Fall 12-2016

Parturient Safety: Proper Positioning Education Prior to Neuraxial Anesthesia

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PARTURIENT SAFETY: PROPER POSITIONING EDUCATION

PRIOR TO NEURAXIAL ANESTHESIA

by

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A Capstone Project
Submitted to the Graduate School
and the Department of Advanced 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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December 2016

Published by the Graduate School

ABSTRACT

PARTURIENT SAFETY: PROPER POSITIONING EDUCATION PRIOR TO NEURAXIAL ANESTHESIA

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December 2016

In the United States, 61% of parturient patients elect neuraxial anesthesia for labor pain (Koyyalamudi et al., 2016). The incidence of postdural puncture headache is estimated up to 81% following accidental dural puncture-especially in pregnant women receiving elective epidurals (Ragab & Facharzt, 2014). Although the combined rates of complications for spinal and epidural anesthesia are low (2.78%) (American Society of Anesthesiology, 2014), patient safety is extremely important and should be addressed by the overall healthcare system. The purpose assessed a willingness to change which focused on the CRNAs incorporation of proper positioning education prior to neuraxial anesthesia into their plan of care. Current and past literature was synthesized to offer a practice change recommendation to Certified Registered Nurse Anesthetists at three local hospitals in Southeastern Mississippi. The recommendation described the benefits of educating parturient patients prior to neuraxial anesthesia. Thirty-four Certified Registered Nurse Anesthetists took part in a survey after the presentation of evidence regarding parturient education prior to neuraxial anesthesia. All of the participants agreed to incorporate proper positioning education into their plan of care for the parturient population prior to neuraxial anesthesia. Descriptive and nonparametric statistics were used to analyze the data. This practice change supports patient safety initiatives outlined by the Institute of Medicine and American College of Obstetricians and Gynecologists.

Keywords: *PDPH, postdural puncture headache, post dural puncture headache, post-dural puncture headache, patient positioning, spinal anesthesia, epidural anesthesia, regional anesthesia, neuraxial anesthesia, spinal headache, parturient education, obstetric safety, patient safety, labor pain*

ACKNOWLEDGMENTS

I would like to offer a special thanks to Dr. Vickie Stuart for helping me establish a foundation for this capstone project. Also, I would like to thank Dr. Patsy Anderson, my committee chair, and my other committee members, Dr. Cathy Hughes and Dr. Marjorie Geisz-Everson for offering me their guidance and expertise throughout the evolution of this project.

DEDICATION

First and foremost, I would like to give honor to God; He has kept me and gave me the strength to endure this rigorous program! Also, I would like to thank my mother, Marnice Young, for supporting my education and encouraging me to follow my dreams!

I am giving a special thanks to my family and friends; I thank all of you for supporting my decision to move far away from home in efforts to obtain my Doctor of Nursing Practice degree. Thank you.

TABLE OF CONTENTS

ABSTRACT ii

ACKNOWLEDGMENTS iv

DEDICATION v

LIST OF TABLES ix

LIST OF ILLUSTRATIONS x

LIST OF ABBREVIATIONS xi

CHAPTER I - INTRODUCTION 1

Problem Statement 1

Background 2

Significance 2

Purpose of Project 3

Clinical Question 4

CHAPTER II – REVIEW OF LITERATURE 5

Parturient Education 7

Safety Initiatives 9

Preventive Techniques 12

Postdural Puncture Headache 15

Positioning 17

Financial Implications 19

CHAPTER III - THEORETICAL FRAMEWORK 21
Theoretical Background 21
Theoretical Explorations 22
Theoretical Application 23
Theoretical Analysis 24
CHAPTER IV – METHODOLOGY 25
Design and Target Population 25
Detailed Procedure 26
Population and Setting 27
CHAPTER V – RESULTS 28
Barriers and Limitations 31
The Essentials of Doctoral Education for Advanced Nursing 32
Essential One: Scientific Underpinnings for Practice 33
Essential Two: Organizational and Systems Leadership for Quality Improvement and Systems Thinking. 34
Essential Three: Clinical Scholarship and Analytical Methods for Evidence-Based Practice. 34
Essential Four: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Healthcare. 35
Essential Five: Healthcare Policy for Advocacy in Healthcare. 35

Essential Six: The Inter-Professional Collaboration for Improving Patient and Population Health Outcomes. 35

Essential Seven: Clinical Prevention and Population Health for Improving the Nation's Health. 36

Essential Eight: Advanced Nursing Practice. 36

CHAPTER VI – SUMMARY 37

Summary of Findings 37

Outcomes 37

Implications for Nursing Practice 38

Future Recommendations 38

Conclusion 39

APPENDIX A – Review of Related Literature Matrix 42

APPENDIX B – Consent 53

APPENDIX C – Survey 54

APPENDIX D – Poster Board Presentation Outline 56

APPENDIX E – IRB Approval Letter 57

APPENDIX F – Facility Approval Letter 58

REFERENCES 59

LIST OF TABLES

Table 1 Sample Demographic Characteristics 28

Table A1. Positioning Complications 42

Table A2. Patient Education 51

Table A3. Financial Implications 52

LIST OF ILLUSTRATIONS

Figure 1. Willingness to Change Results 30

LIST OF ABBREVIATIONS

AHRQ	Agency for Healthcare Research and Quality
BLT	Behaviorist Learning Theory
CDC	Center for Disease Control and Prevention
CSF	Cerebral Spinal Fluid
CRNA	Certified Registered Nurse Anesthetist
DNP	Doctorate of Nursing Practice
IOM	Institute of Medicine
IRB	Institutional Review Board
IHS	International Headache Society
NA	Neuraxial Anesthesia
PDPH	Postdural Puncture Headache
SRNA	Student Registered Nurse Anesthetist

CHAPTER I - INTRODUCTION

In the late 1800s, spinal anesthesia was discovered. In the early 1900s, the literature reflected headache as a complication in 50% of subjects receiving spinal anesthetics. Presently, postdural puncture headache (PDPH) remains a disabling complication of needle insertion into the subarachnoid space (Turnbull & Shepard, 2003). Currently, "61% of women delivered in the USA receive regional analgesia for the relief of labor pain" (Koyyalamudi et al., 2016, p.11). Some authors suggested that the risk of PDPH is less with spinal anesthesia; however, the incidence of PDPH is estimated up to 81% following accidental dural puncture while placing epidurals-especially in pregnant women (Ragab & Facharzt, 2014). The increasing utilization rate of neuraxial anesthesia (NA) for pain relief places the obstetric population at an increased risk for postdural puncture headache.

The complications of PDPH impair a mother's ability to care for herself and her baby which disrupts mother-infant interaction (Aphel et al., 2010; Bradbury, Singh, Badder, Wakely, & Jones, 2013; Turnbull & Shepard, 2003). It is important to prevent the complications of PDPH in the clinical setting. For the purpose of this study neuraxial anesthesia will include single shot spinals and epidural catheter insertions.

Problem Statement

It is unclear whether parturients understand how to position themselves prior to NA. An educational demonstration or discussion focused on proper positioning may be beneficial for this population. Jackson, Henry, Avery, VanDenKerkhof, and Milne (2000) stated that laboring women had a moderate understanding of risks associated with neuraxial anesthesia. Moreover, "anesthesiologists are among the least likely to have

educated a patient about epidural analgesia" (p. 1071). It appears that there is a lack of communication between parturients and anesthesia providers regarding NA education. Therefore, preemptive education may help improve the parturients understanding as demonstrated by her correct body positioning prior to insertion of spinal and epidurals. Improving education is a simple and cost effective tool that could help decrease complications of PDPH. There is no clear consensus on the best preventive method for PDPH following accidental dural puncture. Currently, there is a lack of information in the literature on incorporating proper positioning education as a method of reducing PDPH for the parturient patient.

Background

Neuraxial anesthesia is a popular choice for management of labor pain. NA is the gold standard for labor analgesia in the obstetric population which places them at increased risk for developing PDPH (Koyyalamudi et al., 2016). Other authors agreed that PDPH is higher in parturient patients as compared to other patients due to age and gender (Fattahi, Hadavi, & Sahmeddini, 2015). According to Choi et al. (2003), there is a 1 in 67 risk of accidental dural puncture with epidural insertions whereas PDPH associated with single shot spinals were 1 in 59 parturients.

Significance

The quoted incidence of postdural puncture headache complications has been less than 3% (ASA, 2014; Candido & Stevens, 2003) but can be as high as 81% with accidental dural puncture with epidural insertions (Ragab & Facharzt, 2014). In 2012, it was estimated that 51% of parturients received epidurals (Harkins, Carvalho, Evers, Mehta, & Riley, 2010). However, the utilization rate increased to 61% for women in the

United States (Koyyalamudi et al., 2016). Hamilton, Martin, Osterman, Curtin, and Mathews (2015) stated that "there were 3.978 million births in the United States in 2015" (Hamilton et al., 2015, Demographic Characteristics section, para. 1). Koyyalamudi et al. (2016) stated that 61% of Women utilized regional anesthesia for labor pain management and according to the authors, 2.43 million women in the United States may have opted for neuraxial analgesia in 2014, per the statistics provided by Hamilton et al. (2015). When using the incidence of accidental dural puncture rates of 81% that were provided by (Ragab & Facharzt, 2014), the accidental dural puncture rates could have been as high as 3.22 million in 2014. The Mississippi State Department of Health provided an illustration describing the total births in Mississippi to be 46,455 (Mississippi State Health Department, 2007). Therefore, approximately 23,337 (according to Koyyalamudi et al., 2016) women opted for regional anesthesia for labor pain control and up to 37,628 parturients experienced postdural puncture headache complications in 2007 per the statistics provided by Ragab and Facharzt (2014).

The incidence of PDPH is increasing and parturient education prior to NA could be used to help reduce complications. This iatrogenic complication may be reduced with the institution of proper positioning education prior to neuraxial anesthesia incorporated into anesthesia providers plan of care. Therefore, teaching the parturient how to properly position prior to NA may improve outcomes and reduce complications of PDPH.

Purpose of Project

The purpose of this project is to measure the Certified Registered Nurse Anesthetists willingness to change which focused on the CRNAs incorporation of proper positioning education prior to neuraxial anesthesia into their plan of care. There is a need

for proper positioning education prior to neuraxial anesthesia for the parturient population. A literature search that included patient education, patient safety, PDPH, preventative techniques for reducing PDPH, PDPH description, positioning and financial implication of complications associated with neuraxial anesthesia was undertaken and synthesized. Based on available literature, a recommendation was made to the anesthesia providers in three local hospital facilities in Southeastern Mississippi. The recommendation encouraged anesthesia providers to incorporate proper positioning education into their plan of care prior to neuraxial anesthesia for the parturient population. Once the recommendation was made, the anesthesia providers willingness to incorporate proper positioning education prior to neuraxial anesthesia into their plan of care was assessed.

Clinical Question

Is there a willingness to change practice when anesthesia providers at three local hospitals in Southeastern Mississippi are provided with evidence on parturient safety prior to neuraxial anesthesia?

CHAPTER II – REVIEW OF LITERATURE

The literature search was carried out using Scopus, MEDLINE, CINAHL, SciVerse, ScienceDirect, SpringerLink, Ovid, JSTOR, and EBSCOhost. Various sources were identified, references were located and screened for relevancy for anesthetic considerations related to patient education, patient safety, complication reduction for postdural puncture headache, financial implications, positioning and patients experiencing postdural puncture headache after neuraxial anesthesia from 1987-2016. After all relevant references were reviewed, the sources were organized and integrated into this review. Keywords used included PDPH, postdural puncture headache, post dural puncture headache, post-dural puncture headache, patient positioning, spinal anesthesia, epidural anesthesia, combined spinal epidural, regional anesthesia, neuraxial anesthesia, spinal headache, headache, anesthesia and analgesia, parturient education, obstetric safety, patient safety, obstetric safety guidelines and financial implications for PDPH. Relevant recent research that contained, education, body mechanics, labor pain, alternate pain modalities, prophylactic spinal pain reduction, and anecdotal spinal pain treatments and financial issues associated with NA were included in to the review. One hundred twenty-three relevant articles were reviewed for inclusion; 33 articles were chosen on the topic. Research studies containing parturient education, safety, PDPH, PDPH prevention positioning and financial implications are included in the following review.

The literature lacks a standardized educational description of proper positioning prior to neuraxial anesthesia for the parturient patient. Furthermore, there is no evidence available that mentions that proper positioning education is used to reduce complications associated with PDPH. Although, some authors mentioned positioning for epidural

placement, the actual process before the active stage of labor has not been discussed. In several studies, proper positioning education was never stated to have been given to any of the parturients prior to NA (Aphel et al., 2010; Eckle & Grasshoff, 2015; Hermandies Hollmann, Stevens, & Lirk et al., 2012). The authors do offer a more detailed explanation of positioning prior to epidural placement; however, the description is directed towards the anesthesia provider and not the patient. The authors agreed that parturients usually place their legs over the edge of the bed and put their feet upon a stool and arch their back outwards. Lastly, Shankar, Rajput, and Murugiah (2015) provided an illustration of lateral positioning for epidural placements. The authors described that flexing the spine in the lateral decubitus position to the maximum extent possible by drawing the knees to the chest and flexing the neck produced proper positioning for regional blockade. The authors did not mention explaining this positioning to the parturient; the description was provided for the anesthesia provider. It is clear that education prior to NA is neither provided to parturients nor other populations receiving NA (Abo, Chen, Johnston, & Santucci, 2010; Podder, Kumar, Yaddanapudi, & Chari, 2004; Thundiyil, O'Brien, & Papa, 2007).

Throughout the reviewed literature, PDPH has been described as a complication following dural puncture. The authors agreed that proper patient positioning is important for successful regional blockade (Bezove, Ashina, & Lipton, 2010; Podder et al., 2004; Ragab & Facharzt, 2014), but there is no detailed approach for proper positioning education available for the parturient patient. Additionally, the reviewed literature expanded on headache as a major symptom of epidural complications as well as nausea and vomiting, neck stiffness, tinnitus, hypacusia (decreased hearing ability) or

photophobia, increased hospital stays and visits. Some authors specifically stated that parturients "are unable to care for themselves or their babies" while experiencing symptoms of PDPH (Bradbury et al., 2013, p. 417) and "[PDPH] often interferes with mother-infant interaction" (Van de Velde, Schepers, Berends, Vandermeersch, & De Buck, 2009, p. 329). Klein and Loder (2010) mentioned that "75% of women with medically recognized PDPH reported that it limited their activities" (p. 426). Although, some descriptions of positioning prior to epidural placement are provided in the literature, it is unclear if these descriptions of proper positioning are beneficial in reducing the complication of PDPH. The current descriptions of proper positioning are not geared towards the parturient patient. Gaps in the literature for educational interventions for the reduction of PDPH remain; educating patients regarding proper positioning prior to NA has not been suggested. The review of literature suggests that education prior to NA may reduce complications of PDPH.

Parturient Education

The Agency for Healthcare Research and Quality (AHRQ, 2001) provided a guideline summary for parturients receiving neuraxial anesthesia during labor. The guideline offered evidence-based clinical practice recommendations for nursing assessment and management of women undergoing obstetric neuraxial pain management. In the section titled, *Scope*, patient education was listed under interventions and practices to be considered (section 3). This guideline suggested that nurses provide education about various analgesic options as needed. However, no description regarding proper positioning education prior to NA was available. An expected outcome from AHRQ's recommendation was for the healthcare providers to assess the women's knowledge of

neuraxial anesthesia, prepare her, and intervene as needed to minimize untoward effects. This guideline supports the need for parturient proper positioning education prior to neuraxial anesthesia. Milligan argued that "the process of making significant moves towards patient safety culture requires changes in healthcare education" (Milligan, 2007, p. 95). Therefore, education prior to neuraxial anesthesia should be made available to the parturient patient. Patient safety is a shared priority because unnecessary harm is occurring in the process of treating and caring for patients (Institute of Medicine ([IOM], 2000). Healthcare education can make a great contribution towards creating a culture of safety; therefore, a learning environment provided for parturients may reduce complications associated with NA. Similarly, the ASA (2007) practice guidelines for obstetric anesthesia did not mention patient education for the reduction or management of complications associated with PDPH.

Furthermore, knowledgeable parturients consider headache, bed confinement and prolongation of labor least important when consenting for an epidural. The authors discussed that the "ability to understand" neither correlated with age, anxiety level, pain level, desire for an epidural or duration of labor nor was affected by level of education, previous epidural experience, and opioid premedication" (Jackson et al., 2000, p. 1068). Moreover, patient education is mentioned by some authors but it is not specific to NA and PDPH reduction. There is a large gap in the literature regarding parturient education and NA complication reduction. Although strong support for parturient education prior to NA is not currently available, it is always a viable option when attempting to improve patient safety.

Safety Initiatives

As the healthcare system grows more complex, the opportunity for error increases. The Institute of Medicine (IOM, 2000) released a report titled, *To Err Is Human: Building a Safer Health System.* The authors stated that humans in all lines of work make errors; "errors can be prevented by designing systems that make it hard for people to do the wrong thing and easy for people to do the right thing" (IOM, p. ix, 2000). In healthcare, building a safer system means designing processes of care to ensure that patients are safe from accidental injury (IOM, 2000). The report listed additional recommendations that would improve patient safety:

1. Ongoing "accreditation processes for health professionals should place greater attention on safety and performance skills" (IOM, 2000, p. 12).
2. Create an environment that assures that organizations identify errors, this evaluates causes and takes suitable actions to improve performance.
3. Develop and adopt standards to form expectations for safety among providers and consumers. These expectations and standards are not only set by regulations both by purchasers' and consumers. These are practical standards for healthcare professionals, the organizations in which they work, and the tools they use to care for patients.
4. Create "a highly visible [health] center with secure and adequate funding, the center would establish goals for safety; develop a research agenda; define prototype safety systems; develop and disseminate tools for identifying and analyzing errors and evaluate approaches taken; develop tools and methods for educating consumers about patient safety; issue an annual report on the

state of patient safety, and recommend additional improvements as needed" (IOM, 2000, p. 7).

The American College of Obstetricians and Gynecologists (ACOG) has committed to improving quality and safety in women's healthcare. ACOG's Committee on Patient Safety and Quality Improvement agreed that patient safety was extremely important and should be addressed by the overall healthcare system. In the year 2000, the release of IOM's report stimulated ACOG's (2015) patient safety committee to create several patient safety objectives:

- Objective I, Develop a commitment to encourage a culture of patient safety, "Safety should be viewed as an essential component of a broader commitment to the provision of optimal healthcare for women. Promoting safety requires that all those in the healthcare environment recognize that the potential for errors exists systemically. Women's healthcare should be delivered in a learning environment that encourages disclosure and exchange of information in the event of errors, near misses, and adverse outcomes" (American College of Obstetricians and Gynecologists (ACOG), 2015, section 2);
- Objective IV, Improve communication with healthcare providers, The "communication between all members of the healthcare team is a crucial element in patient safety" (ACOG, 2015, section 4). While analyzing sentinel events, The Joint Commission found nearly two thirds of the events involved communication failure as a root cause (The Joint Commission, 2004);
- Objective V, Improve communication with patients "Communication is a core element of the physician–patient relationship and is essential for the

delivery of high quality, safe patient care. Open communication and transparency in healthcare will increase trust, improve patient satisfaction, and may decrease liability exposure" (ACOG, 2015, section 5);

- Objective VI, Establish a partnership with patients to improve safety. Patients who are involved in making their healthcare decisions have better outcomes than those who are not involved in their care; and
- Objective VII, Make safety a priority in every aspect of practice "Emphasizing compassion, communication, and patient-focused care will aid in creating a culture of excellence. Opportunities to improve patient safety should be used whenever identified" (ACOG, 2015, section 7).

Crossing the Quality Chasm: A New Heath System in the 21st Century (IOM, 2001) was issued by IOM. The discrepancy between perceived care given and the actual care received was discussed. Six aims were created in attempts to bridge the gaps in healthcare for Americans, the first aim focused on patient safety. Patients should never be harmed by care that is envisioned to help them. A redesigned healthcare system that makes safety a function of design instead of the individual healthcare provider's responsibility would contribute significantly to patient safety improvements. Two other aims included by IOM (2001) are: effectiveness, providing services based on scientific knowledge to all who could benefit, and refraining from providing services to those not likely to benefit. Some other objectives were described such as patient-centeredness, delivery of care that is respectful of and supportive of individual patient needs, values and preferences; efficiency, prevent waste, including waste of equipment, supplies, ideas, and energy; and equitability, healthcare facilities should provide care that does not vary

in quality because of personal characteristics such as, ethnicity, gender, and socioeconomic status. A healthcare system that makes gains in these six areas will be better equipped to meet the needs of Americans.

Best Care at Lower Cost: The Path to Continuously Learning Healthcare in America was published by IOM in 2012. Two recommendations were specific to patient safety when considering parturient education and the reduction of complications. Recommendation 7 supports patient safety by applying systems engineering tools and process improvement methods to improve operations and care delivery processes. It is suggested that "healthcare delivery organizations utilize systems engineering tools and process improvement methods to eliminate inefficiencies, remove unnecessary burdens on clinicians and staff, enhance patient experience, and improve patient health outcomes" (IOM, 2012, p. 3). A safety system mechanism could include patient education. Recommendation 9 listed a strategy for progress toward healthcare transparency goals which suggested that the availability of information on the safety, quality, prices and cost, and health outcomes of healthcare delivery organizations should be collected and expanded. When healthcare professionals incorporate many recommendations and guidelines set forth by accredited agencies, an improvement in positives health outcomes may be realized by Americans.

Preventive Techniques

Much of the literature discussed treatments for PDPH and does not focus on preventative measures such as proper positioning education prior to neuraxial anesthesia (NA). However, many articles do discuss attempts to reduce the occurrence of PDPH. There is strong evidence that lumbar punctures are reduced when using noncutting

needles for NA (Bezove et al., 2010). Reducing the needle size and type has made an impact on the incidence of PDPH. Turnbull and Shepard (2003) stated that the decrease in PDPH paralleled needle size: "~70% with a 16G Tuohy needle" (p. 721); "~40% with a 22G needle; 25% with a 25G needle; 2-12% with a 26G Quincke needle; and <2% with a 29G needle" (p. 720). Needle orientation and design has been utilized to reduce complications as well (i.e. facing bevel of needle lateral to spinal column to reduce tearing of meninges) (Barash et al., 2013).

Various treatments including intrathecal catheter insertion post accidental dural puncture, epidural saline or morphine injections, and prophylactic blood patches have been studied. Some of the studies have shown some efficacy; however, no clear recommendations can be made for prevention of PDPH (Apfel et al., 2010). One study evaluated the effect of ondansetron (Zofran) on decreasing the incidence of PDPH. The authors found that intravenous ondansetron could be effective in the prophylactic management of PDPH in parturients undergoing elective cesarean section under spinal anesthesia (Fattahi et al., 2015). Other simple therapies such as bed rest, rehydration, supine positioning, and abdominal binders have been employed, but did not provide complete relief. Although supine positioning is recommended, Barash and colleagues (2013) stated that "there is no evidence that keeping the patient supine reduces the incidence of PDPH" (p. 926). Desmopressin acetate, adrenocorticotrophic hormones, caffeine, Sumatriptan, epidural dextran, and fibrin glue are ineffective pharmacological treatments employed for PDPH (Turnbull & Shepard, 2003). Persistent cerebral spinal fluid leaks unresponsive to treatment are escalated to surgery for dural perforation

closure. Although the literature lists numerous techniques for the preventions of PDPH, parturient education prior to neuraxial anesthesia was never mentioned.

It was suggested that particular attention is made to technique in patients between the ages of 20 and 40 years; parturients in this age group are highly prone to PDPH (Morewood, 1993). The low cost of incorporating education into the anesthetic plan and the potential benefits received by parturient patients makes an educational intervention an option for reducing the complication of PDPH. Despite the high number of studies addressing the incidence of PDPH in parturient populations, research is lacking in the use of a standard educational program that would help reduce complications associated with NA. Currently, there is no evidence that any method causes a significant reduction in accidental dural puncture (Bradbury et al.). Therefore, it is beneficial to explore educational techniques in an attempt to reduce complications of PDPH.

Mansutti, Bello, Calderini, and Valentinis (2015) identified nurses and questions about lumbar puncture, related nursing interventions and post-dural puncture headache - PDPH and found answers in the available literature. The authors found that atraumatic needles, the small arm adjustment during needle puncture, and needle positioning in cranial direction and the spindle reintegration reduce the risk of PDPH. There has been insufficient evidence on the effectiveness of “extra” hydration, however, adequate hydration must be achieved. Conflicting results about the position during the procedure and the potential link between CSF volume taken and PDPH emerged. The review undertaken by the authors discussed that atraumatic needles, small gauge, bevel orientation, cranial insertion and reinsertion stylet are variables that reduced the risk of PDPH. They also found that bed rest has no efficacy in reducing the complication of

PDPH. More research is needed to study the efficacy of other interventions. Uncertainty remains regarding patient positioning during the procedure, the volume of cerebrospinal fluid withdrawn, hydration, and the analgesic efficacy of drugs (Mansutti et al., 2015).

Postdural Puncture Headache

Female sex, young age and pregnancy are factors that increase the risk of PDPH (Butterworth, Mackey, & Wasnick, 2013). Some authors listed headache as the primary symptom for PDPH (Barash et al., 2013; Trumbull & Shepard, 2003). The differentiating characteristic for PDPH is increasing in severity of pain when in an upright position. There is potential for considerable morbidity and even death with complications of PDPH. Women experiencing symptoms of a PDPH describe it to be searing and spreading like hot metal radiating down the front and sides of the head and is aggravated in the standing position and diminishes in the supine position. This pain spreads down through the neck and shoulders as well. Other symptoms associated with PDPH are nausea, vomiting, tinnitus, vertigo, neck stiffness, visual disturbances, dizziness and paresthesia of the scalp, and upper and lower limb pain (Trumbull & Shepard, 2003).

According to the diagnostic criteria described by the International Headache Society (IHS, 2004), the headache appears up to five days after dural puncture and disappears spontaneously within a week, or up to 48 hours after an epidural blood patch. One study stated that eighty-five percent of parturients experiencing PDPH will resolve in six weeks without treatment (Turnbull & Shepard, 2003). The IHS (2004) criteria are as follows: a) headache that worsens within 15 minutes after sitting or standing and improves within 15 minutes after lying down, with at least one of the following symptoms (neck stiffness, tinnitus, hypoacusia [decrease in hearing ability], photophobia

and nausea); b) dural puncture has been performed; and c) headache develops within 5 days after dural puncture (Amorim, Gomes de Barros, & Valenca, 2012). Ninety per cent of headaches will ensue within 3 days of the dural puncture, and 66% will start within the first 48 hours (Trumbull & Shepard, 2003). Results of several studies had an onset of PDPH within 5 days of dural puncture: all participants developed symptoms less than 48 hours (Hakim, 2010); median symptom development was 16 hours (range 1-120 hours) (Kim et al., 2012); and majority of symptoms developed within two and five days for spinal and epidural needles respectively (Choi et al., 2003).

The exact mechanism for PDPH is unclear. PDPH occurs from cerebral spinal fluid (CSF) leakage from the subarachnoid space via needle puncture. Candido and Stevens (2003) stated that "the loss of CSF through a dural hole results in intracranial tension or traction on nerves and meningeal vessels" (p. 454). This traction on the nerves is created by a gravitational pull when the parturient is in an upright position. The authors mentioned a second theory suggesting that "there is a combination of both low CSF pressure and resultant cerebral vasodilatation in reaction to the stretching of vessels" (p. 459). The pain associated with PDPH is caused by stretching and traction on the pain-sensitive intracranial structures.

Generally, the quoted incidence for PDPH is less than 3% with rates of complications being extremely low at 2.78% (ASA, 2014). Youth, female gender, pregnancy and labor, and a history of recurrent headache are factors that predispose parturients for increased complications (Amorim et al., 2012). The accidental perforation of the dural mater with an epidural needle occurs in up to 1.5% of parturients (Bradbury et al., 2013). Other authors stated that PDPH following dural puncture occurs up to 70%

after dural puncture in epidural anesthesia (Rahmawy, Rashawn, & Mohamed, 2013). Agerson and Scavone (2012) stated that 51% of patients develop PDPH following accidental dural puncture. PDPH following single-shot spinal anesthesia was found to be 18% in one study (Viitanen, Porthan, Viitanen, Heula, & Heikkila, 2005); while other authors concluded that the incidence of PDPH is less than 1% for continuous spinal anesthesia (Denny et al., 1987). Even with a combined lowered complication rate for NA, the morbidity from one case of PDPH can prove costly (Aphel et al., 2010; Bradbury et al., 2013).

Positioning

Proper patient positioning is important for success of regional blockade, and is impeded by pregnancy (Shankar et al., 2015). Chestnut, Polley, Tsen, and Wong (2009) provided a full description of positioning for spinal or epidural:

> When spinal or epidural anesthesia is performed with the patient in a lateral position, the patient's back should lie at, and parallel to, the edge of the bed, for at least two reasons. First, the edge is the firmest section of the mattress. If the patient lies away from the edge of the bed, the patient's weight will depress the mattress, and the anesthesia provider must work in a "downhill" direction. Second, this position allows anesthesia providers to keep their elbows flexed, facilitating control of fine hand and wrist muscle movements. The plane of the entire back should be perpendicular to the mattress. When asked to flex the lower back, patients typically roll the top shoulder forward, an action that rotates the spine, which is undesirable, but does not flex the lower back.

> Similarly, patients positioned sitting should have their feet supported by a stool with the backs of their knees against the edge of the bed. A maneuver that helps position the patient's back closer to the anesthesia provider. The shoulders should be relaxed symmetrically over the hips and buttocks. Beds in obstetric units often break at the foot and the split in the mattress encourages the patient's seat to slope downhill if she is straddling the mattress split; this position will cause spine rotation and may make the procedure more difficult. (p. 228)

Coppejans, Hendrickx, Goossens, and Vercauteren, (2006) stated that "there are few studies that evaluate the influence of patient posture during the performance of neuraxial anesthetic techniques" (p. 243). The patient has to arch her back outwards to facilitate safe epidural puncture. Patient positioning changes the relationship of osseous and soft tissues and potentially effects needle placement (Hermanides et al., 2012). The spinal cord is flexible within the dural sac and changes position according to gravity when positioned supine or laterally. Hermanides et al. described that proper positioning for patients consisted of "assuming a flexed position with the head down" (p. 145). This positioning causes the spinal cord to move anteriorly at the thoracic level, which facilitates easier placement and reduced complications. The authors explained that the "sitting position has been described to result in shorter insertion times and a trend towards higher accuracy at the first attempt" (Hermanides et al., 2012, p. 146). Eckle and Grasshoff (2015) stated that "women are commonly brought in a sitting position for performing lumbar regional analgesia and in this posture; the parturient usually places her legs over the edge of the bed and puts the feet upon a stool" (p. 1). Furthermore, the author stated that the sitting position results in quicker insertion times and a tendency

towards higher accuracy at the first attempt than the lateral position (Hermanides et al., 2012). Whereas another study found more technical difficulties in the lateral position compared with the sitting position (Coppejans et al., 2006). The lateral position increases the distance from the skin to the epidural space (Hamza, Smida, Benhamou, & Cohen, 1995), which may cause increased attempts at successful neuraxial blockade, but both positions have comparable success rates once established. The study conducted by Coppejans et al. (2006) found the sitting position to be technically easier and was associated with fewer complications. No convincing evidence is available that suggests any particular position to reduce the incidence of headache after lumbar puncture; the position used is chosen by the anesthesia provider.

Financial Implications

Modern healthcare systems utilize managed care services thereby providing strong incentives to deliver efficient and effective medical care. A study that compared spinal vs. epidural costs associated with caesarian section concluded that epidural proved costlier. The indirect costs of epidurals were greater than for spinals. The spinal technique is simpler and there is less potential for problems and may contribute to less cost (Riley, Cohen, Macario, Jayshree, & Ratner, 1995). Another study performed in a tertiary hospital by Dakkar, Warra, Albadareen, Jankowski, and Silver (2011) concluded that noncutting needles were associated with less adverse events and less costs providing a savings of $20,000 per year ($73 per person). Another study by Bradbury and colleagues (2013) stated that "women with severe PDPH are usually bedridden, are unable to care for themselves or their babies, and often have increased hospital stays as well as repeated hospital visits" (p. 417). As a consequence of PDPH, Apfel et al. (2010)

determined that healthcare costs are increased in the maternity ward. There are a few studies available that provide a limited financial picture of costs associated with NA complications. However, some authors have agreed that adverse events increase hospital costs, and increases morbidity and mortality for the parturient patient (Apfel et al., 2010; Dakkar et al., 2011; Riley et al., 1995).

CHAPTER III - THEORETICAL FRAMEWORK

Theoretical Background

Many human activities are learned. Learning is the acquisition of knowledge or skills through experience, study, or by being taught (Merriam-Webster Online, 2009). The basis for operant behavior lies in the mechanisms of speech and skeletal muscle, which in turn produces vocal responses and movement (Karen, 1974); these behaviors are learned from an organism's environment. Skinner (1956) investigated the behavior of hungry rats placed in a box. Skinner (1956) observed the patterns of behaviors displayed by the rats once they learned that pushing a lever would produce a food pellet. Skinner thoughts of operant conditioning was the best way to understand behavior by looking at the causes of an action and its consequences. Skinner (1981) developed the theory of operant conditioning. It was assumed that behavior was determined by its consequences, reinforcements or punishments, which make it more or less likely that the behavior will occur again. Skinner (1981) stated that "through operant conditioning, new responses could be strengthened by events which immediately follow them" (p. 501). The organism must be influenced by its environment in order to exhibit a change in behavior. For example, the parturient is taught how to properly position by CRNAs before receiving neuraxial anesthesia (NA) and then the parturient demonstrates this proper positioning. This will help create a safer anesthetic and may reduce complications of postdural puncture headache. The important function of operant conditioning is to adapt organisms to their environment by ensuring that actions with beneficial consequences are repeated and actions with harmful consequences are not (Mackintosh, 1983).

The Behaviorist Learning Theory (BLT) is used in this project to assist the parturient in gaining knowledge through learned experiences. Emotions, behaviors and attitudes can be changed through the process of learning, therefore "how can people be motivated to learn, and which kinds of experiences facilitate learning?" (Butts & Rich, 2015, p. 196). CRNAs can facilitate learning by educating parturient patients on proper body positioning prior to NA, which may decrease the incidence of postdural puncture headache. This educational intervention implemented by the providers may motivate the parturient population to cooperate and properly position themselves in preparation of NA. The use of BLT: a) improves the success of professional education and intervention programs, and b) maximizes the probability that learning will occur and learned information will be transferred to a variety of settings (Butts & Rich, 2015). This learning theory provides a better setting on which to expand the concept of learning, and automaticity when applied to the parturient patient learning proper positioning prior to NA.

Theoretical Explorations

Several assumptions apply to BLT. Firstly, teaching parturients proper body positioning prior to NA and then observing a return demonstration of the learned proper body positioning before the procedure. Secondly, learning involves a behavior change. The demonstration of proper positioning by the parturient confirms that learning proper body positioning has occurred. Thirdly, learning is the result of environmental events. The education on proper body positioning was provided in the clinical setting by the CRNAs. Safety is inherent within the hospital setting. Lastly, reinforcement and contiguity are crucial to explaining the learning process. The BLT integrates the concept

of knowledge and automaticity; individuals must acquire new information, process it according to given instruction, and demonstrate learned behavior without strenuous mental effort (Butts & Rich, 2015). The assumptions assist with the acquisition of learning proper body positioning before the stress of active labor. Therefore, it is expected that the parturient automatically positions herself prior to NA without exercising much thought; the positioning should be spontaneous.

The CRNAs behavior has to be considered as well. The participation from each CRNA is required to support parturient safety by incorporating proper positioning education into their plan of care. When the incorporation of proper positioning education is demonstrated by the CRNA, it can be assumed that the CRNA has a willingness to change their practice to continually support parturient safety.

Theoretical Application

When applying this theory to the capstone project, two steps of operant behavior must be considered. This behavior involves a process between the organism and the environment by means of a stimulus followed by a response. Step 1, a verbal description of proper body positioning is given by the CRNA followed by a physical demonstration of the proper body positioning. This step provides the stimulus condition (S) in the environment in which the behavior is to be demonstrated by the parturient. Step 2, the parturient will demonstrate (indicating that learning has occurred) the proper positioning prior to neuraxial anesthesia. This step exhibits the response (R) to the learning experience. This (S)-(R) dynamic is simple and based on associations people make between stimuli, and that life is a matter of habit that requires little thinking (Butts &

Rich, 2015). Therefore, the goal is to provide educational instructions on proper body positioning prior to NA.

Theoretical Analysis

The BLT fits with teaching parturients new behaviors. This theory is useful for breaking bad habits and working with people who are more comfortable engaging in actions than reflecting on thoughts and emotions (Butts & Rich, 2015). It can be used to enable parturient cooperation during the stresses of labor as long as education occurred before NA placement. The theory connects with the capstone project in that it supports education, via the (S)-(R) dynamic, for effective body positioning via verbal and visual demonstrations of proper body positioning technique. Parturients are emotionally charged with fear, anxiety and pain at the time of labor. It is easier for the parturient to physically position her body rather than make decisions during periods of stress and pain. An educational discussion and demonstration is to be provided to the parturient by the CRNAs. This education demonstrates proper body positioning prior to NA and it is expected that the parturient will automatically position for NA during the stress of active labor. Focus should be on observable behaviors because there is no exact way to know what a person is thinking (Butts & Rich, 2015). According to the BLT, proper positioning during active labor requires little thinking and the parturient should physically assume proper positioning to facilitate NA.

CHAPTER IV – METHODOLOGY

Design and Target Population

Upon approval by the Institutional Review Board (IRB) at The University of Southern Mississippi and three local hospital facilities in Southeastern Mississippi, a 7-question survey was developed to assess CRNAs willingness to make a practice change focused on providing proper positioning education prior to NA; the CRNAs were asked to incorporate proper positioning education prior to neuraxial anesthesia into their plan of care. At the completion of each presentation, a survey was completed by each anesthesia provider. Each respondent was identifiable to the investigator; however, no identifiable information was given by each individual who completed the survey. All answers were completed independently by each participant. Each CRNA signed an informed consent prior to answering the survey questions.

Inclusion criteria were limited to CRNAs employed by the local hospital anesthesia group. Participants must be 18 years or older. All others were excluded from participating.

Currently, the local anesthesia group employs 44 CRNAs; therefore, the goal sample size was 44. Convenience sampling was used at the three facilities in this study. Nonparametric statistics, frequencies and distributions were used to analyze the seven item survey. The survey included age, gender, years practicing as CRNA, patient safety as a priority, presentation of current evidence on postdural puncture headache, safety benefits of proper positioning education and a willingness to include proper positioning prior to neuraxial anesthesia into their plan of care.

Detailed Procedure

Convenience sampling of CRNAs within the local hospital group was utilized for this project. The investigator travelled between three facilities that are part of the group in effort to capture all of the CRNAs. Anesthesia providers sampled were assessed for a willingness to incorporate proper positioning into their plan of care.

First, an overview of the project was given to the CRNAs. A consent (Appendix C) that outlined the project overview, risks and benefits were presented for project participation. Secondly, individual presentations (Appendix D) were given to the CRNAs; the presentation included current literature that supported parturient education prior to neuraxial anesthesia. The preemptive education that is implicated by the evidence in promoting parturient safety and reducing complications associated with postdural puncture headache (PDPH) was addressed within the presentation. The presentation highlighted the following topics provided in current literature: parturient education, parturient safety, and PDPH reduction. The CRNAS were encouraged to provide parturient education on proper positioning prior to neuraxial anesthesia. Next, a survey (Appendix C) was given to the anesthesia provider in effort to determine if they would incorporate proper positioning education into their plan of care prior to neuraxial anesthesia. The proposed timeline for completion of the survey was at the conclusion of the presentation.

The consent was obtained prior to participating in the project and the participants were assured that there were no risks associated with the project. All paper consents and surveys obtained were stored in a locked box with one key, and held by the principal investigator. All consents, surveys and data sets obtained from this study will be

destroyed six months after fulfillment of all graduation requirements. The participants were notified on the consent that all of their identifiable data will be de-identified to protect their identity.

Population and Setting

A convenient sample took place within three facilities affiliated with a local anesthesia group in Southeastern Mississippi. The population consisted of all CRNAs in Mississippi 18 years or older. Surveys were physically given to the participants at the three facilities and returned to the investigator upon completion.

CHAPTER V – RESULTS

This project investigated a willingness to change practice when anesthesia providers at a local hospital in Southeastern Mississippi were provided with evidence on parturient safety prior to neuraxial anesthesia. It was assumed that all CRNAs made patient safety a priority and would be willing to incorporate proper positioning prior to neuraxial anesthesia into their plan of care. Safety must be a property of the system and no one should ever be harmed by healthcare (IOM, 2000). There are 44 CRNAs affiliated with the local anesthesia group in Southeastern Mississippi, therefore, the goal sample size was 44.

Table 1

Sample Demographic Characteristics

Characteristic	Captured	
	n	%
Participants (n)	34	77
Gender		
Male	20	58.8
Female	14	41.2
Refusal	0	0.3

Table 1 (continued).

Characteristic	Captured	
	n	%
Age		
25-30	0	0
31-40	11	32.4
41-49	16	47
>50	7	20.6
Number of years practicing as a CRNA		
<1 year	1	0.3
2-5 years	8	25
6-10 years	5	15
>10 years	20	59.7

Note. n = number.

n = 34

All percentages rounded to the tenth place

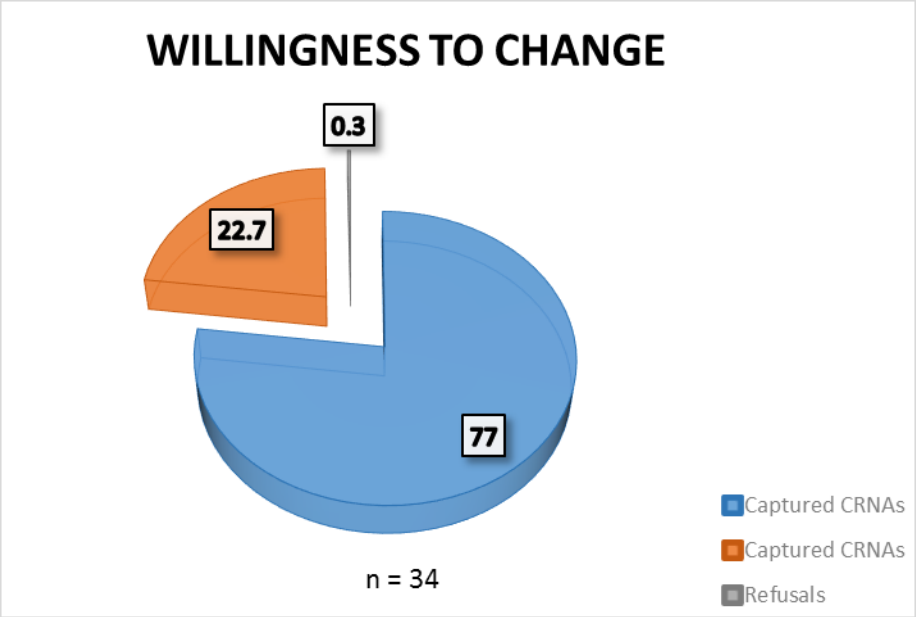

Figure 1. Willingness to Change Results

Thirty-four Certified Registered Nurses Anesthetists were captured during this project. The males captured totaled 58.8% of the sample while females represented the remaining 41.2%. Unfortunately, one CRNA refused to participate in the project; this refusal represented 0.3% of the sample. The single refusal to participate was included in the "uncaptured" group. The uncaptured providers represented 22.7% of the sample. The final analysis of the surveys produced the following: captured CRNAs, 34/44 (77%); uncaptured CRNAs, 10/44 (22.7%); and refusal to participate, 1/35 (0.3%), refer to Figure 1 for illustration. The single refusal was included into the "uncaptured" group because the presentation was halfway completed by the time the provider decided not to participate. Therefore, that participant's survey was not included into the "captured" group.

Majority of the providers were aged 41-49 (47%) with experience greater than 10 years (59.7%). Then followed by ages 31-40 (32.4%) with 2-5 years of experience (25%).

Even with the differences in ages and years of experience, every anesthesia provider that participated, agreed to incorporate proper positioning education into their plan of care.

Barriers and Limitations

A small sample size was a major limitation for this project. The maximum achievable sample size was 34 CRNAs due to the inability to capture the goal of 44 anesthesia providers. Additionally, one provider refused to participate. A limited number of participants may limit applicability of the data gathered. Other barriers such as: time; the inability for CRNA participation due to patient assignment, the unavailability of the CRNA at the facility, and the time constraints of the investigator; and refusal to participate presented challenges during the study. IRB approvals from the University of Southern Mississippi and the hospital facility had a major influence on the viability of this project as well

Barriers specific to the reception of the parturient safety presentation were noted: incivility, some provider were impolite and did not want to consider any current studies taking place at the facilities; not meeting the CRNAs at once, improved results may have been obtained if the presentation was given in a group setting; avoidance, some CRNAs felt as though the presentation would make them late for their patient assignment and constantly asked the investigator to present to them at a later date; hurriedness, some providers were so hurried that they missed the purpose of the project which led to multiple questions that were previously addressed during the presentation; lack of patient contact, many CRNAs asked, “why isn’t this project directed towards the patients?” This created an issue for them and hindered the intended purpose of the project; and resistance to change, some providers shared polarizing feelings regarding the project. Either they

always educated their patients prior to neuraxial anesthesia or they did not need to worry about this topic because they will not be caring for the parturient population throughout the three facilities.

The lack of acknowledgment for the need for change and providing insufficient information about the nature of change are forces that hinder change in work organizations (Yılmaz & Kılıçoğlu, 2013). It is important to contribute continuous improvement practices with changing conditions to achieve effectiveness within the healthcare system. The authors described some causes for resistance to change: 1) selective perception, people process the provided information selectively in order not to change their point of view; 2) habit, when faced with change, individuals may tend to react to these changes outside of their usual manner of behaving; and 3) limited resources (skill and time), insufficient resources may lead to abandoning the desired changes. Change is a complex and psychological event; effective management of change is based on clear understanding of human behavior in the organization. The authors listed education, communication, participation and involvement, facilitation and support, negotiation and agreement as means to overcoming change (Yılmaz & Kılıçoğlu, 2013).

The Essentials of Doctoral Education for Advanced Nursing

The American Association of Colleges of Nursing (AACN) has identified eight essentials for Doctoral Prepared Nurses (DNP) as foundational outcome competencies essential to all DNP graduates. Society demands that nursing education prepare individuals for practice with interdisciplinary, information systems, quality improvement, and patient safety expertise (AACN, 2006). Advance practice nursing roles are defined

and distinguished by these essentials; and the framework is provided for the nurses' expertise.

The AACN (2006) characterized advanced practice nursing as "any form of nursing intervention that influences healthcare outcomes for individuals or populations, including the direct care of individual patients, management of care for individuals and populations, administration of nursing and healthcare organizations, and the development and implementation of health" (p. 2). The DNP prepared nurses are equipped with skills and knowledge to assist with the complex process of transforming and improving quality outcomes for all individuals, communities and systems based on research and evidence-based data. This project incorporates the eight essentials in order to offer the greatest influence for Certified Registered Nurse Anesthetists considering a change in their current practice.

Essential One: Scientific Underpinnings for Practice

This essential focuses on the patterning of human behavior in interactions with the environment in normal and critical life situations and recognizes that health of human beings is in continuous interaction with their environments (AACN, 2006). This capstone project addresses DNP essential one by synthesizing current literature and evidence-based practices to demonstrate how parturient education prior to neuraxial anesthesia improves safety and reduces the complications of postdural puncture headache for the parturient patient.

Essential Two: Organizational and Systems Leadership for Quality Improvement and Systems Thinking.

Essential two requires that a DNP graduate understand the role of organizational leadership and applies the conceptualization of healthcare systems in order to improve the quality of healthcare experiences for the community. Also, DNP is equipped to develop and evaluate care delivery approaches that meet the current and future need is of patient populations based on scientific findings in nursing and other clinical sciences (AACN, 2006). This essential is demonstrated by the investigator's ability to assess Certified Registered Nurse Anesthetists willingness to incorporate proper positioning education prior to neuraxial anesthesia into their plans of care for the parturient population. The DNP will "ensure accountability for quality of healthcare and patient safety for populations whom they work" (AACN, 2006, p. 10).

Essential Three: Clinical Scholarship and Analytical Methods for Evidence-Based Practice.

The willingness of CRNAs to make a practice change was investigated by performing an extensive literature review, which provided various articles regarding the topics of parturient safety and education. As well as apply applicable findings to the development of practice guidelines and improved practices (AACN, 2006). This essential is fulfilled by recognizing a lack of proper positioning education provided to the parturient population and processing the clinical problems through clinical practice and current research.

Essential Four: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Healthcare.

Utilization of information systems and technology is an indispensable skill that every practitioner must possess. Technological advancements in healthcare require the DNP graduate to understand and be able to utilize technology for the betterment of the healthcare system. In this project, technology is utilized to retrieve current evidence-based practices and literature that supports parturient safety and education. The use of statistical analysis signifies the DNP student's proficiency in technology to improve healthcare.

Essential Five: Healthcare Policy for Advocacy in Healthcare.

This essential is crucial for this project. It involves the development and provision of leadership for healthcare policy, regulation and delivery. The design and implementation of this project requires the DNP graduate to understand and conceptualize hospital policy and its impact on the patient. Leadership will be informed about outcomes of this parturient education project and encouraged to incorporate positioning education into obstetric neuraxial anesthesia policies.

Essential Six: The Inter-Professional Collaboration for Improving Patient and Population Health Outcomes.

Professional collaboration is required of all healthcare professionals in a multi-faceted health system. Collaboration is an important concept for the DNP; one must form partnerships with other advanced practitioners to promote improved patient outcomes. This capstone project demonstrates the collaboration between the investigator, the nurse

anesthesia program administration and a local hospital in order to obtain permission to survey CRNAs regarding a willingness to change practice.

Essential Seven: Clinical Prevention and Population Health for Improving the Nation's Health.

The AACN (2006) defined clinical prevention as "health promotion and risk reduction and illness prevention for individuals and families" (AACN, 2006, p. 15). Furthermore, the implementation of clinical prevention and population health activities is central to achieving the national goal of improving the health status of the United States. The institution of proper positioning education for the parturient aids in the prevention of complications related to neuraxial anesthesia. CRNAs providing education to the parturient prior to neuraxial anesthesia supports patient safety initiatives and may assist in the reduction of PDPH.

Essential Eight: Advanced Nursing Practice.

The DNP is prepared to "demonstrate advanced levels of judgement, systems thinking, and accountability in designing, delivering, and evaluating evidence-based care to improve patient outcomes" (AACN, 2006, p. 17). The institution of this project allows the DNP to apply current evidenced-based literature to clinical practice. Pushing for practice changes that benefit patients is the responsibility of the advanced nurse. The integration of the eight DNP essentials will allow the advanced nurse to provide patients with evidenced-based safe, efficient, and cost-effective care.

CHAPTER VI – SUMMARY

Summary of Findings

The significance of this capstone project was to determine if CRNAs had an increase in willingness to incorporate proper body positioning education prior to neuraxial anesthesia into their plan of care when presented with current evidence on parturient safety and postdural puncture headache complication reduction. For this project, the investigator utilized a low cost poster board presentation based on the Behaviorist Learning Theory. This project may be disseminated at job interviews, at a state or national meeting in the fields of obstetric nursing, advanced practice nursing, or nurse anesthesia. Even though the results of this study were gathered from a small sample, they aid in determining a CRNA's willingness to change and incorporate education on proper positioning prior to neuraxial anesthesia into their plan of care.

The findings of this study did not support the Behaviorist Learning Theory. The framework was used to describe how the parturient patient learned proper positioning once taught by an anesthesia provider. The acquisition of knowledge, proper positioning education prior to neuraxial anesthesia, from the parturients' environment may help to reduce complications of postdural puncture headache. The findings in this study was that all participating CRNAs were willing to change, they agreed to incorporate proper positioning prior to neuraxial anesthesia into their plan of care.

Outcomes

Short and long term outcomes were considered in this study. The short term outcomes for this study was a reduction of headache symptoms, reduction of postdural puncture headache diagnosis, decreased cost associated with postdural puncture

headache, improved patient satisfaction with pain management and improved safety. The institution of a standardized proper positioning education routine was a long term outcome.

Implications for Nursing Practice

There is an implication that parturient education prior to neuraxial anesthesia enhances patient safety and may reduce the complication of postdural puncture headache (PDPH). Preemptive education strategies addressing proper positioning techniques are likely to be helpful in reducing complications associated with spinal and epidural placement. Anesthesia providers throughout the nation should consider incorporating parturient education prior to neuraxial anesthesia into their anesthetic plans to enhance safety and to help reduce complications of postdural puncture headache. Another implication for future practice would be to find out when is the optimal time to provide proper positioning education to the parturient patient. Also, some authors found that intravenous ondansetron (Zofran) could be effective in the prophylactic management of PDPH in parturients undergoing elective cesarean section under spinal anesthesia (Fattahi et al., 2015). The use of ondansetron could be considered for future practice in preventing PDPH I the parturient population

Future Recommendations

A future study should be conducted using a larger sample size and should be directed towards the parturient patient. Also, undertaking a prospective study on a group of parturients at 3 months, 6 months and 9 month intervals may determine if proper positioning education can be considered a factor that reduces complications associated with neuraxial anesthesia. As a result of parturient education prior to neuraxial

anesthesia, the facility may experience a reduction in complications of postdural puncture headache and lowered hospital costs.

Although, this was a willingness to change project that focused on the CRNAs incorporation of proper positioning education prior to neuraxial anesthesia into their plan of care, the recommendations for future study provided by the CRNAs were appreciated. The CRNAs recommended that the following be addressed in future studies:

- Direct the project towards the parturient patient.
- Obtain current postdural puncture headache rates from facility and determine what method of neuraxial anesthesia (spinals or epidurals) resulted in more complications.
- Determine the best positioning to help reduce postdural puncture headache (current evidence is inconclusive).
- Provide evidence based educational brochure to CRNAs and patients that explains proper positioning.
- Create a video demonstrating proper positioning for patient use at facility.
- Educate patients on what to expect immediately after spinal and epidural insertion.
- Educate the obstetric Registered Nurses' about patient positioning after single shot spinals (i.e. lay flat for 2 hours), although evidence does not prove this effective.

Conclusion

Presenting current literature on parturient safety and incidence of postdural puncture headache compelled all of the CRNAs captured, with the exception of 1 refusal

to participate, to agree to incorporate proper positioning education prior to neuraxial anesthesia into their plan of care. Also, they agreed that safety was a priority for the parturient patient, and that proper positioning education prior to neuraxial anesthesia was a safe method for reducing the incidence of postdural puncture headache. In question four, all CRNAs agreed that patient safety was a priority. In question five, controversy arose for some of the CRNAs. Was the evidence regarding parturient safety and proper positioning education prior to neuraxial anesthesia presented in an understandable way? The term, understandable, was misinterpreted by some of the providers; the investigator attributes this misunderstanding to the barriers previously mentioned. Therefore, further explanations of the purpose of the project, current literature, and honing in on the fact that this project was focused on the CRNA (direct effect) and not the parturient patient (indirect effect) was reiterated. All participating anesthesia providers agreed that proper positioning education prior to neuraxial anesthesia was a safe method for reducing the incidence of postdural puncture headache (question six) Lastly, all participants choose "yes" when asked if they will provide parturient patients with proper positioning education prior to neuraxial anesthesia (question seven). This response supported the investigator assumption that CRNAs have a willingness to change their practice to continually support parturient safety and incorporate proper body positioning into their plan of care.

This study contains weaknesses that can be corrected and improved. Firstly, more information on the topic is needed, which shows the need for future research. Advances in research and the continuous evaluation of newly emerging studies can address and improve the issue of parturient education prior to neuraxial anesthesia. If stronger

evidence is available, then there would be less controversy surrounding the study. For example, the literature does not support sitting positioning over lateral positioning (Chestnut et al., 2009; Eckle & Grasshoff, 2015); therefore, the investigator was unable to endorse one position over the other when encouraging CRNAs to educate the parturient patient on proper positioning. Secondly, stronger participation and interest can be elicited from the CRNAs. As advanced providers, it is essential to stay abreast of current evidenced based practices in order to provide the safe effective care to our patients. Taking the time to support research findings in hopes of improving patient outcomes and clinical practices is integral for the advanced practice nurse.

APPENDIX A – Review of Related Literature Matrix

Table A1.

Positioning Complications

	Shankar, H., Rajput, K., & Murugiah, (2015)	Kim et al., (2012)	Van de Velde et al., 2009)	Agerson & Scavone, (2012)	Ragab & Facharzt, (2014)
Positioning for epidural placement	-Picture provided to show lateral positioning (p. 252) -Flexing the spine in the lateral decubitus position to the maximum extent possible by drawing the knees to the chest and flexing the neck (p. 252) -Proper patient positioning is important for success of regional blockade, and is impeded by pregnancy, spinal deformities and advanced age (p. 253)				
Occurrence of postdural puncture headache		-The frequency of post-lumbar puncture	-Common and important complicatio	Unintentio nal dural puncture occurs at a	Incidence of PDPH is estimated

(PDPH) and/or accidental dural puncture (ADP)		(31.4%) is similar to previous reports (p. 4) -Patients with previous lumbar puncture headaches have higher incidences with subsequent lumbar punctures (p. 4)	n of epidural insertion in obstetric patients (329) - PDPH >75% in young adult patients (329) -ADP may go unrecognized at the time of insertion (p. 329) -The incidence of PDPH and accidental dural puncture is similar to previous studies (p. 333)	rate 1.5%; approx. half of these patients develop PDPH (p.133)	up to 81% following accidental dural puncture - especially in pregnant women (p. 182)
Negative impact on mother-infant bonding			PDPH often interferes with mother-infant interaction (p. 329)		
Complications of dural puncture	PDPH is a relatively common complication of spinal anesthesia (p. 181)	-Headache, hemorrhage, local pain and infection (p.1) - Symptoms associated with nausea, vomiting, blurred vision,	Residual or recurrent headache (p. 332)	Headache neck stiffness, photophobia, hypacusia (hearing dysfunction), nausea or tinnitus (p. 133)	Headaches (p. 181)

		vertigo, hearing alteration and back pain (p.1)			
Skill of provider					Incidence partly dependent on the skill and experience of the person performin g the lumbar puncture, but even in the best of hands headache occurs despite apparently atraumatic punctures of the theca (p. 182)
	Bradbury et al., (2013)	Rahmawy, Rashawn, & Mohamed, 2013)	Klein & Loder, (2010)	Bezove, Ashina, & Lipton, (2010)	Hakim, 2010)
Positioning for epidural placement					
Occurrence of postdural puncture headache (PDPH) and/or accidental dural puncture	- Accidental dural puncture with an epidural needle occurs in up to 1.5% of parturients (p. 417)	-PDPH following dural puncture up to 70% after dural puncture in epidural	-The overall incidence of PDPH is difficult to ascertain (p. 422)	-PDPH most common cause of orthostatic headache, whether due to deliberate	-Incidence of accidental dural puncture at attempted epidural placement

	PDPH occurs in approx. 81% of patients (p. 417) -No evidence that any method caused a significant reduction in ACCIDENTAL DURAL PUNCTURE but five techniques (not positioning) were associated with the reduction of PDPH (p. 425)	anesthesia (p. 358)		or accidental dural puncture (p. 1482)	in obstetric patients has been reported to be 0.4-6% (p. 413)
Negative impact on mother-infant bonding	Women with severe PDPH are usually bedridden, are unable to care for themselves or their babies (p. 417)		75% of women with medically recognized PDPH reported that it limited their activities (p. 426)		
Complications of dural puncture	-Headaches (p. 420) -Increased hospital visits and stays (p. 417)	Headaches, nausea, vomiting. dizziness or visual disturbances (p. 358)	Benign primary headache: migraine and tension type headache, secondary headache disorders: stoke and	Headache (p. 1485)	Headache, nausea, & vomiting -Neck stiffness, tinnitus, hypacusia or photophobia (p. 414)

			venous sinus embolism (p. 427)		-Increased hospital stay (p. 413)
Skill of provider				-Incidence of accidental dural puncture during epidural anesthesia is lower for experienced clinicians (p. 1485) -Perhaps house staff fatigue and not just lack of experience contributes to higher rates of PDPH when procedures performed by less experienced clinicians (p. 1485)	

	Thundiyil, O'Brien, & Papa, (2007)	Abo, Chen, Johnston, & Santucci (2010)	Podder, Kumar, Yaddanapudi, & Chari, 2004)	Eckle, & Grasshoff	Hermanides, Hollmann, Stevens, & Lirk, (2012)
Positioning for epidural placement	- "Optimal patient positioning during a lumbar puncture (LP) has not been adequately evaluated" (p. S11) - Positioning in either the lateral decubitus or sitting during the LP was equally effective in obtaining CSF" (p. S11)	- Evaluate the potential improvement of the LP success rate using a positioning pillow, to ensure maximum lumbar flexion, and allow paravertebral muscles to relax (p. 1) - Appropriate body posture, … are important determinants of the success of the LP (p. 2) - It (lumbar pillow) is placed on the thighs of the child who was sitting with his trunk leaning forward. This position ensures a	- "In the classic lateral position for epidural catheterization, the patient's back is at the edge of the operating table and parallel to it. The knees are flexed and drawn up to the abdomen as much as possible, and the head is brought down towards the knees. Special care is required to avoid rotation of the hips and shoulders" (p. 1829) - The sitting position	-Women are commonly brought in a sitting position for performing lumbar regional analgesia and in this posture, the parturient usually places her legs over the edge of the bed and puts the feet upon a stool. To facilitate epidural puncture, the patient has to arch her back outwards. Lumbar flexion might be counteract	-Patient positioning, the use of a midline or paramedian approach, …can all influence the success rate (p. 147) - The patient assuming a flexed position with the head down will result in the anterior movement of the spinal cord (p. 145)

		maximum lumbar flexion. The trunk can rest on the pillow allowing paravertebral muscles relaxation. The body axis and the spinal column are perfectly maintained symmetrical in the sagittal plane (p. 2) - There was no statistically significant difference between LP rate of success with and without pillow (p. 4)	with the patient's feet resting on a stool or chair may be preferable for extradural blockade (p. 1831)	ed by an inward extension of the sacrum (p. 1) - In a cross-legged sitting position the interlaminar foramen's space is widely opened and the sacrum is outwardly tilted (p. 1) -This sitting posture greatly diminishes the radius of unintended sacral extension (p. 1) - In our institution, we successfully make use of the cross-legged sitting position, which in	

				our experience reduces the time to identification of epidural space and/or the number of puncture attempts (p. 1) - Anxious patients might involuntarily extend the lumbar spine region during the procedure and therefore impede the technical ease of epidural puncture (p. 1)	
Occurrence of postdural puncture headache (PDPH) and/or accidental dural puncture					
Negative impact on mother-					

infant bonding					
Complications of dural puncture		Bi-frontal, occipital, neck, or upper shoulders location headache, photophobia, nausea, loss of appetite, diplopia (p. 4)			
Skill of provider			The anesthesiologist's unfamiliarity with performing the midline block in an unflexed spine may also have caused the increased incidence of intravascular catheter placement (p. 1831)		

	Apfel et al., (2010)	Turnbull & Shepard, (2007)	Candido & Stevens, (2003)
Positioning for epidural placement			
Occurrence of postdural puncture headache (PDPH) and/or	- Accidental dural puncture ranges from 0.19% t to 3.6%. -0.9% accidental dural puncture with	-PDPH 66% (1898); 11% (1956) -Incidence PDPH with size of spinal needle as follows: 70% (16G), 40%	-PDPH following spinal anesthesia varies from 0.2-24%. -Generally quoted incidence is <3%.

accidental dural puncture	50% of those patients experiencing PDPH (p. 255)	(22G), 25% (25G), 2-12% (26G Quincke needle), and <2% (29G) (p. 720)	-Unrecognized accidental dural puncture is 1.5% for epidural attempts (p 452)
Negative impact on mother-infant bonding	The mother may be unable to care for her newborn or herself for quite some time. This condition can also prolong hospital stay for both mother and child and contribute to increase in healthcare in the maternity ward (p. 255)	Obstetric patients expect to feel well and happy and to be able to look after their new baby (p. 723)	
Complications of dural puncture			
Skill of provider		The incidence is inversely related to the experience of the anesthetist (p. 721)	

Table A2.

Patient Education

	AHRQ, (2001)	American Society of Anesthesiology, (2007)	Milligan, (2007)	Jackson et al., (2000)
Patient education	-Patient education listed under section titled, Interventions and practices to be		-A significant move towards a patient safety culture requires a	-Anesthesiologists are among the least likely to have educated a patient about epidural

	considered (Scope section)		change in healthcare education. (p. 95)	analgesia" (p. 1071). - "ability to understand" nether correlated with age, anxiety level, pain level, desire for an epidural or duration of labour nor was affected by level of education, previous epidural experience, opioid premedication (p. 1070) Knowledgeable women were not dissuaded by potential adverse effects of epidurals and proceeded to consent to procedure. (p. 1070)

Table A3.

Financial Implications

	Riley et al., (1995)	Dakkar et al.,(2011)
Financial impact of NA	- Charges for spinal anesthesia is significantly less than those to patients who had epidural anesthesia. -indirect costs of epidural outweigh indirect and direct costs of spinal anesthesia. (p 711)	- The use of noncutting needles saved approx. $20,000 per year ($75 per person). -The use of the noncutting needle may have been associated with the least cost. (711)

APPENDIX B – Consent

THE UNIVERSITY OF SOUTHERN MISSISSIPPI AUTHORIZATION TO

PARTICIPATE IN RESEARCH PROJECT

Participant's Name:

Consent is hereby given to participate in the research project entitled Parturient Safety: Proper Positioning Education Prior to Neuraxial Anesthesia. All procedures and/or investigations to be followed and their purpose, including any experimental procedures, were explained by Christina J. Young, SRNA. Information was given about all benefits, risks, inconveniences, or discomforts that might be expected.

The opportunity to ask questions regarding the research and procedures was given. Participation in the project is completely voluntary, and participants may withdraw at any time without penalty, prejudice, or loss of benefits. All personal information is strictly confidential, and no names will be disclosed. Any new information that develops during the project will be provided if that information may affect the willingness to continue participation in the project.

Questions concerning the research, at any time during or after the project, should be directed to researcher(s) name(s) at telephone number(s). This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-5997.

Not applicable: The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participation in research projects. However, efforts will be made to make available the facilities and professional skills at the University. Information regarding treatment or the absence of treatment has been given. In the event of injury in this project, contact treatment provider's name(s) at telephone number(s). A copy of this form will be given to the participant.

_____ _____

Signature of participant Date

_____ _____

Signature of person explaining the study Date

APPENDIX C – Survey

Date: _____

This survey provides the investigator with data that will assess a Certified Registered Nurse Anesthetist's willingness to change practice based on data presented. Gender

Male

Female

Q2) Number of years practicing as a Certified Registered Nurse Anesthetist?

Less than 1 year

2-5 years

6-10 years

Greater than 10 years

Q3) Age

25-30

31-40

41-49

Greater than 50

Q4) Patient safety is a priority in my practice.

Yes

No

Q5) Was the evidence regarding parturient safety and proper positioning education prior to neuraxial anesthesia presented in an understandable way?

Yes

No

Q6) Proper positioning education prior to neuraxial anesthesia is a safe method for reducing the incidence of postdural puncture headache.

Yes

No

Q7) Based on the evidence given, I will provide parturient patients with proper positioning education prior to neuraxial anesthesia.

Yes

No

APPENDIX D – Poster Board Presentation Outline

The time allotted for this presentation was 15 minutes. A 35 x 24 poster board was used to present the current evidence to Certified Registered Nurse Anesthetists regarding Parturient Safety: Proper Positioning Prior to Neuraxial Anesthesia:

- Background and Significance (Chapter I)
- PICOT Question (Chapter I)
- Theoretical Framework (Chapter III)
- Evidence Summary (Chapter II)
- Proposed Study Strategy (Chapter IV)
- Discussed Priority References
- Question and Answer Session

APPENDIX E – IRB Approval Letter

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION

The project 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 (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are 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 regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16062802
PROJECT TITLE: Parturient Safety: Proper Positioning Education Prior to Neuraxial Anesthesia
PROJECT TYPE: New Project
RESEARCHER(S): Christina J. Young
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Nursing
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Exempt Review Approval
PERIOD OF APPROVAL: 07/22/2016 to 07/21/2017
Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX F – Facility Approval Letter

[redacted] HOSPITAL [redacted]

LETTER OF SUPPORT

June 17, 2016

To the Institutional Review Board [redacted]

It is my pleasure to write a letter in support of the proposal (PARTURIENT SAFETY: PROPER POSITIONING EDUCATION PRIOR TO NEURAXIAL ANESTHESIA) being submitted by Christina J. Young at the University of Southern Mississippi's Nurse Anesthesia Program.

The purpose of this project is to synthesize current and past literature in order to make a practice change recommendation to Certified Registered Nurse Anesthetists at a local hospital in Southeastern Mississippi. The recommendation will describe the benefits of educating parturient patients prior to neuraxial anesthesia.

Target population: Employed CRNAs in the [redacted] Clinic Group [redacted]

In conclusion, I fully support the efforts of Christina J. Young as she seeks to expand Nurse Anesthesia's body of knowledge and promote patient safety.

Sincerely,

Dr. Joe[redacted]

[redacted]

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