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## **Efficacy of Intravenous Ondansetron in Relieving Nausea/ Vomiting and Pruritus Post Epidural Administered Opioids in the Obstetric Patient**

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EFFICACY OF INTRAVENOUS ONDANSETRON IN RELIEVING  
NAUSEA/VOMITING AND PRURITUS POST EPIDURAL  
ADMINISTERED OPIOIDS IN THE OBSTETRIC PATIENT

by

Benjamin Stephen Butler

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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## ABSTRACT

### EFFICACY OF INTRAVENOUS ONDANSETRON IN RELIEVING NAUSEA/VOMITING AND PRURITUS POST EPIDURAL ADMINISTERED OPIOIDS IN THE OBSTETRIC PATIENT

by Benjamin Stephen Butler

December 2016

One prominent side effect in the use of a neuraxial anesthesia is pruritus, with an incidence in the obstetric patient of 60-100% (Kumar & Singh, 2013). Another side effect of an epidural placement is nausea and vomiting. Nausea and vomiting occurs frequently during the progress of labor and is difficult to determine an incidence that is related to epidural opioid administration (Chestnut et al., 2014). A review of literature was performed and established evidence that ondansetron is effective in reducing incidence of pruritus in intrathecal administered opioids for cesarean sections in the obstetric patient. No literature was found concerning ondansetron reducing either incidence of nausea/vomiting or pruritus in post epidural administered opioids for obstetric patient. A retrospective chart review was completed and statistical analysis concluded that in this sample ondansetron was not effective in reducing nausea/vomiting or pruritus in the obstetric population (Pruritus  $p = .195$  and Nausea/Vomiting  $p = .844$ ).

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## DEDICATION

This project is dedicated to my family, for your continuous love and support throughout these past three years. A special dedication to my mother, Joyce, for your unconditional love and unwavering support. Lastly, to my significant other, the love of my life, Linsey Phipps, this project is dedicated to you. We have had many trials and tribulations these last three years but we have always made it through, together. I would not be here today without your support and continuing drive to keep me motivated. I can never say thank you enough for all that you have done.

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## LIST OF ABBREVIATIONS

<i>ASA</i>	American Society of Anesthesiologists
<i>CDC</i>	Center for Disease Control and Prevention
<i>CRNA</i>	Certified Registered Nurse Anesthetist
<i>CSE</i>	Combination Spinal-Epidural
<i>CSF</i>	Cerebral Spinal Fluid
<i>DNP</i>	Doctor of Nursing Practice
<i>EPIC</i>	Electronic Patient Information Chart
<i>FDA</i>	Food and Drug Administration
<i>IRB</i>	Institutional Review Board
<i>IT</i>	Information Technology
<i>IV</i>	Intravenous
<i>mcg</i>	Microgram
<i>mg</i>	Milligram
<i>ml</i>	Milliliter
<i>MSDH</i>	Mississippi State Department of Health
<i>PONV</i>	Post-operative nausea and vomiting
<i>5HT-3</i>	Serotonin receptor
<i>USM</i>	The University of Southern Mississippi

## CHAPTER I - INTRODUCTION

For the obstetric patient population, an epidural is an elective anesthetic procedure that is used to decrease the pain and discomfort. Epidurals are in a classification of anesthesia termed neuraxial anesthesia. The administration of a local anesthetic is often used in combination with an opioid to provide neuraxial analgesia. According to Chestnut et al. (2014), “neuraxial analgesia is the only form of analgesia that provides complete analgesia for both stages of labor” (p. 457). The epidural is placed either by the anesthesia provider and it is the responsibility of the anesthesia provider to care for the patient until the epidural is discontinued when the obstetric patient delivers her baby. The anesthesia provider is responsible for ensuring patient safety and managing any potential side effects. One prominent side effect in the use of a neuraxial anesthesia is pruritus, with an incidence in the obstetric patient of 60-100% (Kumar & Singh, 2013). Another side effect of an epidural placement is nausea and vomiting. Nausea and vomiting occurs frequently during the progress of labor and is difficult to determine an incidence that is related to epidural opioid administration (Chestnut et al., 2014). These side effects are not life-threatening but they are undesirable and a discomforting effect of neuraxial administration of opioids.

### Background

In the majority of health care facilities a protocol is established to help alleviate the effects of nausea/vomiting and pruritus. Currently there is no guideline endorsed by the American Society of Anesthesiologists (ASA) for these treatments. Treatment is warranted by patient condition and the preference of the anesthesia provider. The medications ordered for current treatments are not always effective in relieving the

patient of the pruritus. A common first step intervention used in current treatments is the administration of diphenhydramine. This medication inhibits the release of histamine but not all neuraxial administered opioids release histamine and the patient may still complain of pruritus.

Ondansetron is a serotonin (5HT-3) antagonist that is approved by the Food and Drug Administration (FDA) for treatment of nausea and vomiting. Chestnut et al. (2014) indicate that, “prophylactic administration of ondansetron 4 to 8 mg has been shown to have better antiemetic profile in the first 24 hours after intrathecal and epidural opioid administration when compared with a placebo” (pp. 642-643). Ondansetron also has been shown to help alleviate the pruritic side effect of neuraxial administered opioids and does not have the sedative effects commonly seen with diphenhydramine. The exact mechanism of action for the reduction of pruritus from ondansetron is unknown.

#### Significance

Starting in January of 2016, the anesthesia department of a southeastern Mississippi healthcare facility created a four person epidural team consisting of all CRNAs that assumed the placement and management of epidurals in the obstetric patient. It was previously performed by the obstetric physicians. Currently in practice, one CRNA is administering 4mg IV ondansetron within 5 minutes after placement of an epidural.

#### Needs Assessment

Osterman and Martin (2011) published in the National Vital Statistics Report that overall, 61% of women who had a single birth in a vaginal delivery in 2008 received either spinal or epidural anesthesia. The Mississippi State Department of Health

(MSDH), Office of Public Health Statistics (2015) indicate that in 2014 there were a total of 38,735 live births. If the assumption that 61% of those births were a vaginal delivery that received either spinal or epidural anesthesia, then approximately 23,628 live births were performed with the assistance of neuraxial anesthesia in the year 2014. To further that the MSDH reported each county of Mississippi's live births, Forrest County had 1,038 births. Assuming that 61% received neuraxial anesthesia for vaginal birth, roughly 633 live births in Forrest County were performed with aid of neuraxial anesthesia. This number of obstetric patients that may have the potential side effect of nausea/vomiting and/or pruritus from opioid administration via epidural or spinal anesthesia offers an assumption of significance to provide the utmost care.

#### Overview of Literature Review

The obstetric patient that has received a neuraxial analgesic deserves to have anesthesia care that is based on evidence based practice. The focus of the literature review is to research the administration of ondansetron intravenously in preventing nausea/vomiting and reduce the incidence of pruritus. The literature review is key to establishing the best evidence based practice to implement a change in practice.

#### PICO, Problem Statement, and Purpose

Will the administration of IV ondansetron to the obstetric patient that has received opioids via an epidural reduce the incidence of nausea/vomiting and pruritus? The administration of IV ondansetron within five minutes of successful epidural placement to the obstetric patient that has received opioids via an epidural will reduce the incidence of nausea/vomiting and pruritus in the setting of a southeast Mississippi health facility that has the highest amount of deliveries in the area. This is the PICO statement and will be

the focus of the doctoral project. The purpose of this project was to determine the efficacy of intravenous ondansetron in reducing the incidence of nausea/vomiting and pruritus post epidural administered opioids in the obstetric patients. Efficacy, in this project, was defined as the overall effectiveness of ondansetron to relieve or reduce the incidence of nausea/vomiting and pruritus in this patient population. Comparison will be made between no administration of ondansetron 5 minutes after epidural placement and the administration of ondansetron within 5 minutes of epidural placement. One member of the anesthesia team is using 4mg ondansetron IV within five minutes of epidural placement, the project will look at the efficacy of ondansetron in reducing epidural-induced nausea/vomiting and will focus on ondansetron as an alternative medication for the relief of pruritus. Pruritus is not life-threatening but it can be very frustrating and burdensome to the patient and may decrease overall patient satisfaction. The effect may increase in intensity so that it disturbs the patient's sleep. By determining the efficacy of ondansetron in preventing nausea/vomiting and an added benefit of reducing the incidence of pruritus, a practice change can be made to provide future obstetric patients with the best evidenced based care.

#### Doctor of Nursing Practice (DNP) Essentials

This project met all eight DNP essentials as described in Appendix A. The two essentials that were most represented in this project were essentials III and VI. Essential III, Clinical Scholarship and Analytical Methods for Evidence-Based Practice, was demonstrated by using analytic methods to critically appraise existing literature on ondansetron reducing nausea/vomiting and/or pruritus in the obstetric patient, designed and implemented a process to evaluate the outcomes of current practice, then evaluated

quality improvement methodologies, performed research methods to collect appropriate data, inform, analyze, and the identify gaps, if any, in current practice. Essential VI, Interprofessional Collaboration for Improving Patient and Population Health Outcomes, was demonstrated by employing effective communication and collaborative skills with the information technology (IT) department. Electronic patient information charting (EPIC) was utilized for data collection and in the development and implementation of change in the health care system. Collaboration with the IT department was vital in the inclusion and exclusion of criteria of data that is presented in Chapter III.

## CHAPTER II – REVIEW OF LITERATURE

A comprehensive review of literature was performed to locate information regarding the use of the drug ondansetron to reduce incidence of pruritus in obstetric patients receiving intrathecal opioids. The search consisted of multiple databases accessed through the University of Southern Mississippi's (USM) online catalogue. The databases used were Ovid, Cochrane Library, Pubmed, CINAHL, and Ebscohost. The search terms and MeSH terms used were ondansetron, Zofran, pruritus, nausea, obstetric, and epidural. All of these search terms were used interchangeably and in different combinations for advanced searches that would result in a desired article. Searches were limited to full text within the past 8 years. Inclusion criteria were that the article must be written in English and must be relevant to the efficacy of ondansetron in reducing neuraxial-induced pruritus and nausea. Exclusion criteria were any articles not written in English, which were not within the past 8 years, and were not relevant to the proposed topic of study. A total of 136 articles resulted from this and 11 articles were used after omitting ones based on relevance or criteria.

### Cesarean Sections

A prospective, randomized, double-blinded and placebo controlled study by Koju, Gurung, and Dongol (2015) was conducted over a 5 month period with 50 healthy parturients who were undergoing caesarean section under spinal anesthesia. The patients were randomly categorized into placebo group and treatment group. Twenty five received a placebo, 2ml of normal saline, and the treatment group of 25 received 4mg of ondansetron. Each group was administered their respective dose 30 minutes prior to injection of intrathecal morphine. Pruritus and post-operative nausea and vomiting

(PONV) scores were observed 24 hours after the administration of intrathecal morphine. Statistical analysis was done using chi-square test. The placebo group experienced a significant increased incidence, severity, and need for treatment for pruritus than compared to the treatment group (88% vs 16%  $p < 0.001$ ), and in both groups no participant required any additional medication to treat the pruritus (Koju et al., 2015). This result demonstrates ondansetron's efficacy on reducing pruritus with neuraxial morphine. The study was limited to one type of 5HT-3 antagonist with a fixed dose; however, it efficiently shows that pruritus can be managed by the administration of 4mg IV ondansetron 30 minutes prior to morphine injected intrathecally. In addition, the risk of PONV in the placebo group was increased compared to the treatment group (56% vs 8%,  $p < 0.001$ ) (Koju et al., 2015).

Randomized, double-blind study by Gulhas et al. (2007), was aimed to compare the effectiveness of lornoxicam and ondansetron for the prevention of intrathecal fentanyl-induced pruritus in patients undergoing c-section. One hundred and eight parturients ASA I-II status were given neuraxial analgesia by a combination spinal-epidural (CSE) technique. The CSE was performed and all participants received 25mcg of Fentanyl and 12mg hyperbaric bupivacaine. Three groups were established, group L received 8mg IV of lornoxicam, group O received 8mg IV of ondansetron, and group P which received 2ml of normal saline, each group had 36 participants. A Chi-square test was performed and results from 4 hours until 12 hours postoperatively, the incidence of pruritus was significantly lower for group O when compared to that in group L and group P ( $p < 0.05$ ), also the number of patients experiencing no pruritus was significantly higher in group O than compared to the other groups (Gulhas et al., 2007, p. 161).

Dong, Soon, Ja-Young, Jae, and Ki (2007), looked at the effectiveness of epidural administration of ondansetron, rather than intravenously, to reduce pruritus in elective cesarean deliveries. An animal study was performed on rats first to test for any neurotoxic side effects of ondansetron administered intrathecally. Upon dissection of the spinal cord of the rats, there was no specific morphological or histological changes noted. Eighty patients undergoing cesarean delivery consented and participated in this study. Forty patients received ondansetron through an epidural (EP) and the remaining forty received the medication intravenously (IV). The incidence of pruritus was significantly lower in the EP group (22.5% and 15%) than the IV group (55% and 30%) at 24 and 48 hours post-operatively ( $p < 0.05$ ) (Dong et al., 2007, pp. 683-687). The administration of intrathecal administration of ondansetron needs to be evaluated further.

In 2014, Kung et al. performed a prospective, randomized, double-blinded study to test the efficacy of prophylactic administration of ondansetron in reducing the incidence of intrathecal morphine-induced pruritus. Ninety participants undergoing cesarean section were randomized into three groups: placebo group (PLAC), treatment group (TREAT), or prophylactic group (PROPH). The patients all received the same dose of spinal anesthetic which included both 25 mcg of fentanyl and 250 mcg of morphine. Two syringes were prepared as follows: PROPH group: syringe A: ondansetron 8mg (4ml); syringe B normal saline 4ml; TREAT group: syringe A: normal saline 4ml; syringe B: ondansetron 8mg (4ml); PLAC group: both syringes were 4ml of normal saline. Syringe A was administered immediately following the umbilical cord clamping and syringe B administered in the post-anesthesia care unit (PACU). A visual analog scale (VAS) was then used to assess nausea, pain, and pruritus in time increments of 30,

60, and 120 minutes after arriving to the PACU. The study was terminated before completion due to lack of statistical evidence from the interim analysis that showed no effect from ondansetron in relieving pruritus. Statistical analysis was performed by ANOVA with Bonferroni correction or Fisher's exact test (Kung et al., 2014, pp. 222-236). Limitations to this study were that it was stopped early, intrathecal fentanyl was used in addition to morphine which deviates from the title suggestion of treatment of morphine-induced pruritus, and ketorolac, an anti-inflammatory medication, was given post-operatively and may have helped with the decrease of pruritus.

#### Other Populations

A systematic review of 15 randomized control trials shows the efficacy of a prophylactic single intravenous bolus of 5HT-3 receptor antagonists, such as ondansetron, in reducing pruritus after neuraxial administration of opioids. The 5-HT3 receptor antagonists have been shown to decrease the incidence and the intensity score of pruritus, primarily when morphine is used as the neuraxial opioid and suggested a decrease in the treatment of pruritus (Kumar & Singh, 2013). The systematic review did not suggest that the 5HT-3 receptor antagonists was effective in reducing the incidence of pruritus after the injection of neuraxial lipid-soluble opioids, such as fentanyl.

A double blind randomized case-control study was done by Jahanbakhsh, Fathi, and Bazyar (2014) to appraise the effects of ondansetron in preventing pruritus from intrathecal fentanyl in the orthopedic patient. One hundred and seven participants were randomly assigned to the case group, which received 8mg of ondansetron IV, and 100 randomly assigned to the control group, which received 4ml of normal saline. After intrathecal fentanyl administration of 25mcg, the patients were evaluated at 5, 10, 30, 60

minutes and then hourly up to 6 hours for any side effects. The presence, severity, and location of pruritus were also evaluated after 2 and 6 hours. The data was analyzed using Kolmogorov-Smirnov test, student *t*-test, Mann–Whitney *U*, chi-square test, Fisher exact test, and Spearman linear correlation coefficient (Jahanbakhsh et al., 2014). The results were that the incidence of pruritus was 60% in the control group and 34% in the case group (Jahanbakhsh et al., 2014). Pruritus among the participants was most prevalent at the injection site of fentanyl; however, the administration of ondansetron decreased pruritus at the injection site (Jahanbakhsh et al., 2014). Some of the case group still experienced severe pruritus. The phenomenon of neuraxial induced pruritus is undetermined and further studies must be performed to understand its true exact mechanism of action. It should be noted that these participants were undergoing orthopedic procedures, not an obstetric procedure, but the results are still promising in that it establishes a reduction of fentanyl-induced pruritus.

#### Review of Literature Conclusion

The review of literature has provided evidence that ondansetron is effective in reducing the incidence and the severity of pruritus associated with intrathecal administered opioids. There was minimal literature on ondansetron and epidural use, the literature was older than eight years and was not used. The review of literature states ondansetron to be a safe and effective alternative to treat intrathecal opioid-induced pruritus in the cesarean population and also in other patient populations.

#### Theoretical Framework

The theoretical framework that would best fit this study is the Model for Change to Evidence Based Practice developed and introduced by Rosswurm and Larrabee (1999).

The model framework involves six steps which are: 1.) assess need for change in practice; 2.) link problem with interventions and outcomes; 3.) synthesize best evidence; 4.) design a change in practice; 5.) implement and evaluate the practice change; and 6.) integrate and maintain the change (Rosswurm & Larrabee, 1999). The overall goal of this study is to implement a new protocol based on the best evidence-based practice. By using the framework established by Rosswurm and Larrabee it will allow for a structured model to provide a change in practice in reducing the incidence of nausea/vomiting and pruritus with neuraxial administered opioids in the obstetric patient.

## CHAPTER III - METHODOLOGY

For the obstetric patient population, the epidural is an elective anesthetic procedure that is used to decrease the pain and discomfort. One prominent side effect to the use of an epidural is pruritus, with an incidence in the obstetric patient of 60-100% (Kumar & Singh 2013). Ondansetron, an anti-emetic, has been shown to decrease the incidence of pruritus in the review of literature. The next sections will present the proposed method design, data collection, and statistical analysis that will be used so that the necessary information to determine if this alternative treatment would be beneficial in decreasing the incidence of pruritus in the obstetric patients receiving epidural administered opioids.

### Population

Inclusion criteria was the obstetric patient receiving an epidural opioid, are between the ages 20 and 40, English speaking, and vaginal delivery with an epidural. Exclusion included all of the obstetric patients that did not receive an epidural administered opioid and any patients that had a cesarean section. Exclusion criteria also included obstetric patients that are younger than 20 years of age and older than 40 years of age, non-English speaking patients.

### Setting

A 512-bed Level II trauma hospital in southeast Mississippi will be the facility in which the data is collected. Retrospective chart analysis was used and the process of collecting the data was important in determining the efficacy of the study.

## Design

The study used a retrospective chart review coupled with quantitative statistical analysis to determine if the administration of IV ondansetron preemptively reduced the incidence of nausea and also reduce the incidence of pruritus following an epidural administered opioid. Upon completion of the data collection process, an online sample size calculator was used to determine the sample size based on the number of the total population, the confidence level, and the confidence interval.

A benefit of this study is that by using a retrospective chart analysis there were no patient interactions and no intervention performed. Patient safety was advocated, meaning the patients used in the study will be at no risk for harm. Observations were made for obstetric patients who had pruritus and/or nausea after an epidural.

### *Data Collection*

Successful Institutional Review Board (IRB) approval from the selected health care facility and then IRB approval from the University of Southern Mississippi, access to patient's electronic medical record was granted. All data recovered from the medical record was de identified ensuring confidentiality. The time period requested was composed of two parts. The first part was to research from February 1, 2015 to August 31, 2015, this was to collect and observe data when the obstetric physicians were in charge of epidural management. The second part was from February 1, 2016 to August 31, 2016, this was to collect and observe the anesthesia epidural management. Data collection recorded which medication treatment was given, either ondansetron or any other medication used and then record the outcome of the treatment and determine the effectiveness, if any, of the medications

All data collection was stored and de-identified on a password protected personal computer, and data was disposed of by shredding any paper documents or deleted from computer six months after all graduation requirements have been met.

### *Statistical Analysis*

A t-test can be applied to establish two groups are statistically different from each other. The two groups can be classified as no administration of ondansetron and administration of ondansetron and observing the incidence of pruritus and/or nausea of the two groups. Power analysis calculator provided on <https://www.ai-therapy.com/psychology-statistics/sample-size-calculator> was used to estimate the appropriate sample size (AI-Therapy Statistics, 2016). A one-tailed t-test, with independent groups, effect size of 0.6, significance level ( $\alpha$ ) of 0.05, and power of 0.8 determined that a sample size of 72 (36 in each group) is sufficient to produce statistical evidence that the two groups are statistically different. Additionally an odds ratio was utilized to determine the odds that a particular outcome will occur. Administration of ondansetron can be a variable and the odds ratio can predict the odds that the outcome of decreased nausea/vomiting and pruritus can occur. This can be further compared to no administration of ondansetron and determining the odds that the outcome decreased nausea/vomiting and pruritus can occur. Based upon the significance level, the validity of the quantitative study was established and included in the project.

### Conclusion

In conclusion, a retrospective chart analysis was used to determine the efficacy of ondansetron relieving pruritus and/or nausea compared to that of diphenhydramine in the obstetric patient that has received epidural administered opioids. This methodology does

not place the patient's safety and health at risk. Inclusion criteria for the project was stated and there will be no breach in patient confidentiality. Statistical analysis ultimately determined if the outcomes of collected data has validity and significant statistical evidence that ondansetron is more effective in preemptively reducing the incidence of nausea and vomiting and in addition reduce the incidence of epidural opioid-induced pruritus in the obstetric patient.

## CHAPTER IV – ANALYSIS OF DATA

### Results

A retrospective chart analysis was performed to identify the efficacy of ondansetron in reducing the incidence of pruritus post epidural administered opioids in the obstetric patient. The software Electronic Patient Identification Chart (EPIC) was used to view the patient charts that met the inclusion criteria. The facility was unable to offer the patient charts requested for February, 2015 to August, 2015. The only available charts granted permission to review were from the dates of February 2, 2016 until August 31, 2016. A total of 605 (N=605) charts met the criteria and after further evaluation only a total of 24 (n=24) patients were administered ondansetron within the five minute time parameter as established in the data collection tool (Appendix D). Additionally 581 (n=581) patients were not administered ondansetron and used in the statistical analysis.

#### *Demographics*

Table 1

#### *Demographics of Patients that Received Ondansetron*

Characteristics	Number	Percentage
<b>Delivery Method</b>		
Vaginal	24	100
<b>Anesthetic</b>		
Epidural	24	100
<b>Age</b>		
Mean	28.3	
Range	21-39	

All patient information was collected using EPIC and was de-identified on a personal password protected computer. No identifiable patient information was removed from the facility. The patient demographics are listed in Table 1, and illustrate that the patients were within the parameters of the inclusion criteria.

### *Relevant Results*

Of the 24 patients that received ondansetron five minutes after epidural placement only one patient experienced pruritus and required administration of 25mg diphenhydramine IV. The patient received the medication 7 hours post epidural placement. The incidence of pruritus in those patients that received ondansetron was 4.17%. In addition, four patients also needed additional treatment for nausea/vomiting. One patient received 12.5mg Phenergan IV and three patients received another dose of 4mg ondansetron IV. The average time onset of nausea/vomiting in these four patients was 9 hours post epidural placement. The incidence of nausea/vomiting in this group was 16.67%.

It was observed that in the group of 581 patients involved in this study that did not receive ondansetron within 5 minutes of epidural placement only 6 patients required treatment of pruritus with diphenhydramine, 5 patients received 25mg orally and one patient received 25mg IV, and one patient experienced severe pruritus and required a total of four doses of 25mg diphenhydramine orally. The other five in the group only required one dose. The group that did not receive ondansetron within 5 minutes of epidural placement had an incidence of pruritus of 1.03%. The average time onset of pruritus was 8.34 hours after epidural placement. It was noted that in this group 105 patients experienced nausea/vomiting. This is an incidence of 18.07%. The average time

onset of nausea/vomiting in these patients was 4.49 hours. By doing simple probability, based on this sample group, it was determined that the odds of having pruritus are 4.18 times greater for obstetric patients who did receive ondansetron. This was attributed to the fact that the ondansetron group had a pruritus incidence of 4.17% and compare that to the no administration of ondansetron group which had an incidence of 1.03%. It was also determined that the odds of having nausea/vomiting are 1.1 times greater for obstetric patients who did not receive ondansetron. Based on this sample size of the population there is an increased odds of having pruritus with pre-treatment of ondansetron. There was however a very small increased odds of having nausea/vomiting with no pre-treatment of ondansetron.

#### Data Analysis

The initial statistical analysis test was originally a one-sided t test. This was further evaluated and was determined that this test would be insufficient and a forward logistic regression along with an odds ratio test would be the optimal test to perform. Forward logistic regression was conducted to determine if the independent variable (ondansetron) is a predictor of pruritus and nausea/vomiting in obstetric patients that received opioids via an epidural.

#### *Pruritus*

Regression results indicated that the overall model fit of the predictor (ondansetron) was reasonably good (-2 Log likelihood = 75.128) and was not statistically reliable in distinguishing between variables [Independent variable (ondansetron) and dependent variable (pruritus)] [ $\chi^2(1) = 1.222, p = .269$ ]. The model is accurate in classifying 98.8% of the participants. Regression coefficients are presented in Table 2.

Wald statistics indicated that ondansetron did not significantly predict pruritus. Odds ratio for the variable indicated very little change in the likelihood of patient experiencing pruritus.

Table 2

*Regression Coefficients for Pruritus*

	<i>B</i>	<i>Wald</i>	<i>df</i>	<i>p</i>	Odds Ratio
Ondansetron	-1.427	1.681	1	.195	.228
Constant	-3.135	9.422	1	.002	

*Nausea/Vomiting*

Regression results indicated that the overall model fit of the predictor (ondansetron) was debatable (-2 Log likelihood =573.669) and was not statistically reliable in distinguishing between variables [Independent variable (ondansetron) and dependent variable (nausea/vomiting)] [ $\chi^2(1) = .039, p = .844$ ]. The model correctly classified 81.8% of the cases. Regression coefficients are presented in Table 3. Wald statistics indicated that ondansetron did not significantly predict nausea/vomiting. Odds ratio for the variable indicated very little change in the likelihood of patient experiencing nausea/vomiting.

Table 3

*Regression Coefficients for Nausea/Vomiting*

	<i>B</i>	<i>Wald</i>	<i>df</i>	<i>p</i>	Odds Ratio
Ondansetron	.110	.039	1	.844	.894
Constant	-1.609	8.634	1	.003	

## Data Evaluation

The overall purpose of this project was to determine if administration of ondansetron within five minutes of successful placement of an epidural would decrease incidence of nausea/vomiting and pruritus in the obstetric patient. After evaluating the statistical analysis for this sample it was determined that the administration of ondansetron does not reduce the incidence of nausea/vomiting and pruritus in the obstetric patient post epidural administered opioids.

## CHAPTER V – DISCUSSION

### Summary of Major Findings

As stated in Chapter IV, after statistical analysis the administration of ondansetron within five minutes after epidural placement did not demonstrate significant statistical evidence that it decreases the incidence of nausea/vomiting and pruritus in the obstetric patient (Pruritus  $p= .195$  and Nausea/Vomiting  $p= .844$ ).

### Limitations and Barriers

#### *Limitations*

Limitations and barriers to this project were that it was an overall small sample size of patients that did receive ondansetron five minutes post epidural ( $n= 24$ ). The facility that was used in this project utilized an epidural infusion of Naropin 0.25% plus 0.125mcg/ml of fentanyl at a rate of 10-18 ml/hour. The current practice used in this facility does not use opioids in the loading dose of the epidural. The only exposure of opioids the obstetric patient receives comes from the epidural infusion which is a minimal dose and a slow rate of infusion. This is a limitation to this project because the patient is only exposed to a minimal concentration of opioids. A history of post-operative nausea/vomiting (PONV) in the obstetric patients was not observed and could have factored in the outcome. Also, once the epidural was discontinued no more observations of nausea/vomiting and pruritus was recorded in the data collection. There may have been more instances of nausea/vomiting and pruritus after the epidural was discontinued and could have had an impact on the statistical result.

## *Barriers*

A barrier to this project was that only one CRNA administered ondansetron within minutes post epidural, and in some instances the administration was after five minutes and did not meet the inclusion criteria and was excluded from the sample size. A technology barrier was present in that there was no electronic charting present for the requested dates of February 1, 2015 to August 31, 2015. The facility used paper charting during those dates and were not able to provide these charts for the statistical analysis and could add more statistical validity to the project.

## Implications of Clinical Scholarly Project

Based on the statistical analysis, the implications on nursing practice is that it provided anesthesia providers some evidence that ondansetron is not effective in decreasing the incidence of nausea/vomiting and pruritus post epidural administered opioids in the obstetric patient. The results of this project will provide the obstetric patients with a more satisfying overall stay in the hospital which will enhance quality improvement. For future studies, a needs assessment may need to be done first to determine what the actual incidence of nausea/vomiting and pruritus is in post epidural administered opioids in the obstetric patient. If there is a significant incidence (~ 50% or greater) of nausea/vomiting or pruritus the clinical question will ondansetron reduce the incidence on nausea/vomiting and pruritus can be utilized and further studied. Further studies need to include a larger sample size to add more strength in the statistical analysis. A recommendation of a longer time frame than five minutes to administer ondansetron post epidural can be further studied for any statistical difference. Suggested future studies may want to observe if parity is a variable that can increase or decrease incidence of

nausea/vomiting and pruritus. A history of PONV could be included in further studies to determine its impact on incidence of nausea/vomiting post epidural. Finally, a study to determine if there is an increase in the incidence of nausea/vomiting and pruritus in either duramorph or fentanyl administered via epidural in the obstetric patient. In the future, the author can perform either a pilot study or randomized control trial to add more statistical validity to this project.

Dissemination of the findings was provided to the key stakeholders of the anesthesia department at the healthcare facility where the data was collected. Statistical analysis, interpretation of results, and future recommendations was presented. Dissemination of results and recommendations for future studies was also presented to students in the nurse anesthesia program at The University of Southern Mississippi. In the future, the author can present findings to a state chapter or national anesthesia association.

### Conclusions

The goal of this project was to determine the efficacy of intravenous ondansetron in reducing the incidence of nausea/vomiting and pruritus post epidural administered opioids in the obstetric patients. A retrospective chart review was performed and statistical analysis revealed in this sample that ondansetron is not statistically significant in reducing either nausea/vomiting or pruritus. This project can provide key stakeholders current evidence-based knowledge regarding nausea/vomiting and pruritus post epidural in the obstetric patient.

## APPENDIX A – DNP Essentials

Essential I: Scientific Underpinnings for Practice	This capstone project described actions and advanced strategies to help alleviate the phenomena of post epidural administered opioid induced nausea/vomiting and pruritus.
Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking	This capstone project developed and evaluated care delivery that meet current and future needs of the obstetric patient who receives epidural administered opioids.
Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This capstone project used analytic methods to critically appraise existing literature on ondansetron reducing nausea/vomiting and/or pruritus in the obstetric patient, designed and implemented a process to evaluate the outcomes of current practice, then evaluated quality improvement methodologies, performed research methods to collect appropriate data, inform, analyze, and the identify gaps in current practice.
Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	This capstone project demonstrated the conceptual ability to develop and execute an evaluation plan.
Essential V: Health Care Policy for Advocacy in Health Care	This capstone project developed, evaluated, and provided leadership for health care policy and helped shape health care delivery to the obstetric patient who has received epidural administered opioids.
Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes-	This capstone project employed effective communication and collaborative skills in the development and implementation of change in the health care system.
Essential VII: Clinical Prevention and Population Health for Improving the Nation’s Health	Dissemination of findings to state chapter or national anesthesia association upon completion of project
Essential VIII: Advanced Nursing Practice	This capstone designed, implemented, and evaluated therapeutic interventions based on nursing science, to reduce the incidence of post epidural opioid-induced nausea/vomiting and pruritus in the obstetric patient population.

## APPENDIX B – USM IRB Approval Letter



### **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](http://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:** 15081504

**PROJECT TITLE:** Efficacy of Intravenous Ondansetron in Relieving Nausea/Vomiting and Pruritus Post Epidural Administered Opioids in the Obstetric Patient

**PROJECT TYPE:** New Project

**RESEARCHER(S):** Benjamin Butler

**COLLEGE/DIVISION:** College of Nursing

**DEPARTMENT:** Advanced Nursing Practice/Nurse Anesthesia Program

**FUNDING AGENCY/SPONSOR:** N/A

**IRB COMMITTEE ACTION:** Exempt Review Approval

**PERIOD OF APPROVAL:** 08/16/2016 to 08/15/2017

**Lawrence A. Hosman, Ph.D.**

**Institutional Review Board**

APPENDIX C – Facility IRB Approval Letter



DATE: August 3, 2016

TO: Benjamin Butler

FROM: General Hospital Institutional Review Board

STUDY TITLE: [P1611-1] EFFICACY OF INTRAVENOUS ONDANSETRON IN RELIEVING NAUSEA/VOMITING AND PRURITUS POST EPIDURAL ADMINISTERED OPIOIDS IN THE OBSTETRIC PATIENT

SUBMISSION TYPE: HIPAA IRB Waiver of Authorization

ACTION: APPROVED

APPROVAL DATE: July 20, 2016

EXPIRATION DATE: July 15, 2017

REVIEW TYPE: Full Committee Review

The General Hospital Institutional Review Board (IRB) has reviewed and approved the Waiver of Authorization for use of protected health information (PHI) for this research study as outlined in the approved research protocol.

In approving this Waiver of Authorization, the FGH IRB has determined the following criteria has been met:

The use or disclosure of the requested information involves no more than a minimal risk to the privacy of individuals based on, at least, the presence of the following elements:

- An adequate plan to protect the identifiers from improper use and disclosure
- An adequate plan to destroy the identifiers at the earliest opportunity consistent with conduct of the research, unless there is a health or research justification for retaining the identifiers or such retention is otherwise required by law.
- Adequate written assurances that the requested information will not be reused or disclosed to any other person or entity, except as required by law, for authorized oversight of the research study, or for other research for which the use or disclosure of the requested information would be permitted by the Privacy Rule.
- The research could not practicably be conducted without the waiver or alteration
- The research could not practicably be conducted without access to and use of the requested information

In making this determination the IRB has followed the requirements of the Common Rule using Full Board Review procedures.

If you have any questions, please contact Michele Stanley at 601-24 or mstanley@general.com. Please include your study title and reference number in all correspondence with this office.

Sincerely,

Lewis E. [redacted], M.D.  
Chairman, Institutional Review Board

APPENDIX D – Data Collection Tool

	Age	Epidural assisted vaginal delivery	Ondansetron administered within 5 minutes of epidural	Ondansetron not administered	Any other medications used to treat N/V or pruritus
Subject1					
Subject2					
Subject3					

APPENDIX E – Literature Matrix

AUTHOR	YEAR	DESIGN	FRAMEWORK	SAMPLE	FINDINGS
Dong, W. H., Soon, W. H., Ja-Young, K., Jae, W. L., & Ki, K. J.	2007	Not specified	N/A (No Theoretical Framework used)	N= 80 ASA I elective cesarean section n=40 EP ondansetron n=40 IV ondansetron	The incidence of pruritus was significantly lower in the EP group (22.5% and 15%) than the IV group (55% and 30%) at 24 and 48 hours post-operatively (p < 0.05)
Jahanbaksh, S. S., Fathi, M., & Bazyar, S.	2014	double blind randomized case-control study The data was analyzed using Kolmogorov-Smirnov test, student t-test, Mann-Whitney U, chi-square test, Fisher exact test, and Spearman linear correlation coefficient.	N/A (No Theoretical Framework used)	N= 207 ASA I, II, III receiving lower extremity orthopedic surgery n= 107 ondansetron IV (case group) n= 100 normal saline IV (control group) all receiving 25mcg of fentanyl intrathecally	The results were that the incidence of fentanyl-induced pruritus was 60% in the control group and 34% in the case group
Gulhas, N., Erdil, F. A., Sagir, O., Gedik, E., Tugal, T., Begec, Z., & Ersoy, M. O.	2007	randomized double blind study , chi-square test	N/A (No Theoretical Framework used)	N=108, ASA I, II, cesarean section, CSE 25mcg Fentanyl, n=36 group L (8mg lornoxicam), n=36 group O (8mg ondansetron), n=36 group P (2ml normal saline)	the incidence of pruritus was significantly lower for group O when compared to that in group L and group P (P < 0.05), also the number of patients experiencing no pruritus was significantly higher in group O than compared to the other groups

Koju, R. B., Gurung, B. S., & Dongol, Y	2015	prospective, randomized, double-blinded and placebo controlled study chi-square test	N/A (No Theoretical Framework used)	N=50 ASA I, II caesarean section n=25 placebo (2ml normal saline) n=25 treatment (4mg ondansetron) receiving 0.2mg of morphine intrathecally	The placebo group experienced a significant increased incidence, severity, and need for treatment for morphine-induced pruritus than compared to the treatment group (88% vs 16% P < 0.001), and in both groups no participant required any additional medication to treat the pruritus
Kumar, K., & Singh, S. I.	2013	systematic review of 15 randomized control trials	N/A (No Theoretical Framework used)	Not specified	The 5-HT <sub>3</sub> receptor antagonists have been shown to decrease the incidence and the intensity score of pruritus, primarily when morphine is used as the neuraxial opioid and suggested a decrease in the treatment of pruritus. did not suggest that the 5HT-3 receptor antagonists was effective in reducing the incidence of pruritus after the injection of neuraxial lipid-soluble opioids, such as fentanyl.

<p>Kung, A. T., Yang, X., Li, Y., Vasudevan, A., Pratt, S., &amp; Hess, P.</p>	<p>2014</p>	<p>prospective, randomized, double-blinded study Statistical analysis was performed by Bonferroni correction or Fisher's exact test.</p>	<p>N/A (No Theoretical Framework used)</p>	<p>N=90 ASA I, II n (PLAC)= 26, n (TREAT)= 32, n (PROPH)= 24 undergoing cesarean section were randomized into three groups: placebo group (PLAC), treatment group (TREAT), or prophylactic group (PROPH). The patients all received the same dose of spinal anesthetic which included both 25 mcg of fentanyl and 250 mcg of morphine.</p>	<p>The study was terminated before completion when the interim analysis showed no effect. . Limitations to this study were that it was stopped early, intrathecal fentanyl was used in addition to morphine which deviates from the title suggestion of treatment of morphine-induced pruritus, and ketorolac, an anti-inflammatory medication, was given post-operatively and may have helped with the decrease of pruritus</p>
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