from the survey should be used to facilitate future research and projects in this location. Time allotted for the response was five weeks. This short period could explain the limited number of respondents and future projects should allow for a longer sample period to collect more data.

Conclusion

This BPG aims to be a reference of current EBP for anesthesia providers as they practice with the obese patient population undergoing TKA. The impact of this BPG was assessed using qualitative data collected via an anonymous email survey. Respondents indicated many areas for future research including opportunities for further education, areas of practice change, and areas for improved patient safety. Notably, limitations were found to be low respondent volume and time allotted for data collection. These indicators paired with increased sample size and data collection period could address the limitations found in the current study. Adjusting the sample size, moving beyond a convenience sample in one state, and increasing the time allotted for data collection should capture more responses. With these changes to study design more qualitative data could be collected exposing themes that can be better applied to the broader population. As the American population changes are paramount anesthesia providers continue to be equipped to practice safely and efficiently. The information included in this BPG can be used to allow anesthesia providers to continue to provide safe care to this complex patient population

APPENDIX A – DNP Essentials

The Doctor of Nursing Practice (DNP) essentials has been met as follows

Essential I: Scientific Underpinnings for Practice- This project includes an extensive literature review of obesity's impact on the pathophysiologic, biochemical, and patient safety principles on the human body. By examining current literature, the student identified areas of importance to distribute in the form of a best practice guideline (BPG) to practicing anesthesia providers.

Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking – This project includes data derived from literature review including a large patient population (obese patients undergoing total knee arthroplasty), patient safety (outlined by examining risk for falls, infection, difficult intubation, ventilation, variance in practices), efficiency (as outlined by a cost analysis based upon patient BMI and length of stay). The BPG provides information to improve the target facilities economic outlook (encourages increased regional anesthesia to decrease pain and length of stay.) This project examines the impact of national accreditation agencies on anesthesia practice for the target patient population (The Joint Commission, 2018).

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice – This project involves an extensive literature review of the impact of obesity on the human body and the dissemination of this knowledge to current anesthesia providers. Included in this is the project is a survey of current practice designed to evaluate current anesthesia practice compared to current EBP in the literature. This information, gained from the included survey, can be used to further develop research programs or to implement a practice change at the clinical sites evaluated.

Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care – Data was extracted from a qualitative survey and analyzed for themes. This demonstrates the ability to synthesize information, disseminate, and apply for areas of future research.

Essential V: Health Care Policy for Advocacy in Health Care – This project identified stakeholders in the selected facilities that were provided tailored information accordingly to influence future policies to be written based upon EBP in the current literature.

Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes – This project demonstrates an ability to synthesize information allowing for the creation of the BPG which was disseminated to multiple anesthesia providers.

Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health – This project require the analysis of population statistics (obese patients undergoing TKA), environmental data (hospital specific concerns), and took into account ethical considerations (implications of denying obese patients services).

Essential VIII: Advanced Nursing Practice – This project demonstrates an ability to examine a patient population critically by the analysis of the pathophysiologic implications of obesity, as well as, the application of this knowledge into a practice specialty (anesthesia). Further, the creation of the BPG demonstrates the ability to guide other nurses and healthcare providers to achieve excellence.

APPENDIX B – Survey Questions for Best Practice

Guidelines DNP Project

Please read and respond to the questions below after you have finished reviewing the BPG.

Measure of Knowledge

1. Have you observed a need for a BPG for this patient population?
2. Did you feel your knowledge prior to reading the summary included with the BPG was sufficient?
3. Did the summary included in the BPG expose you to a new technique or knowledge?

Measure of Current Practice

4. Will this BPG influence your current anesthesia practice for obese patients undergoing TKA? If so, in what way?
5. Do you regularly provide anesthesia for obese patients undergoing TKA?
6. Do you feel your facility meets the needs and expectations of your obese patients undergoing TKA?
7. Is neuraxial anesthesia a common part of your anesthesia practice for obese patients undergoing TKA?
8. What neuraxial or peripheral nerve block techniques do you use for obese patients undergoing TKA?

Measure of Patient Safety

9. Does your facility currently have procedures in place for screening obese patients undergoing TKA for increased risk factors (e.g., OSA, difficult intubation, antibiotic prophylaxis)?
10. Do you feel that the current practice in your facility is standardized between providers to accommodate the needs of obese patients undergoing TKA? If not, why?

APPENDIX C – IRB Approval Letter

Office of
Research Integrity



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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.

PROTOCOL NUMBER: IRB-19-38

PROJECT TITLE: IMPACT OF OBESITY BEST PRACTICE GUIDELINE STATEMENT ON ANESTHESIA PRACTICE IN RURAL MISSISSIPPI

SCHOOL/PROGRAM: School of LANP, Leadership & Advanced Nursing

RESEARCHER(S): Steven Hodnett, Nina McInain

CATEGORY: Exempt

Category 2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

APPROVED STARTING: February 19, 2019

A handwritten signature in cursive script that reads "Donald Sacco".

Donald Sacco, Ph.D.

Institutional Review Board Chairperson

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