AN EDUCATIONAL INTERVENTION FOR CRNAS ON THE USE OF NON-OPIOID ANALGESICS IN THE GYNECOLOGICAL POPULATION: A RETROSPECTIVE CHART REVIEW AND QUALITATIVE SURVEY

By

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Abstract

**Objective:** Non-opioid analgesics provide pain control while avoiding detrimental side effects caused by opioids such as nausea and vomiting, respiratory depression, and opioid dependence. This study aimed to determine the effect of hour long educational intervention given to CRNAs about the use of non-opioids in gynecological surgery patients on the use of non-opioid analgesics, postoperative pain scores, and length of stay in the PACU. A secondary aim was to determine CRNA perceived barriers to implementing non-opioid analgesics into practice.

**Theoretical Framework:** Kurt Lewin’s Change Theory

**Methods:** A CRNA educational session was presented at one local hospital. Pre-intervention and post-intervention non-obstetric gynecological surgery patient charts were reviewed 30 days before and after the intervention. Data was collected on the number of non-opioids administered/prescribed by a CRNA, postoperative pain scores in phase 1, and length of stay in phase 1. A Likert-survey was disseminated to CRNAs 2 weeks after the intervention to determine perceived barriers.

**Results:** Patients after the educational intervention received non-opioids significantly more; had a significantly decreased length of stay in phase 1 recovery; and had significantly less pain at 75 and 90 minutes (p < 0.05). Pain scores did not significantly change at 15, 30, 45, 60, 105, and 120 minutes. CRNAs reported that perceived barriers included anesthesiologist and surgeon reluctance and cost of medications.

**Discussion:** Data confirmed that an educational session for CRNAs on non-opioid analgesics may decrease length of stay in phase 1 recovery and increase the number of non-opioid analgesics administered to gynecological surgery patients.
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Background

Pain control in the perioperative environment is important for patient recovery (Rivkin & Rivkin, 2014). Inadequate pain control can negatively affect a patient’s quality of life, function, and increase a patient’s risk of post-surgical complications (Chou et al., 2016). However, the traditional use of opioid analgesics for pain control can cause detrimental effects to patients during their surgical recovery such as increased nausea and/or vomiting, drowsiness, constipation, difficulty urinating, central nervous system impairment, and respiratory depression (Oderda, Gan, Johnson, & Robinson, 2013). Additionally, opioid use on surgical patients can increase risk for ileus, which may increase hospital length of stay (LOS) (Oderda et al., 2013). Furthermore, research has shown that prescribing opioid after surgery can increase a patient’s likelihood of having long-term opioid dependence by 44% (Oderda et al., 2013). Non-opioid analgesics can have many benefits for the gynecological surgery patient (Santoso et al., 2014), however, currently there is a lack of education for certified registered nurse anesthetists (CRNAs) in Buffalo, NY about the appropriate use of these medications. Finally, there is currently an opioid shortage in healthcare systems nationwide (Hollingsworth & Herndon, 2018) and non-opioid adjuncts can be utilized to help with pain control.

Gynecological procedures are done to treat a multitude of disease including gynecologic malignancies, pelvic organ prolapse, endometrial bleeding, and endometrial fibroids (Kalogera et al., 2013). These diseases affect women of all demographics and the gynecological procedures implemented to treat these diseases can cause moderate to severe pain postoperatively. Effective analgesia is necessary to implement function after gynecological surgery (Aubrun et al., 2008). Additionally, patients undergoing gynecological surgery are at an increased risk of experiencing postoperative nausea and vomiting (PONV) and the use of opioids can contribute to PONV.
NON-OPIOID ANALGESICS

(Aubrun et al., 2008). Although pain control and PONV prevention, as with all surgical procedures, is important for patient recovery, there is limited research on multimodal non-opioid pain control in this specialty (Kalogera et al., 2013).

Opioid analgesia is defined as any synthetic narcotic that has opiate like activities (Miller-Keane & O’Toole, 2005), specifically used to reduce pain (Centers for Disease Control, 2015). This class of drugs includes but is not limited to oxycodone, hydrocodone, morphine, methadone, hydromorphone, fentanyl, remifentanil, sufentanil, and alfentanil (CDC, 2015). Non-opioid analgesics are medications that have analgesic properties but are non-narcotic and do not produce euphoria, tolerance, or addiction (Root & Hofmann, 1963). This class of medications includes but is not limited to ketamine, gabapentinoids, lidocaine, dexmedetomidine, clonidine, acetaminophen, ibuprofen, esmolol and ketorolac (Rivkin & Rivkin, 2014).

Postoperative pain score is defined as the patient’s reported feeling of discomfort on a scale of zero to ten. (Santosa, Ulm, Jennings, & Wan, 2014). The Wong-Baker Faces Pain Score is a pain scale modification of the zero to ten scale where 0 indicates no pain, 2 indicates a little pain, 4 indicates a little more pain, 6 indicates it hurts even more, 8 indicates it hurts a whole lot, and 10 indicates its hurts the worst (Santosa et al., 2014).

The enhanced recovery after surgery (ERAS) model has been implemented in gynecological procedures. Kalogera et al. (2013) studied the implementation of enhanced recovery in patients undergoing gynecologic surgery. Within this enhanced recovery protocol was the implementation of scheduled acetaminophen, scheduled NSAIDs, and tramadol in addition to oxycodone and hydromorphone as needed for breakthrough pain. The use of this protocol reduced overall opioid use by 80% within the first 48 hours, reduced cost to the hospital by 18.8% and decrease LOS by 4 days. However, there were a variety of steps within the ERAS
model in addition to the multimodal analgesia which all influenced patient outcomes. The use of multimodal nonnarcotic pain control in this ERAS protocol cannot be specifically attributed to the decrease in opioid use and LOS (Kalogera et al., 2013).

A literature review on non-narcotic analgesics for preoperative and intraoperative pain control in gynecological surgery demonstrated a variety of studies about the use of multimodal pain control and/or opioid free techniques. The literature revealed that currently there is a variety of articles demonstrating the effectiveness of many non-opioid medications, including gabapentin (Chotton et al., 2014; Fassoulaki et al., 2012; Patel et al., 2016), acetaminophen (Crisp et al., 2017; Faiz et al., 2014), and dexmedetomidine (Ge et al., 2016; Wang et al., 2016), on postoperative pain control after a non-obstetric gynecological procedure. However, the literature review also revealed a lack of evidence supporting the education of certified registered nurse anesthetists (CRNAs) on the use of non-opioid analgesics preoperatively and/or intraoperatively for patients undergoing non-obstetric gynecological procedures.

**Significance and Gap in Practice**

Currently, there is a lack of evidence for opioid free anesthesia protocols specifically for preoperative and intraoperative management of gynecological procedures in western New York. CRNAs provide the majority of anesthesia in New York state (NYSANA, 2018). CRNAs are advanced practice nurses (APNs) and have the autonomy and ability to manage patients pain intraoperatively and postoperatively utilizing techniques which are tailored to each individual patient. However, there is a gap in the literature on educational interventions on opioid free anesthesia or opioid sparing techniques for CRNAs. An educational intervention on opioid sparing techniques for gynecological procedures may decrease post anesthesia care unit (PACU) length of stay, while maintaining or improving pain scores postoperatively.
Purpose Statement

The purpose of this capstone project is to educate CRNAs at a local community suburban hospital where a large number of non-obstetric gynecological procedures are performed. The education will be on the use of a variety of non-narcotic opioid sparing analgesics that can be implemented to help decrease opioid use intraoperatively and postoperatively while maintaining or improving pain scores, decrease PACU length of stay, and decrease PONV. The secondary purpose of this project is to determine current perceived barriers to administering non-opioid analgesics in this patient population. CRNAs are patient advocates, especially as the patient is undergoing anesthesia and recovering from anesthesia and therefore it is the responsibility of an advanced practice nurse to utilize current research when providing care and anesthesia for a patient. Currently, CRNAs at this community hospital have not been educated about the use of opioid sparing techniques for gynecological procedures.

The capstone project questions are: In female adults (age 18 – 75) undergoing inpatient and outpatient non-obstetric gynecological surgical procedures, what is the effect of an hour long educational intervention for CRNAs at a local community hospital on opioid free and opioid sparing analgesics compared with no CRNA education on opioid free techniques on post anesthesia care unit (PACU) length of stay and postoperative pain scores? At a local community hospital, what are the current perceived barriers CRNAs feel are preventing the administration and/or prescription of non-opioid analgesics during the perioperative period for gynecological surgical patients?
Supporting Literature Review

A review of nursing and health related literature was conducted to synthesize current evidence-based knowledge and understanding regarding multimodal non-narcotic analgesia in intraoperative and postoperative pain control in adult females undergoing non-obstetric gynecological surgical procedures. Databases searched for this review were limited to the English language and the years 2013 through 2018. Databases searched included Google scholar, Pubmed, CINAHL and Cochrane Review. The search was performed using the following keywords both individually and in various combinations: opioid free, pain control, gynecological, non-opiate, decreased length of stay, gynecology, non-narcotic, multimodal, postoperative, intraoperative, female, hospital, anesthesia, and non-opioid. The following presents findings resulting from the review of current nursing and health-related literature exploring effects of multimodal non-narcotic analgesia on postoperative pain scores and length of stay.

An article by Chotton et al. (2014) looked at the administration of preoperative pregabalin for postoperative pain control in patients undergoing an abdominal hysterectomy utilizing a randomized control single-blinded trial. The aim of their study was to evaluate the use of a single oral dose of pregabalin on attenuating postoperative pain and analgesic consumption. The researchers enrolled ninety (n = 90) subjects in their study and found that postoperative pain and analgesic consumption was reduced in the group receiving pregabalin as compared to the placebo group (p < 0.05). Overall, this study demonstrated the use of pregabalin preoperatively as an adjunct to decrease pain postoperative in patients undergoing an abdominal hysterectomy.
Another article by Crisp et al. (2017) utilized a double-blind placebo-controlled randomized trial to determine the effect of intravenous acetaminophen versus placebo on postoperative pain, satisfaction with pain control, and narcotic use after vaginal reconstructive surgery. The researchers utilized a sample size of ninety seven (n = 97) and found that there was not a difference between groups in pain with rest or activity at 18 or 24 hours postoperatively and also did not demonstrate a difference in narcotic use during this period. However, this study did not look at pain scores until 18 hours postoperatively. The use of acetaminophen did not improve pain scores at the 18 and 24 hour mark, yet may improve pain scores earlier in the postoperative time period. This study provides evidence that there is a lack of concrete evidence on postoperative pain scores in PACU following the use of non opioid pharmacological adjuncts such as intravenous acetaminophen.

Faiz, et al. (2014) utilized a prospective, randomized, double-blind multicenter clinical trial to determine if intravenous (IV) acetaminophen is more effective than IV ketamine as an analgesic after an abdominal hysterectomy. The sample size in this study was eighty (n = 80) and each participant was randomized to receive IV acetaminophen or IV ketamine intraoperatively near the end of their surgical procedure. Results from this study demonstrated that visual analogue scales were significantly lower in the recovery room after 4 hours, 6 hours, 12 hours and 24 hours in the group who received acetaminophen compared to those who received ketamine (p < 0.05). In addition, the group receiving acetaminophen required fewer doses of breakthrough pain treatment with narcotics. Although both are non-opioid techniques, this article demonstrates the use of acetaminophen as a non-narcotic alternative for pain control postoperatively in the gynecological surgical population.
Fassaoulaki, Melemeni, Tsaroucha, & Paraskeva (2012) utilized a randomized control trial to determine the effect of preoperative administration of pregabalin on acute and chronic pain postoperatively and postoperative analgesic requirements. The researchers enrolled 80 patients and found that the patients who received preoperative pregabalin had a decreased morphine consumption at 4, 8, 24, and 48 hours postoperatively compared to those who did not receive pregabalin. This study provides evidence towards preoperative pregabalin as a part of a multimodal approach to pain control in the gynecological population.

Ge, et al. (2016) utilized a double-blind randomized clinical trial on the use of intraoperative dexmedetomidine on improving the analgesic effect of morphine based patient controlled analgesia (PCA) and also on the promotion of recovery after abdominal hysterectomy. The researchers enrolled sixty four (n = 64) participants who either received dexmedetomidine intraoperatively or remifentanil and propofol. The researchers found that patients who received DEX had a higher sedation score after extubation, but lower resting pain scores at 2, 4, and 12 hours postoperatively (p = 0.02, 0.04, 0.03) and lower moving pain scores 4 hours after postoperatively (p = 0.03). This study demonstrates the use of dexmedetomidine as an adjunct for pain control postoperatively in patients undergoing an abdominal hysterectomy.

Patel, Pranchal, & Patel (2016) attempted to compare the effectiveness of pregabalin on postoperative pain scores utilizing a randomized placebo controlled trial. The researchers enrolled ninety (n = 90) participants undergoing abdominal hysterectomy and bilateral salpingo-oophorectomy (BSO). The results from this study demonstrated a statistically significant decrease in postoperative visual analogue score during movement and coughing in groups receiving pregabalin compared to the placebo group at 30, 60, 90, minutes, 2, 6 and 12 hours postoperatively (p < 0.05). Additionally, a statistical significant increase in time to first rescue
analgesic was found in the group receiving pregabalin ($p < 0.001$). Additionally, the pregabalin groups had lower incidences of nausea and vomiting than the placebo group. Overall, this study demonstrates the efficacy of preoperative pregabalin in pain control postoperatively.

An article by Wang, et al. (2016) attempted to evaluate the effects of dexmedetomidine on postoperative pain for patients who underwent laparoscopic surgery compared to utilizing fentanyl utilizing a quantitative prospective randomized control trial. The researchers enrolled forty ($n = 40$) participants and found that there was not a statistical significant difference in the visual analogue scale postoperatively. However, the researchers did find that the group who received dexmedetomidine had a statistically significant decrease in postoperative nausea and vomiting (PONV), earlier time to first flatus or bowel movement, and increase patient satisfaction ($p < 0.05$). This study demonstrates the efficacy of dexmedetomidine as an alternative to fentanyl as it improves PONV and satisfaction. Although it did not improve pain scores significantly, it should be noted that it also did not worsen pain scores. Dexmedetomidine can be utilized in an opioid free anesthesia protocol.

Finally, Santoso, Ulm, Jennings, & Wan (2014) utilized a prospective cohort with a retrospective historical control to study the association of a multimodal pain protocol with reduced hospital stay after an open abdominal hysterectomy. This study performed a chart review on 113 participants who received a morphine PCA and PRN IV morphine and/or PRN oral oxycodone/acetaminophen after open abdominal hysterectomy. The researchers then enrolled 105 participants in the study and utilized preoperative gabapentin and acetaminophen, local anesthetic at the incision site, and postoperative gabapentin, acetaminophen, ketorolac, morphine PCA and oxycodone/acetaminophen PRN. The results demonstrated a 50% reduction in hospital stay for patients who received the multimodal intervention ($p < 0.0001$). This study
exemplifies how the use of a multimodal pain control protocol can decrease length of stay for patients undergoing gynecological procedures. However, there was no change in the intraoperative management of patient’s pain in this study other than utilization of local anesthetic. This study then demonstrates the gap in literature on intraoperative multimodal protocols for gynecological procedures and the need for this capstone project.

A literature search was performed to review opioid free anesthesia educational interventions for CRNAs, and this researcher found a lack of evidence in this area. The current opioid epidemic combined with opioid shortages in many facilities provides anesthesia providers with an opportunity to implement opioid free analgesics into their practice when caring for gynecological patients (Mauermann, Ruppen, & Bandschapp, 2017). This intervention will attempt to determine barriers to change as well as determine the effects of opioid free analgesia techniques on postoperative length of stay, nausea and vomiting, and pain scores.

**Theoretical Framework**

The purpose of this study is to improve CRNA’s understanding and use of non-opioid alternatives in the perioperative setting in order to decrease unwanted side effects of opioids and decrease patient length of stay in PACU. This project will utilize the framework by Kurt Lewin, known as the change theory (Rotondo, 2017). This project requires education and implementation of a new technique, while overcoming barriers to change by utilizing the three-step model of change. Lewin implemented “planned change” in the 1940s and created this three-step model of change and action research which works to make improvement in group behavior utilizing unfreezing, moving, and refreezing (Burnes, 2004). It is likely that there will be some barriers to implementing this educational technique, and Kurt Lewin’s change theory attempts to mitigate these barriers with the three-step process.
Lewin described four elements of change: field theory, group dynamics, three-step model of change, and action research (Burnes, 2004). Field theory and group dynamics are utilized to determine current group behavior while the three step model of change and action research attempt to make an improvement in behavior. This change theory utilizes driving phases to unfreeze, move, and refreeze while attempting to mitigate restraining forces by trialing and evaluating the new behavior and making modifications to ensure long-term success. In this project, the field theory and group dynamics are the CRNAs at a community hospital in western New York who current utilize opioid as their main technique to prevent and treat pain intraoperatively and postoperatively. The action research will be the educational intervention on opioid sparing techniques for gynecological patients.

The three-step model of change, according to Lewin, begins with the unfreezing phase. The unfreezing phase can also be thought of as the preparation phase. This phase utilizes techniques to destabilize the current practice in order to introduce a new practice (Rotondo, 2017). In order to successfully “unfreeze” the current technique, a motivational technique is important in order to rationalize the new technique and build a community about the proposed change. The unfreezing phase in this project will consist of an educational intervention for CRNAs at a local hospital. During this educational session, the negative side effects of opioids and the benefits of non opioids will be introduced along with an overwhelming literature review that describes alternative techniques and the positive effects on patient outcomes from the administration of non opioid alternatives. This will create a sense of urgency for change and help to overcome barriers and beliefs about the use of opioids for patients undergoing gynecological surgery.
The moving phase attempts to utilize driving forces to create the change while mitigating barriers to change. This occurs as the new behavior is trialed and re-evaluated over a period of time. It consists of editing and constantly updating the behavior in order to meet the needs of the proposed behavior. The moving phase for this project will consist of a month long period post educational session to allow for implementation of non-opioid techniques in the gynecological population, while receiving feedback from CRNAs on the barriers to this change. Because this intervention is based on patient, surgeon, anesthesiologists, pharmacy and CRNA preferences, the intervention will require modifications for each situation. The moving phase allows for trialing and evaluating the behavior and allows for modification for each patient situation (Rotondo, 2017).

Finally, the last phase of the change theory is the refreezing phase. This phase consists of maintaining the behavior permanently to allow for a long-term behavior modification. During this process, it is important to determine methods to maintain the behavior change while preventing barriers from causing regression to previous behaviors. If the facility chooses to, the non-opioid interventions can be made into a policy or practice change (Rotondo, 2017), and can possibly be integrated into other surgical disciplines. This may be the most important phase as it causes a long-term shift of practice leading to improved patient length of stay while maintaining or improving pain scores. Future studies may expand upon the impact of utilizing non-opioid alternatives such as the prevalence of nausea and vomiting and long-term outcomes including decreased opioid dependence in this population.

**Design**

The study period was from August to October 2018 at a local, community hospital. Pre-intervention retrospective chart reviews were performed to determine PACU length of stay, the
amount of opioid-sparing drugs administered or prescribed to gynecological surgery patients during their perioperative and experience, and postoperative pain scores every 15 minutes in patients undergoing adult gynecological procedures. A one-month post-intervention chart review in October 2018 was performed by the researcher to collect the number of non-opioid medications, compared to pre-intervention, administered to or prescribed in the gynecological surgical population. The chart review also collected data after the intervention on PACU length of stay and postoperative pain scores. The findings of this study will be presented to the CRNAs and also disseminated at a local university for research day as a research poster. A qualitative Likert-style survey was disseminated to those CRNAs who listened to the PowerPoint presentation and consented to being a part of the study. The survey attempted to determine barriers to implementing opioid free analgesics into practice. The survey was disseminated two weeks post intervention.

Setting

The setting for this study was at a local hospital in the Western New York area. The hospital has 265 acute care beds and is a teaching hospital with a large variety of patient populations. The operating rooms provide a variety of surgical services ranging from ambulatory to inpatient. The surgical specialties include: gynecological, orthopedic, cosmetic, urology, vascular, general surgery, ear, nose, and throat, and spinal. The hospital also has robotic surgical capabilities, including gynecological procedures such as hysterectomies.

Population

The primary population included female patients aged 18 to 75 who underwent either an inpatient or outpatient gynecological non-obstetric surgical procedure both prior to and after the
educational intervention. Exclusion criteria included patients receiving regional or neuraxial techniques as part of their anesthetic plan or patients receiving their anesthetic from an anesthesia resident, student registered nurse anesthetist (SRNA), or anesthesiologist only. The secondary population included CRNAs employed by the hospital’s healthcare system who listened to the PowerPoint presentation either in person or online. Exclusion criteria will include CRNAs who have not listened to this presentation, anesthesia residents, anesthesiologists, or SRNAs.

Recruitment

Recruitment measures included convenience sampling by providing an in person one hour educational session to CRNAs at the local hospital. CRNAs who were scheduled to be at the hospital on the day of the educational session were offered consent and participation in the study by listening to the educational intervention and following up with online surveys. Additionally, an email to CRNAs within the healthcare system was sent with a voice over PowerPoint of the session and consent forms. All participants were informed that there were no financial or professional burdens and their consent would be voluntary.

Methods

This study utilized a mixed methods design, using an experimental cohort retrospective chart review and qualitative Likert-style survey to guide an educational intervention on non-opioid analgesics and determine barriers to implementing these medications into CRNA practice. The survey was developed and validated by Duale et al. (2015) to determine barriers to utilizing epidurals by anesthesiologists. The questions were slightly modified to fit the barriers related to this study. This method evaluated the effect of an educational opioid sparing analgesic
alternative intervention on CRNA practice at a local hospital, in the adult gynecological patient population. To be included in the study, CRNAs must have consented to participation and have listened to the educational intervention. Patients were included if they were undergoing a non-obstetric gynecological surgery between the ages of 18 – 75, and also if they received anesthesia from a CRNA who had received the educational intervention.

The independent variable included the use of one or more of the opioid sparing methods described in the educational intervention: gabapentin, acetaminophen, dexmedetomidine, lidocaine infusion, ketamine, and/or esmolol in the preoperative, intraoperative, or postoperative period. The independent variable has a ratio level: a rank order and a level of magnitude as well as the ability to have a meaningful zero point as zero non-opioid analgesics is an option for administration. The dependent variables included length of stay (minutes) in the post anesthesia care unit during phase 1 recovery and postoperative pain scores every 15 minutes for up to 120 minutes utilizing the FACES scale. These dependent variables have a ratio level of measurement as they have a rank order, magnitude of difference between values, and a meaningful zero point.

Primary outcomes were the effect of the educational intervention on number of non-opioids administered or prescribed by a CRNA, post anesthesia care unit length of stay and postoperative pain scores. Secondary outcomes were to determine barriers to the implementation and the use of opioid free analgesics in the gynecological surgery population. The educational intervention was a one-hour long interactive educational session for CRNAs employed at this local hospital. The session focused on the current literature about opioid sparing techniques and how to appropriately utilize these pharmacological methods. A recorded voice over PowerPoint was also disseminated to CRNAs not in attendance.
**Data Collection**

Records were obtained from electronic medical records of patients who underwent a non-obstetric inpatient or outpatient gynecological procedure 30 days prior to or during the 30 days after the educational intervention. The researcher collected data on the length of stay in phase 1 care postoperatively, the number of non-opioids (gabapentin, acetaminophen, dexmedetomidine, lidocaine infusion, ketamine, and/or esmolol) administered/prescribed by a CRNA who had received the education to each patient preoperatively, intraoperatively, and postoperatively, and postoperative pain scores every 15 minutes for up to 120 minutes. After the educational intervention, electronic medical records were reviewed by the researcher for one month. The records were reviewed in the same manner starting on day 1 after the intervention until day 30 after the intervention. The data collection tools were post-intervention chart reviews. Please see appendix 2 for the data collection tool utilized for the pre and post intervention retrospective chart reviews.

Additionally, a validated and reliable survey tool (see appendix 3) modified from Duale et al. (2015) was disseminated to CRNAs who participated in the study via email. The survey was anonymously answered by CRNAs (N = 13). A Likert scale survey tool was given to CRNAs to help determine perceived barriers of implementing opioid sparing analgesics into practice. Survey results were disseminated during research day and will hopefully help to contribute to any further studies to determine barriers that will need to be overcome to implement this change.
Data Analysis Strategies

Statistical Package for the Social Sciences (SPSS) v 24 was utilized to implement the data analysis. Independent paired t-tests were used to compare the mean number of non-opioids analgesics administered by a CRNA or prescribed by a CRNA to each patient preoperatively, intraoperatively, and/or postoperatively before and after the educational intervention. Because this variable was a ratio level of measure, this was accurately analyzed with this statistical test. Independent paired t-tests were used to compare mean postoperative pain scores every 15 minutes up to 120 minutes in phase 1 recovery. Pain scores were recorded utilizing the FACES scale by PACU RNs. This test was appropriate for comparing the means of this data as the pain scores are a ratio level of measurement. Using Levene’s test for equality of variances, it was determined that the variances from the populations were assumed to be equal (p > 0.05) for the number of non-opioids administered and pain scores, and so the parametric independent t-tests were appropriate tests for this data analysis.

Levene’s test was used to assess the equality of variance between the pre-intervention sample and post-intervention sample number of minutes in phase 1 recovery. This test demonstrated that equal variances could not be assumed (p < 0.05) and therefore a non-parametric test was utilized to analyze this data. A Mann-Whitney U test was utilized to compare average number of minutes in phase 1 recovery before and after the educational intervention. A p-value of less than or equal to 0.05 was utilized to indicate statistical significance. Descriptive statistics were used to analyze percentages and frequencies of survey results on perceived barriers to administering non-opioid analgesics.
Results

The results from the analysis of the pre-educational chart reviews and post-educational chart reviews revealed information about the differences between the two patient groups. Data analysis revealed that the number of non-opioids administered and/or prescribed by a CRNA was statistically significantly higher after the educational intervention with a significance of 0.002 (table 1). FACES pain scores at 15 (p = 0.365), 30 (p = 0.721), 45 (p = 0.369), 60 (p = 0.693), 105 (p = 0.503), and 120 minutes (p = 0.184) were not statistically significantly different after the educational intervention (table 1). However, FACES pain scores at 60 and 75 minutes were statistically significantly lower after the educational intervention with significance values of 0.010 and 0.027, respectively (table 1). The number of minutes in phase 1 recovery was statistically significantly lower in the post-educational group with a significance value of 0.047 (Table 2).

The survey was administered and results were analyzed. Based on these results, there were themes that emerged (tables 3 and 4). 38.46% of CRNAs responded with “somewhat agreed” as an answer to the question: “Do you feel limited in administering/ordering non-opioid analgesic medications by the cost of the medication(s)?”; 30.46% of CRNAs responded with “somewhat agree” as an answer to the question: “Do you feel limited in administering/ordering non-opioid medications by the reluctance of the surgeon?”; and 38.46% of CRNAs responded with “somewhat agree” as an answer to the question: “Do you feel limited in administering/ordering non-opioid medications by the reluctance of the anesthesiologist?” In addition, CRNAs were more likely to somewhat or totally disagree when asked about barriers to administration of non-opioids relating to side effects; complexity of the administration; time consumption of gathering, preparing, and administering non-opioid medications; and nursing
staff. Comments did not reveal any other data that was indicated by the results from the Lkert questions.

**Discussion**

Results demonstrated that an educational intervention for CRNAs may help in utilization of additional non-opioid analgesics in the gynecological surgery population. Based on the increase in average non-opioid administration, CRNAs may be more likely to administer or prescribe these medications after education, reminders, or information about these techniques. Results showed a statistically significant decrease in length of stay in phase 1 recovery after the educational intervention. Therefore, this educational intervention and the increase in non-opioid use may potentially lead to a decreased length of stay in phase 1 recovery, leading to a decrease cost to the hospital and potentially earlier discharge home. It is recommended to continue educating CRNAs on the use of non-opioid analgesics in this patient population.

There is inconclusive evidence to support the fact that non-opioid analgesics can further decrease pain scores in the immediate postoperative period. Pain scores did not significantly decrease for 5 out of 7 time points, but did significantly decrease for 2 of the 7 time points (75 minutes and 90 minutes). All patients received opioids intraoperatively, and so therefore opioids can contribute to pain control postoperatively. It is telling that pain scores did not increase when non-opioids were administered, and can be effective with opioids in maintaining pain scores postoperatively. Pain scores may have decreased at the 75 and 90 marker as the effects of non-opioids and/or opioids may have began to have an effect on the patient, allowing them to received lower FACES pain scores.
Survey results demonstrated perceived barriers to administering non-opioid medications may be due to CRNA perceived surgeon and/or anesthesiologist reluctance and cost of the medications. This information is important as further research in this area can be performed by educating multidisciplinary teams in the healthcare system, including anesthesiologists and surgeons. Because this intervention was focused on one profession (CRNAs), it is important to address other professions in further research in order to maximize improved patient outcomes.

**Recommendations**

This study has the ability to educate healthcare administrators, CRNAs, surgeons, pharmacists, and anesthesiologists on the creation of a multidisciplinary educational training session about the continued and improved use of non-opioids for the gynecological surgery patient population. Additionally, informed patients can advocate for themselves by requesting these medications if there are no known contraindications. Based on the findings from the qualitative surveys, surgeon and anesthesiologists reluctance to administration/prescription of these adjuncts may be a possible barrier to CRNA implementation. Further research should incorporate a similar study design yet educating multidisciplinary healthcare teams in order to broaden the understanding of the use, safety, and benefits of non-opioid analgesics in the gynecological surgery patient population.

Based on the results of this study, a protocol may be developed for the gynecological surgery patient to include the use of non-opioid analgesics with the goal of decreased length of stay in PACU and increased compliance with administration of non-opioid analgesics. This may overall improve patient satisfaction with less time in phase one recovery, possibly allowing for earlier family visitation time, earlier ambulation, and earlier feeding. In addition, educating
CRNAs further may lead to improved patient advocacy for utilizing these medications to help with postoperative outcomes.

**Protection of Human Rights**

Approval for this project was received by the Institutional Review Board (IRB) from the University at Buffalo on September 4, 2018 with approval ID #STUDY00002774. Consent was obtained by CRNAs who participated in the surveys after the educational intervention. Consent from patient subjects were not required as the anesthesia records were accessed retrospectively. All data collected from patient electronic medical records were de-identified and stored in a password protected computer. Data collected from CRNAs was anonymous and results were stored in a password protected computer.

**Strengths and Limitations**

A limitation of this study is the research was performed at one hospital and utilized one cohort of CRNAs who are employees of the same company. A multi-center design study can improve validity and generalizability. CRNA recruitment was performed by convenience sampling, and so CRNAs who were already interested in the subject may have been more likely to fill out the survey about non-opioid use. In addition, patients who had sensitivities or contraindications to the medications were not excluded from the study. This may lead to inaccurate results as the CRNA may have chosen not to utilize a specific non-opioid analgesic based on the individual patient’s sensitivity or contraindication to use. Finally, this study was limited to one profession (CRNAs) and also one surgical population. The researcher recommends further studies to include multiple professions and multiple surgical populations.
The strengths of this study include the use of a large patient sampling size, leading to improved validity of the results. Additionally, the patients were from a wide variety of demographics, including American Society of Anesthesiologist classes 1 through 4, age ranges 18 to 75, undergoing a wide variety of gynecological surgical procedures. Additionally, a strength of this study included the creating of an educational intervention for CRNAs on current uses, dosages, contraindications, and considerations for six non-opioid analgesics that are trending in practice today. The strengths of this study provide solid basis for the results of this study to be considered as part of a guide for further research in this area.
References


Appendix 1: Outline of Educational Session for CRNAs

Opioid-Sparing Analgesics in Gynecological Surgery Population: An Educational Session for CRNAs

1) Explain purpose of presentation and topic
   a) The purpose of this study is to educate CRNAs at a local community suburban hospital where a large number of non-obstetric gynecological procedures are performed.
   b) The aims of this study are to determine the effect of this intervention on the intraoperative use of opioid sparing techniques, post anesthesia care unit (PACU) length of stay (LOS), and pain scores in PACU.
   c) This intervention may help to improve patient outcomes, decrease PACU LOS, improve or maintain pain scores, and potentially help the healthcare system financially.

2) Obtain informed consent

3) Review current uses of opioids intraoperatively
   a) Facilitate hemodynamic stability
   b) Decrease cardiac output, maintain coronary perfusion
   c) Facilitate ventilation
   d) Block ascending nociceptive stimuli
   e) Decrease required amounts of inhaled and/or IV anesthetic agents

4) Review unwanted side effects of opioids
   a) N/V
   b) Urinary retention
   c) CNS depression
   d) Respiratory depression
   e) Cardiac depression
   f) Hyperalgnesia (remifentanil)
   g) Ileus / constipation
   h) Pruritus
   i) Muscle rigidity
   j) Dependence, addiction
   k) Tolerance
   l) Somnolence
   m) Pharyngeal muscle weakness

5) Review current literature on utilizing non opioid analgesics in gynecological surgery patient

6) Review pharmacology, dosing, side effects of specific non-opioid analgesics.
   a) Gabapentin
   b) Acetaminophen (PO and IV)
   c) Dexmedetomidine
   d) Lidocaine infusion
   e) Ketamine
   f) Esmolol

7) Review the study aims (again)
8) Encourage Society of Opioid Free Anesthesia (SOFA) as resource
9) Answer any questions
10) Explain about survey process
   a) Brief survey given halfway through and end of one month post-intervention to evaluate
      barriers, concerns, thoughts about the use of non-opioids
11) Provide contact information of researcher
    a) Lauren Schmitt, RN, SRNA
    b) Email: LS72@buffalo.edu
    c) Phone: 585-704-1557

Appendix 2: Data collection tool

<table>
<thead>
<tr>
<th>De-identifying number</th>
<th>Number of non-opioids received preoperatively, intraoperatively, postoperatively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of minutes patient in PACU</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 15 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 30 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 45 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 60 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 75 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 90 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 105 minutes</td>
<td></td>
</tr>
<tr>
<td>Pain score (0-10) at 120 minutes</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3: Survey Collection Tool

CRNA Survey Tool

**How did you listen/watch the Non-Opioid Analgesics for Gynecological Surgery presentation?**

<table>
<thead>
<tr>
<th>In person</th>
<th>Voice-Over PowerPoint</th>
</tr>
</thead>
</table>

To each item, please circle your level of agreement.

Do you feel limited in administering/ordering non-opioid medications by:

1. **The risk of the side effects of the medication(s)?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

2. **The complexity of the administration of the medication(s)?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

3. **The time consumption of gathering, preparing, and administering any of the medication(s)?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

4. **The cost of the medication(s)?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

5. **The reluctance of the surgeon?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

6. **The reluctance of the anesthesiologist?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

7. **The reluctance of the nursing stuff (preop or postop)?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

8. **Insufficient training for nurses?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

9. **Other?**
   - Totally disagree
   - Somewhat disagree
   - No opinion
   - Somewhat agree
   - Totally agree

If you stated somewhat agree / totally agree to any of the answers above, please note which medications and explain:

Please explain any other barriers, concerns, or remarks about the use of opioid-sparing analgesics in the gynecological surgery patient:
Appendix 4

University at Buffalo Institutional Review Board (UBIRB)
Office of Research Compliance | Clinical and Translational Research Center Room 5018
875 Ellicott St. | Buffalo, NY 14203
UB Federalwide Assurance ID#: FWA00008324
APPROVAL OF SUBMISSION

September 4, 2018

Dear Lauren Schmitt:

On 9/4/2018, the IRB reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Initial Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of Study:</td>
<td>The effect of an opioid sparing educational intervention on postoperative length of stay and pain scores in the gynecological surgery patient</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Lauren Schmitt</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>STUDY00002774</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
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<tr>
<td>Grant ID:</td>
<td>None</td>
</tr>
<tr>
<td>IND, IDE, or HDE:</td>
<td>None</td>
</tr>
</tbody>
</table>

Documents Reviewed:
- HRP-502-Template Consent Document Schmitt.pdf, Category: Consent Form;
- Data collection tool 1, Category: Recruitment Materials;
- Schmitt DNP Presentation Outline.pdf, Category: Recruitment Materials;
- Lauren Schmitt, Category: IRB Protocol;
- Schmitt HRP-612-HIPAA-Waiver.docx, Category: Other;
- Recruitment email Schmitt.pdf, Category: Recruitment Materials;
- CRNA Survey Tool.pdf, Category: Recruitment Materials;
Table 1

<table>
<thead>
<tr>
<th>Comparison of non-opioid use and postoperative pain scores</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Significance (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average non-opioids administered</td>
<td>Pre</td>
<td>109</td>
<td>0.43</td>
<td>0.551</td>
<td>.002*</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>122</td>
<td>0.66</td>
<td>0.584</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 15 minutes</td>
<td>Pre</td>
<td>109</td>
<td>2.08</td>
<td>2.897</td>
<td>.365</td>
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<tr>
<td></td>
<td>Post</td>
<td>122</td>
<td>1.75</td>
<td>2.744</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 30 minutes</td>
<td>Pre</td>
<td>108</td>
<td>2.54</td>
<td>2.924</td>
<td>.721</td>
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<tr>
<td></td>
<td>Post</td>
<td>122</td>
<td>2.4</td>
<td>2.816</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 45 minutes</td>
<td>Pre</td>
<td>103</td>
<td>2.69</td>
<td>2.532</td>
<td>.369</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>117</td>
<td>2.37</td>
<td>2.744</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 60 minutes</td>
<td>Pre</td>
<td>91</td>
<td>2.68</td>
<td>2.633</td>
<td>.693</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>101</td>
<td>2.53</td>
<td>2.500</td>
<td></td>
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<tr>
<td>Average pain score at 75 minutes</td>
<td>Pre</td>
<td>68</td>
<td>2.84</td>
<td>2.392</td>
<td>.010*</td>
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<tr>
<td></td>
<td>Post</td>
<td>71</td>
<td>1.85</td>
<td>2.116</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 90 minutes</td>
<td>Pre</td>
<td>45</td>
<td>2.64</td>
<td>2.560</td>
<td>.027*</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>47</td>
<td>1.53</td>
<td>2.175</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 105 minutes</td>
<td>Pre</td>
<td>29</td>
<td>2.24</td>
<td>2.911</td>
<td>.503</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>35</td>
<td>1.80</td>
<td>2.336</td>
<td></td>
</tr>
<tr>
<td>Average pain score at 120 minutes</td>
<td>Pre</td>
<td>17</td>
<td>1.41</td>
<td>2.717</td>
<td>.184</td>
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<tr>
<td></td>
<td>Post</td>
<td>25</td>
<td>2.44</td>
<td>2.200</td>
<td></td>
</tr>
</tbody>
</table>

*Significant p value < 0.05
Table 2

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Mann-Whitney U Sig.</th>
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</thead>
<tbody>
<tr>
<td>Average number of minutes in phase 1 recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>109</td>
<td>98.71</td>
<td>54.529</td>
<td>.044*</td>
</tr>
<tr>
<td>Post</td>
<td>122</td>
<td>83.48</td>
<td>37.592</td>
<td></td>
</tr>
</tbody>
</table>

*Significant p value < 0.05

Table 3

Survey results from Likert style survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>No opinion</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The risk of the side effects of the medications</td>
<td>15.38%</td>
<td>38.46%</td>
<td>7.69%</td>
<td>30.77%</td>
<td>7.69%</td>
</tr>
<tr>
<td>Complexity of administration of the medication(s)</td>
<td>38.46%</td>
<td>38.46%</td>
<td>7.69%</td>
<td>15.38%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Time consumption of gathering, preparing, and administering any of the medications</td>
<td>38.46%</td>
<td>38.46%</td>
<td>0.00%</td>
<td>23.08%</td>
<td>0.00%</td>
</tr>
<tr>
<td>The cost of the medication(s)</td>
<td>30.77%</td>
<td>15.38%</td>
<td>7.69%</td>
<td>38.46%</td>
<td>7.69%</td>
</tr>
<tr>
<td>The reluctance of the surgeon</td>
<td>23.08%</td>
<td>23.08%</td>
<td>7.69%</td>
<td>30.77%</td>
<td>15.38%</td>
</tr>
<tr>
<td>The reluctance of the anesthesiologist</td>
<td>15.38%</td>
<td>23.08%</td>
<td>7.69%</td>
<td>38.46%</td>
<td>15.38%</td>
</tr>
<tr>
<td>The reluctance of the nursing staff</td>
<td>61.54%</td>
<td>30.77%</td>
<td>7.69%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Table 4

CRNA Perceived Barriers to Utilizing Non-opioid Analgesics in the Gynecological Surgery Patient

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Percentage of survey results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side effect risks</td>
<td></td>
</tr>
<tr>
<td>Complexity of...</td>
<td></td>
</tr>
<tr>
<td>Time consumption of...</td>
<td></td>
</tr>
<tr>
<td>Medication cost</td>
<td></td>
</tr>
<tr>
<td>Surgeon reluctance</td>
<td></td>
</tr>
<tr>
<td>Anesthesiologist reluctance</td>
<td></td>
</tr>
<tr>
<td>Nursing reluctance</td>
<td></td>
</tr>
</tbody>
</table>

- Totally disagree
- Somewhat disagree
- No opinion
- Somewhat agree
- Strongly agree
The Effect of an Opioid Sparing Educational Intervention on Postoperative Outcomes in the Gynecological Surgery Patient and Barriers to Administration of Non-Opioid Analgesics

Lauren Schmitt, RN, DSN, DNP Nurse Anaesthesia Student
University at Buffalo School of Nursing

Introduction
Pain results in postoperative outcomes impacting the patient's memory. However, there is little research or opioid management for pain resulting from non-anaesthetics or surgical interventions. The objective of the study was to assess the impact of a nurse educational intervention on postoperative pain and urinary incontinence in gynecological surgery patients. There was a lack of evidence for CNAs in Buffalo, NY regarding the use of non-opioid analgesics in gynecological surgery patients.

Objectives
1. Determine the effect of education intervention for CNAs on the use of non-opioid analgesics in gynecological surgery patients.
   - Use of non-opioids during the postoperative period
   - Length of stay in PACU/Pharmacy
   - Postoperative pain scores in PACU
2. Determine the relationship between the CNAs and reducing postoperative urinary incontinence.

Methods
This study used a randomized controlled design with an experimental group of gynecological surgery patients and a control group using an educational intervention on postoperative urinary incontinence. Additionally, data were collected and analyzed using Statistical Package for Social Sciences (SPSS). Data analysis was performed using an educational intervention to assess improvement in postoperative pain and urinary incontinence.

Data Analysis
Data analysis using Statistical Package for Social Sciences (SPSS). Independent samples t-test was used to compare the mean difference in postoperative pain scores and postoperative urinary incontinence.

Survey Results
Survey results showed significant improvements in postoperative pain scores and postoperative urinary incontinence.

Conclusion
The results demonstrated that an educational intervention for CNAs can improve the outcomes of postoperative pain and urinary incontinence in gynecological surgery patients.

Acknowledgement
This research was conducted with support from Dr. John Fara and the University Nursing Liaison at the University at Buffalo, School of Nursing.