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Evaluation of a New Surgical Neonatal Nurse Practitioner Core Team in the Neonatal Intensive Care Unit

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EVALUATION OF A NEW SURGICAL NEONATAL NURSE PRACTITIONER CORE TEAM IN THE NEONATAL INTENSIVE CARE UNIT

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EXECUTIVE SUMMARY

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The healthcare workforce is moving from a traditional physician-only model to a multi-level medical provider model. Neonatal intensive care units (NICUs) have come to rely on neonatal nurse practitioners due to the decrease in resident physician hours and the lower cost of hiring a neonatal nurse practitioner. Studies have found advanced practice registered nurses (APRNs) can provide benefits in the areas of communication, patient outcomes, patient satisfaction, and cost. An increasing number of critically ill infants are requiring specialized pre- and postoperative care in one Level IV NICU, which has led to continuous quality improvement in communication and continuity of care between the surgical and NICU team. With the increasing number of surgical infants, a new role called "surgical" neonatal nurse practitioner (NNP) has been developed and implemented to help improve communication between the surgery team and the NICU team, thus improving patient outcomes. The surgical neonatal nurse practitioner team is a dedicated group of NNPs who care for the surgical patients. New surgical education was implemented in the new graduate NNP fellowship program already in place through the Level IV NICU NNP group. This new surgical education was evaluated with pre- and post-tests and a comfort survey completed by the new graduate NNPs. Results from the pre- and post-tests indicated significant differences

existed between the median pre- and post-test scores. The comfort survey found new graduate NNPs felt comfortable but not confident with managing surgical infants and requested more surgical management education during orientation. The NNP education team is taking their comments from the survey into account when making changes in the New Graduate NNP Fellowship Program.

Keywords: Neonatal nurse practitioner, continuity of care, surgical infants, NICU

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CHAPTER I

INTRODUCTION

Background

Neonatal intensive care units (NICUs) have helped improve the outcomes of high-risk infants born prematurely or born with a medical or surgical condition. The first known neonatal intensive care unit at Yale-New Haven Hospital was established in 1960 due to the concern about spreading staphylococcus aureus infections of infants readmitted to hospitals (Gluck, 1992). The unit was for both term and preterm infants with infections, surgical conditions, and medical conditions. Stipulations for the NICU were four to six infants sharing a common air supply, wide separation within the unit, cohort or rotation system of admits, contact excluded with anyone suspected of infection, along with other infection control barriers to protect the infants (Gluck, 1992). In 1976, the first concepts for difference levels of NICU care based on the complexity of care were proposed (Committee on Fetus and Newborn, 2012). Presently, there are four different levels of NICU care.

Levels of Care in Neonatal Intensive Care Unit

The different levels of NICUs are based on the acuity of infants they care for and the care they can provide. A Level I NICU provides basic infant care for infants born between 35- 37 weeks gestation and neonatal resuscitation for all deliveries. Level II NICUs are able to care for infants born 32 weeks gestation or greater and weigh 1,500

grams or greater. Level II NICUs are able to provide mechanical ventilation for a duration of 24 hours or less and can also provide continuous positive airway pressure. Level III NICUs can provide care for infants who are 32 weeks or less gestation and who weigh 1,500 grams or less. They can also take care of all infants of any gestation and weight who might have a critical illness. They are able to provide mechanical ventilation--both conventional and high-frequency ventilation and inhaled nitric oxide. They are able to provide consultation services such as pediatric surgical specialties, pediatric anesthesiologist, and ophthalmologist, and can provide advanced imaging such as MRI, ultrasound, and echocardiography. A Level IV NICU can care for the most complex and critically ill infants of all gestations and weights. They provide a full range of pediatric sub-specialists 24 hours a day including surgical sub-specialists. They are located in an institution, most likely a Children's Hospital, that can provide surgical repair of complex congenital conditions and acquired malformations and provide cardiopulmonary bypass with/or without extracorporeal membrane oxygenation. They can facilitate transport to and from other centers to support the needs of the infant (Committee on Fetus and Newborn, 2012).

Epidemiological Trends of Neonatal Intensive Care Unit Admissions

Harrison and Goodman (2015) reviewed admission rates of NICUs in the United States (residents of 38 U.S. states and the District of Columbia). They included all live births with a weight greater than 500 grams from January 1, 2007 to December 31, 2012., indicating an overall increase from 64 to 77.9 per 1000 live births in admission rates. They also found admission rates increased for all birth weights and “newborns admitted to a NCIU were larger and less premature, although no consistent trend was seen in

weight for gestational age or the use of assisted ventilation" (Harrison & Goodman, 2015, p. 855). Murthy et al. (2014) published a report from the Children's Hospital Neonatal Database on the summary of the infant population admitted to the NICU. They found of the 43,070 admissions, 27,199 had surgical procedures. Twenty-four percent were admitted for primary surgical evaluation and management. Ugwu and Okora (2013) examined epidemiological trends in a tertiary teaching hospital in Africa from April 2002-March 2010 and found 460 (6.2%) of the 7,401 admissions were infants who required surgery. Of those infants who required surgery, 31.6 % had intestinal obstruction, 14.2% had anterior abdominal wall defects, and 88.7% had congenital abnormalities. Fifty-nine percent of infants who required surgery had complications post operation.

Surgical Diagnosis of Infants

Many different surgical conditions can be cared for in a Level IV NICU. Infants with surgical diagnosis not only need specialized care from the surgeons but also from the NICU team. The surgical infant might range from zero days of life to one year of age. These infants might not only need surgical intervention but also respiratory interventions due to premature lungs, electrolyte management due to premature kidneys, genetic consultation, and close nutrition management with parenteral nutrition and enteral nutrition. The following are surgical diagnosis that pertained to this research study.

Esophageal atresia (EA) and tracheoesophageal fistula (TEF) are surgical diagnoses where the trachea and esophagus do not form correctly. In esophageal atresia, the esophagus does not extend down to the stomach and with tracheoesphageal fistula, there is a connection between the trachea and esophageal. These conditions can occur

together. Multiple surgeries might be needed to repair this condition depending on the type of fistula. The EA and TEF conditions are associated with genetic abnormalities such as trisomies and other midline defects. The incidence of esophageal atresia occurs in 1 out of 2,500 to 4,000 live births. Infants with EA and/or TEF need close monitoring for electrolytes, nutrition status, and respiratory status (Hansen & Puder, 2009; Sfeir, Michaud, Salleron, & Gottrand, 2013).

The surgical diagnosis of gastroschisis is when the abdominal viscera is located outside of the abdominal cavity. Abdominal viscera might include the stomach, small intestines, colon, and liver. Surgery is recommended as soon as possible due to the lack of a covering sack. The types of surgeries depend on what abdominal viscera are located outside of the abdominal cavity. A primary closure is when all the abdominal viscera can be placed back into the in the abdominal cavity. A staged closure occurs when the abdominal viscera are unable to be placed back in the abdominal cavity at one time; instead, they are placed in a silo and slowly reduced back into the cavity over five to seven days. Infants born with gastroschisis have abnormal rotation and fixation of the intestines, are at a higher risk of malrotation issues, and might take longer to tolerate enteral feeds. Multiple congenital anomalies are found to be associated in 12% of cases (Hansen & Puder, 2009). Gastroschisis occurs in 1 out of every 4,000 to 20,000 live births (Hansen & Puder, 2009). The Centers for Disease Control and Prevention (2014) reported an increase in gastroschisis from 1995 to 2005. The rate in 1995 was 2.3 per 10,000 live births and increased to 4.4 per 10,000 live births in 2005 (Kirby et al., 2013).

Omphalocele is another surgical diagnosis in which the abdominal viscera is located outside of the abdominal cavity. Unlike an infant with gastroschisis, an

omphalocele has a sac covering the abdominal viscera. Chromosomal abnormalities can be found in almost 50% of cases and associated defects can be present in as many as 80% of cases. A primary repair may be done if the lesion is 5cm or less. If a primary repair cannot be done, a multi-staged approach must be taken, which might involve tissue expanders and vacuum-assisted closure devices. The incidence of omphalocele is 1 in 3,000 to 10,000 live births (Hansen & Puder, 2009).

Duodenal atresia and stenosis is a bowel obstruction that occurs when there is error in the development of the intestine in early period of gestation. Duodenal atresia and stenosis can be associated with trisomy 21 and other anomalies. A duodenoduadenostomy is performed within one to two days after diagnosis is confirmed. The infant is unable to eat until bowel function has returned after surgery. Incidence occurs in 1 to 2,500 to 1 to 40,000 live births (Hansen & Puder, 2009; Karrer, Calkins, & Potter, 2016).

The Role of the Neonatal Nurse Practitioner

Over the past years, health care has had positive and negative changes that affect both providers and patients. One of the positive changes has been the increased autonomy of nurse practitioners. Nurse practitioners have been able to "document their effectiveness, demonstrate their ability to deliver primary care services, achieve excellent patient satisfaction, and significantly contribute to cost-containment and cost-effectiveness in healthcare" (Counts & Mayolo, 2010, p. 13). Dunn (1997) explained the meaning of *advanced* as an improvement or a process of moving forward and *practice* as using knowledge in actual use. Neonatal nurse practitioners (NNPs) are advanced practice registered nurses (APRNs) and are on the forefront of advancing nursing

knowledge and helping to improve clinical nursing practice in the neonatal critical care unit (NICU).

The role of the nurse practitioner (NP) has spread from the NICU to other units/areas due to the need for medical providers. Fry (2011) found the role of the NP not only to be in the NICU but also in management, antepartum consultations, delivery room management, transport, and outpatient follow-up. The NNP role can also be utilized in the pre- and post-operative surgical setting to help with caseload management, improve communication between different medical teams/providers and families, and improve patient outcomes. Siow, Wypij, Berry, Hickey, and Curley (2013) stated, "When nurses provide care that is based on the needs of the individual patient, patient outcomes may be optimized" (p. 395). This can be applied to NNPs as well. When NNPs are trained to manage the care of infants after surgery (called surgical infants in this context), adverse events such as infection rates may be decreased. Siow et al. found in their study of continuity of care in the pediatric intensive care unit that continuity of nursing care was not associated with lower occurrence of ICU-acquired infections, which was opposite of the study hypothesis. The study reported this negative association might be related to bedside nursing assignments.

Neonatal nurse practitioners are looking at exploring and expanding their role to improve infant health care and help reform overall health care. Mullinix and Bucholtz (2009) stated, "NPs provide high-quality primary care in their areas of competence, and their role in the healthcare system should be expanded" (p. 96). Meyers and Miers (2005) found patients managed by a team of acute care nurse practitioners had a decreased length of stay when compared to patients being managed by surgeons alone.

Complex Care of Surgical Infants

Healthcare providers involved in the daily assessment and planning of care for surgical infants include neonatologist attending physicians, neonatologist fellows, NNPs, registered nurses (RN), respiratory therapists (RTs), dietitians, surgical attending physicians, and surgical fellows. During a 24-hour period, one infant can be assessed multiple times by a NICU attending, NICU fellow, NNP, surgical attending, surgical fellow, RN, and RT. The plan of care is discussed with the NICU and surgical team during surgical rounds in the morning but might change due to the infant's clinical status. These surgical infants have had multiple surgeries, have a complicated past medical history, and have been in the NICU for weeks to months. These infants might be admitted for the surgical diagnoses described above: gastroschisis, EA, TEF, CDH, omphalocele, and duodenal atresia. This can be a challenge for a nurse practitioner who has not taken care of surgical infants in the past months and has to learn the past history as well as the present and future medical care necessary for the surgical infant.

Along with understanding one infant's surgical and medical history, neonatal nurse practitioners in the NICU normally oversee 10-14 infants during a 12-hour shift. It can be very daunting to understand the complex medical and surgical history of 10-14 infants and crucial aspects might be missed regarding the care and management of the infant. Every day, the NNP assesses labs, medications, and physical status of the surgical infant. If a critical value on a lab test is missed, the infant might be at risk for harm. If medications are ordered incorrectly, the infant might be in danger. And if physical assessments are overlooked, a change in status might be missed, which might lead to critical danger to the infant's health. The NNPs are also the main providers who write

orders for surgical infants such as medications, IV nutrition, and ventilator changes. It is important to have open communication between the NICU and surgical team so changes are not being made without an order. When this occurs, one team might be under the impression an infant is receiving medical care that might not be occurring.

The NNP group for the NICU consists of 20-25 practitioners who rotate day and night shifts. The NNP group works three to four 12-hour shifts per week. Because surgical infants need complex long-term care, management tries to assign nurse practitioners who are scheduled on consecutive days to the same surgical teams. This continuity of care does not always happen due to scheduling conflicts and NNPs who have not cared for the surgical infants end up caring for them. This is frustrating for both the NNPs and other medical providers caring for surgical infants.

In the NICU where this author works, the providers noticed an issue with the continuity of care for surgical infants and miscommunication among surgical providers, medical providers, the nursing team, and families of surgical infants including different surgical management between surgeons and neonatal providers, changing a plan of care by providers not present during surgical rounds without consulting the primary team, and communication from surgical providers through bedside RNs instead of provider to provider communication. Parents voiced confusion over the plan of care being told by a surgeon compared to what was stated by the NICU team. This situation was thought to be due to a missing link connecting the teams. The NNP team and NICU attending physician decided a new role of the surgical neonatal nurse core team was needed to help with this issue and improve continuity of care of surgical infants.

The new surgical neonatal nurse practitioner core team was designed to provide the missing link to help improve communication between teams and improve the chronological, relational, and informational continuity of care for surgical infants. Tume (2010) explained the advanced practice nurse role "should be complementary to (and not in competition with) other existing medical nursing roles in the ICU" (p. 166). The surgical neonatal nurse practitioner core team was developed as a subset of NNPs who work closely with the surgical team and the neonatologist to provide the best possible care for surgical infants. The surgical NNP core team is a group of NNPs who are interested in taking care of infants who require surgical interventions. These NNPs will be scheduled as a primary NNP team to manage the select surgical infants. This is different from the NNP management before where any NNP would care for any infant no matter the diagnosis. Now, there will be a primary team for the surgical infants. It is anticipated the surgical neonatal nurse practitioner core team would be valued for its accessibility by the surgical team and the NICU team, their expertise in neonatal-surgical management, and their ability to improve communication between the surgery team, the NICU medical team, the nursing team, and families of surgical infants.

Many medical providers contribute to the care of the infant but Cusson et al. (2008) stated, "NICUs have come to rely upon the NNP role" (p. 830). With the increase in surgical procedures saving more lives of infants, NNPs are needed for providing surgical as well as medical care. The new surgical neonatal nurse practitioner core team would help improve the surgical care provided in the NICU by acquiring advanced surgical education in infant surgical procedures on the job through surgical fellows and attending physicians to help improve outcomes, improve continuity of care, and decrease

length of stay. Siow, Wypij, Berry, Hickey, and Curley (2013) stated, "The benefits of knowing the patient have been associated with patient outcomes, such as improving the quality of patient care, encouraging patients to be active participants of their care, and having lower risk of adverse events" (p. 395).

No research studies have been conducted on surgical infants and continuity of care with NPs. Continuity of care was studied on premature and term infants in a study by Settle (2016) who looked at the relationship of acuity and continuity of care in infants born at 24 to 40 weeks gestation. She found a high infant acuity was related to a high continuity of nurse caregivers. Mefford and Alligood (2011) investigated consistency of nursing care on health and economic outcomes. They found a strong relationship between consistency of nursing care with length of stay and ventilator days

> Patients with higher percentages of NICU shifts with care provided by the primary nurse had statistically significantly lower scores for the nurse-sensitive variables of nosocomial infection, length of hospital stay, duration of mechanical ventilation, duration of supplemental oxygen therapy, and duration of parenteral nutrition. (p. 998)

Siow et al. (2013) also looked at the effects of continuity of care and patient outcomes in the pediatric intensive care unit--not the neonatal population or surgical patients. This study was designed to assess the impact of a surgical NNP core team on the outcomes of surgical infants. Due to the increased numbers of surgical infants and the specialized care they require, the neonatology team and the surgical team have implemented a new surgical neonatal nurse practitioner core group. This Doctor of Nursing Practice (DNP) capstone project explains the broad context and specific setting for the project, the observations and sequelae related to continuity and communication,

the importance of optional care for sick newborns, the NNP role, and practice changes that were implemented. An evaluation of that change was the focus of this project.

Problem Statement

The following population, intervention, comparison, outcomes, and time (PICOT) questions were answered by this capstone project: In one Level IV neonatal intensive care unit (NICU) with infants who have complex surgical conditions, will the implementation of a core group of specialized surgical neonatal nurse practitioners (NNPs) to manage the care of surgical infants decrease the length of stay and decrease hospital acquired blood infections?

- Population--Neonatal nurse practitioners who care for infants requiring surgical consultation and/or intervention in one Midwestern U.S. Level IV NICU
- Intervention--Evaluate a new education program for a core team of neonatal nurse practitioners who have become specialized in surgical neonatal care and management through on-the-job training and whose patient assignments and work schedule have changed.
- Comparison-- A pre- and post-comparison test of surgical education and a pre- and post-comfort survey.
- Outcomes--Increase of 10% correct answers on pre- and post-comparison test of surgical education; greater than 10% of new graduate NNPs on comfort survey of being more comfortable managing surgical infants after completion of New Graduate Fellowship Program.

- Time—Eight weeks (evaluation halfway through New Graduate Fellowship Program).

CHAPTER II

REVIEW OF LITERATURE

A literature review was complete by the researcher using the following search engines: CINAHL Plus, Cochrane, and PubMed through the University of Northern Colorado Library. The researcher also performed a literature review on the Internet using Google Scholar, Centers for Disease Control and Prevention (CDC), and American Academy of Pediatrics (AAP). As stated earlier, health care is expanding and the role of the nurse practitioner is broadening with it. Nurse practitioners are becoming more specialized in the population for whom they care. Continuity of care and communication are major aspects of improving care in the role of the nurse practitioner. These advancements could help lead to improvements in patients' outcomes such as length of stay and days on the ventilator. Information from the literature review was used to evaluate the implementation of a core surgical neonatal nurse practitioner team education program.

Benefits of Employing Neonatal Nurse Practitioners

Studies on care provided by NPs have found an association with improved patient/family satisfaction and patient outcomes. Nurse practitioners have been shown to improve communication, which has led to improved collaboration by the ICU team, improved education, and practice development. There are benefits not only to the

medical team but also to the patient--improved consistency of care and improved standard of clinical care.

Tume (2010) found evidence to support the practice of advanced practice nurses (APNs) in intensive care units: “APNs can provide both the best nursing expertise and skilled middle-level medical cover with the ultimate goal of providing improved patient care in the ICU [Intensive Care Unit]” (p.166). From their review of literature, Stanik-Hutt et al. (2013) found physicians saw the care provided by the nurse practitioner in the NICU comparable to the care the physician provided. Neonatal intensive care units have come to rely on neonatal nurse practitioners due to the decrease in medical resident hours and the lower cost of hiring a neonatal nurse practitioner versus a neonatologist. With the creation of new educational programs and on-the-job training for specialized jobs, hospitals can help support the role of the neonatal nurse practitioner. Other studies found better documentation by NPs, higher parent satisfaction scores, and significant cost savings. Mullinix and Bucholtz (2009) reviewed one study that found nurse practitioners “were more adept at communicating with patients and conducting preventive actions” (p. 94).

Continuity of Care

Epstein, Miles, Rovnyak, and Baernholdt (2013) explained, “Continuity of care is a multidimensional concept and includes chronological continuity, relational continuity, and informational continuity” (p. 169). Chronological continuity is defined as “the number of nurses caring for a patient over a period of time” and relational continuity is defined as “the presence of an ongoing relationship between nurse and patient” (Epstein et al., 2013, p. 169). Increases in-patient and family satisfaction, provider satisfaction,

and better patient outcomes were found with higher chronological and relational continuity. Siow et al. (2013) defined continuity of care "as the degree of which fewer different nurses are assigned to care for a patient" (p. 395). The benefits of having fewer providers means better knowledge of past medical and surgical history of patients, leading to improved care and decreased adverse events (Siow et al., 2013). Informational continuity of care can provide consistency in the transfer of information (Epstein et al., 2013). By having a set group of NNPs who care for surgical infants, the information will transfer back and forth between this smaller group of NNPs and not between all the NNPs working in the NICU, thus decreasing error in reporting information.

Communication

Communication is an important concept when it comes to continuity of care. Rothberg et al. (2012) found hospitalists verbally communicate with other physicians on an average of 1.4 minutes per day and with nurses 1.1 minutes per day. They also found physicians spent more time communicating by written methods versus verbally. Care providers from different specialties need communication between each other to understand the whole care of the patient including multiple hand-offs--both in horizontal differentiation of labor and vertical divisions of hierarchy where critical information must be communicated effectively. The relationships between the hierarchical levels can have an influence on how information is effectively communicated (Sutcliffe, Lewton, & Rosenthal, 2004). Miscommunication can lead to error in patient care and teamwork can suffer. Sutcliffe et al. (2004) found 70 mishaps that related to miscommunication, resulting in a range of events from near misses to relatively major incidents. Lack of information was also found between divisions of hierarchy, e.g., from attending physician

to resident. Sutcliffe et al. stated, “Residents perceived that attendings provided far too little information to the resident who would be caring for a particular patient” (p. 189). Failure with communication can also occur with role conflict. This can happen when a patient is admitted to a unit where the unit team becomes the primary care team for the patient but occasionally other providers want to maintain a role in that patient’s care. Disagreement about patient care and management can occur. This can lead to miscommunication with the nurses, patient, and family about the plan of care.

Reduced Length of Stay

“APNs have been shown to provide a superior service, in terms of reducing length of ICU stay and quality of care delivered” (Tume, 2010, p. 166). A study by Liego, Loomis, Van Leuven, and Dragoo (2014) found an association with the implementation of acute care nurse practitioners into the hospital settings and improved patient outcomes, such as length of stay. Mefford and Alligood (2001) found infants who had consistent nurse caregivers had statistically significantly lower scores for length of hospital stay. Fry (2011) reported patients who were cared for by NPs had shorter lengths of stay and lower patient complication rates, leading to positive financial outcomes for the hospital. Meyer and Miers (2005) found a decrease in length of stay when the patient was managed by a team of acute care nurse practitioners compared to surgeons working alone. In the study by Epstein et al. (2013), one aspect examined was how continuity of care was affected by number of care providers each infant had. They found infants who had a shorter length of stay had a better chronological continuity of care, i.e., they had a smaller number of care providers.

Ventilator Days

Fry (2011) found studies that supported the benefit of NNPs in the NICU. One study found when NNPs provided care to infants on a ventilator, the weaning time on the ventilator was less for the NP compared to medical staff. The study showed the NP made more ventilator setting changes compared to the medical provider. This had an improved impact on length of stay, deterioration, treatment, and respiratory management. Longer ventilator days have also been associated with a higher predicted mortality (Siow et al., 2013). Mefford and Alligood (2011) also found a relationship between consistency of nursing care and decreased duration of mechanical ventilation.

Summary

The development of the Surgical NNP core team was influenced by the findings of chronological, relational, and informational continuity of care as described in the literature of best evidence possible. Decreasing the number of providers and developing an on-going relationship with patient and families were found to have positive effects on patient outcomes and care such as length of stay and ventilator days. Decreasing the number of providers helped improve the transfer of patient information from provider to provider and decreased miscommunication by reducing multiply hand offs.

Nursing Theory Model

A theoretical model in nursing research is used to help guide the process to answer a question about nursing practice. The model helps to plan and organize the identification of the problem, the review of literature, design of intervention, analyzing the data, and presenting the findings. Many different theoretical nursing models could be applied to nursing research and quality improvement projects. This author chose Kurt

Lewin's (cited in Connelly, 2015) model of change to apply to development and evaluation of the core surgical NNP group.

Kurt Lewin is a considered the father of social psychology and developed the theory of change in 1947 (Connelly, 2015). Lewin's theory of change follows a three-step model--unfreeze, change, freeze. Connelly (2015) stated, "Kurt Lewin was aware that change is not an event, but rather a process" (para. 11). Lewin saw his theory "as forming an integrated approach to analyzing, understanding and bringing about change at the group, organizational, and societal levels" (Burns, 2004, p. 985). Implementing the new surgical NNP core group was a process needing team commitment, education, time, and the acceptance of change by all members of the NICU and surgical team.

The first step in Lewin's theory, unfreeze, is where there needs to be a point of understanding and readiness that change is needed. When one sees a need for a change, one cannot just implement the change without the knowledge of others whom the change would affect. This step was one of the most important steps because not only did we need to prepare ourselves for change, we also needed to make sure everyone who would be affected by it was also aware of the change. Here, a force field analysis came into play--where both pros and cons of the change needed to be considered before making the change (Connelly, 2015). There were pros and cons related to the surgical NNP core group. The pros were increased communication, improved patient continuity of care, and improved surgical and NICU care. As stated before, the hope was the surgical NNP core group would be the missing link between the NICU team and the surgeons. The surgical NNP core team would help provide increased communication between both teams and increase the continuity of care to surgical infants by being the main constant in the

infant's medical and surgical care. Cons related to the surgical NNP core group were the need for a sufficient number of NNPs interested in surgical management and scheduling conflicts due to being short-staffed. The unfreeze stage began in June 2015 when the discussion of a new surgical NNP core team began by the NICU Medical Director, NNP manager, and Director of Advance Practice. The new role was accepted by the NICU Medical Director, NNP manager, and Director of Advance Practice in September 2015 and the role was implemented in the NICU in January 2016. New surgical education to the new graduate NNP hires began with the New Graduate NNP Fellowship Program in 2017.

The second step was change. It took take time for this process of transition to occur. During this step, everyone who was affected by the change was being educated on new roles, systems, and protocols that would help with the change. The new roles needed to be accepted by all parties involved in the change in order for the change to have an impact. Having role models to help implement the change could increase acceptance of the change (Connelly, 2015). Here, the NICU team moved toward a new approach of a model of care with the new core surgical NNP group in January 2016. This stage was considered the hardest due to new models, new roles, and the hesitation about the change. Good communication was a big factor during this stage as it could help determine what was working and what was not working with the new role (Connelly, 2015). Burns (2004) explained that during the unfreezing step, specific outcomes could be difficult to predict. By using the trial and error approach, the NICU team could assess what was working and what was not working with the core surgical NNP group.

The last step in Lewin's theory of change was freezing or what others liked to refer to as refreezing (Connelly, 2015). This step could occur once the change had been implemented, was accepted, and was now the new routine. The new surgical NNP core team role became accepted into the NICU roles on June 2016 after seven months of implementation and was now a constant role known by NICU providers. Lewin's theory of change saw the freezing step as a time to make sure the change was enforced, accepted, and maintained. This step helped make sure the change carried into the future (Connelly, 2015). Connelly (2015) stated, "This rigidity of freezing does not fit with modern thinking about change being a continuous, sometimes chaotic process in which great flexibility is demanded" (para. 18). Burns (2004) added, "Without reinforcement, change could be short-lived" (p. 986). As always, Lewin's theory of change could always be reapplied as new information, research, and ideas brought attention that a change was needed. The surgical NNP care team has been a constant role in the NICU since June 2016. A new surgical education class was implemented in September 2017.

Lewin's three-step model of change was used to help implement the new surgical NNP core team (Connelly, 2015). By using the change theory, the new role of surgical NNP core team was introduced to all NICU providers and executed over seven months to help educate everyone on the new role and work out any problems that came up during the implementation process. Table 1 presents Lewin's three=step model of change as it pertained to the new core surgical NNP. Table 2 provides a timeline for development of the surgical neonatal nurse practitioner core team.

Table 1

Lewin's Three Step Model of Change As It Pertains to the New Core Surgical Neonatal Nurse Practitioner

Three Steps	Applied to Neonatal Intensive Care Unit and Need for Surgical NNP Neonatal Nurse Practitioner

Unfreeze	● Force Field Analysis
	● Pros:
	  ● Increased communication
	  ● Improved patient continuity of care
	  ● Improve patient outcomes
	  ● Increased surgical education of management of surgical diagnosis in infants
	● Cons:
	  ● Need NNPs interested in Surgical cases
	  ● Concerns about change in scheduling NNPs for surgical team
	● New surgical NNP core team role accepted by NICU Medical Director, NNP manager, and Director of Advanced Practice on September 2015

Change	● Implementation of new surgical NNP core team on January 2016 ● Implementation of scheduling surgical NNPs on surgical side of unit (north side) January-June 2016 ● Communication between all team members (NNPs, attendings, fellows, surgeons, RN, RT) on new role ● Implementation of new surgical education into the New Graduate NNP Fellowship Program
Freeze	● New surgical NNP core group accepted as a new role in the NICU on June 2016 ● Assessment of new surgical education

Table 2

Timeline for Development of Surgical Neonatal Nurse Practitioner Core Team

Date	Steps
June 2015	New role of surgical neonatal nurse practitioner brought to NICU Medical Director and Director of Advanced Practice by NNP manager
September 2015	New role of surgical neonatal nurse practitioner accepted to be implemented in the NICU by NICU Medical Director and Director of Advanced Practice
January 2016	Implementation of new surgical neonatal nurse practitioner team into the NICU (transition period)
June 2016	New role of surgical neonatal nurse practitioner now an accepted everyday role in the NICU (completion of transition period)
September 2017	New surgical education on management of surgical diagnosis in infants implemented

CHAPTER III

METHODOLOGY

Objectives

The practice change of implementing a surgical NNP core team to manage the complex care of surgical infants would help improve continuity of care and communication. The implementation of surgical education to improve the surgical NNP core team was assessed by pre- and post-education tests and a comfort surgery half way through the New Graduate NNP Fellowship Program. This capstone project had the following specific objectives:

1. Document and articulate the change of practice including the care model before the implementation of care, the transition with the new Surgical NNP core team, and model of care after the implementation.
2. Assessment and outcomes of surgical education by pre- and posttests on education clinical day included in the New Graduate NNP Fellowship program; assessment and outcomes of comfort surgery.
3. Assessment of implementation of change if able to step back and improve utilization of change.

Evaluation of Capstone Project

The purpose of this project was to examine the effect of implementing the best evidence possible into practice. A surgical NNP core team was implemented into practice to help improve the continuity of care for surgical infants. A comfort survey and pre-/posttests assessed the knowledge needed to manage complex surgical infants as new graduate NNPs completed their New Graduate NNP Fellowship training.

Design

The idea of a new surgical core team was based on best evidence possible on the findings of Settle (2016) and Siow et al (2013) who supported the positive effect of fewer providers on patient care, outcomes, and parents' perceptions. The plan for the core surgical NNP team was conceived by the NNP manager and discussed with the author of this research due to the importance of quality improvement in surgical patient care and communication between providers. The design for the surgical NNP core team was developed by the NICU manager and the author. Together, based on articles that showed increased continuity of care due to fewer providers had a benefit to patient outcomes and provider satisfaction (Epstein et al., 2013; Siow et al., 2013), the NICU manager and the author developed the idea of dividing the NNPs into two groups--the surgical NNP core team and the regular NNP team. This would limit the number of NNPs who cared for the surgical infants and addressed a chronological continuity of care. Relational and informational continuity of care would also be addressed by limiting the number of providers who are working together on the care of a given surgical infant, thus developing better relationships between providers and fewer providers transferring medical information back and forth.

The discussion of the new surgical NNP core team was started in June 2015 and accepted by the NICU Medical Director and Director of Advanced Practice for NPs on September 2015. The design was to have one to two surgical NNPs scheduled each day to be on the north side of the unit to care for the surgical infants.

Implementation of the Practice Change

After the new role was accepted by the NICU Medical Director and the Director of Advanced Practice, the NICU manager and the author met to determine who would be on the team. The decision was made that anyone who had an interest in surgical infant management and care could be on the surgical team. An email was sent to all NNPs who worked at the Level IV NICU, asking them to respond if they would be interested in working on the surgical team.

The author was asked by the NICU manager to take the role of lead surgical NNP to help facilitate this process of implementing the new surgical NNP core group that began in January 2016. Although the author had no more education in surgical infant care than other NNPs, she did have four years of experience working in a Level IV NICU. The author also had some education in research as part of the coursework for her DNP degree and planned to evaluate the new role after it had been put into practice.

The plan was to start with five NNPs on the surgical team and evaluate that number after the first six weeks of implementing the new role. This would lead to having one to two surgical NNPs on each day shift. There are anywhere from 20-30 infants on the north side, consisting of 10-12 infants on each NNP team, with 25-50% being surgical infants. By keeping one to two surgical NNPs on the day shift, the surgical NNPs could care for the 5-15 surgical infants either on one team or divided into two teams. Some day

shifts had no surgical NNPs scheduled due to days requested off, holidays requested off, and the night and weekend requirements of all NNPs. Ongoing efforts were made to schedule at least one surgical NNP on all day shifts.

To enhance their knowledge as the core team was started, the surgical core NNPs drew on surgical protocols the NICU had in place for gastroschisis, EA/TEF, and intestinal obstructions. In addition, the NNPs learned at the bedside by being present during a larger number of surgical rounds with surgeons and NICU attendings. A neonatal surgical team vision/mission statement was developed by the Neonatal and Surgical attending physicians (see Appendix A) to help improve communication between caregivers. This statement was distributed to all NICU attendings, fellows, NNPs, and surgeons. It was discussed within each group at quarterly or monthly meetings by the lead surgeon/NICU attending/NNP lead. Monthly meetings with the head surgeon, NICU Medical Director, Director of Advanced Practice, NNP manager, and the lead surgical NNP were held to address issues that arose during the implementation of the new role. These concerns were addressed by the group at the meetings and plans were made about how to make improvements. The issues were shared with the individual or individuals involved and suggestions for improvements were presented. Meetings of this leadership committee for the surgical core team were reduced to quarterly as fewer concerns were brought to their attention.

After the three six-week rotations of new scheduling for five surgical NNPs, interest grew in the new role and by the fourth schedule (May 2016), six surgical NNPs were available to be scheduled and provide care to the surgical infants. The scheduler was able to keep one to two surgical NNPs on day shifts, which led to better coverage of

care for surgical infants. This also helped improve communication by decreasing the number of NNPs involved in the surgical infants' care from day to day and allowing the surgeons to know which NNPs to communicate with face-to-face when an issue arose. The new surgical NNP core team was established practice by June 2016 when the role was consistent in the workflow and the NNP schedule maintained one to two surgical NNPs Monday through Friday.

As the unit continued to grow and new graduate NNPs were hired, surgical education was needed for the management of these complex surgical infants. The New Graduate Fellowship program included 16-weeks orientation one-on-one with a preceptor. During this time, the new graduate rotated on to the surgical team with a member of the surgical NNP core team. The new graduate received one-on-one training on the management of complex surgical infants. The new graduate would attend a surgical education class given by the lead surgical NNP, who was also the lead of this project. Here, the new graduate would complete a pre- and post-surgical education tests. Lastly, the new graduate would complete a comfort survey after the 16 weeks of orientation to assess how comfortable he/she was with managing complex surgical infants and working with the surgical team.

Formal Evaluation of This Study

The evaluation periods included the first eight weeks of the New Graduate Fellowship Program. The surgical diagnosis for the pre- and posttests included gastroschisis, intestinal obstruction, and esophagus atresia/tracheoesophageal fistula (EA/TEF). These surgical diagnoses were chosen due to the high rates of these diagnoses in the NICU.

Data Collection

New Graduate Pre/Post Test Outcomes

Data from the pre- and post-surgical education were collected on the day of the surgical education class. No names were on the pre- or posttests. The pre-test was given to the new graduates as they entered the class before the education began. The posttest was given after the education was complete (see Appendix B for pre-/posttests).

Comfort Survey Outcomes

To assess the comfort of new graduates caring for complex surgical infants, a comfort survey was completed after they had completed their first 16 weeks of orientation. This survey utilized a 6-point Likert scale and one open-ended question (see Appendix C). The questionnaire was piloted by a few NNPs first. If the questionnaire was easy to understand and answer, no changes were made but if there were concerns about any of the questions, they were re-evaluated and the questionnaire was piloted again. If the questionnaire elicited no concerns, the data gathered from the pilot were included in the evaluation.

Timeline to Complete Capstone

- July11, 2017--Proposal Meeting
- August 17, 2017—Institutional Review Board approval (see Appendix D)
- August 30, 2017--Pilot Comfort survey, pre/post test (see Appendix C)
- September 15, 2017--Surgical Education Class
- September 22, 2017--Analysis pre/post test
- September 22, 2017--Comfort survey completed by new graduate NNPs

- September 30, 2017--Analysis of comfort survey
- October 19, 2017--Defense of DNP project
- October 20, 2017--Submission of DNP project to Graduate School

Analysis of Data

Descriptive statistics were used to assess the percentage of correct answers and compare the pretest to the posttest. Descriptive statistics were also used to assess the percent improvement of understanding management of surgical infants. A 6-point Likert scale was used to assess the comfort survey questions. The percentages of responses on the Likert scale were presented using descriptive statistics (Polit & Beck, 2008).

The analysis of comments was through thematic analysis. This style required the researcher to read through the data and identify patterns. These patterns were developed into categories or themes. These themes were developed into corresponding codes that helped the researcher organize the data. These codes broke down the qualitative content into smaller units according to the phrases/concepts they shared. These data were entered into computer assisted qualitative data analysis software (Clarke & Braun, 2013) that filtered the selected phrases/concepts. The selected phrases/concepts were described and percentages shared.

Resources and Expenses

Resources required for this project were the preceptors for the New Graduate NNP Fellowship Program, the lead surgical NNP, and stakeholders for the improvement in surgical education. Resources for the surgical education class were the Surgical protocols already implemented in the unit and education text books on surgical management. Expenses required for this project were electricity for computers; personal

time to teach surgical education class, obtain data, and perform data analysis; and paper/pens.

Summary

Nurse practitioners are at the forefront of helping advance care and improve outcomes. Continuity of care for infants has been associated with improved outcomes. The new surgical NNP core team was implemented to help improve continuity of care and communication and improve the outcomes of surgical infants. With the new surgical neonatal nurse practitioner core team, NNPs were trained on the job to enhance the care of surgical infants.

The surgical NNP core group is a new and exciting practice change in the NICU to help the unit provide best care to the surgical infants for whom care is provided. With the implementation of the new education for the surgical NNP core group, an increase in comfort with managing complex surgical infants and an increase in surgical management knowledge is anticipated.

CHAPTER IV

RESULTS AND OUTCOMES

Through the process of implementation and evaluation of the surgical NNP core team, objectives were met, outcomes were assessed, and barriers were faced. It was a long process with the need to evaluate intermittently during the implementation and face challenges that arose with new ideas in order to overcome hurdles. Throughout the process, the NNP groups continued to work together as a team to overcome obstacles and provide the best care to all infants in the unit.

Objective One Outcomes

The first objective was to document and articulate the change of practice including the care model before the implementation of care, the transition with the new NNP core team, and model of care after implementation. Different models of nursing care are used based on leadership, staffing, and economic issues. Hughes (2008) explained three traditional models that have been used in inpatient units: task-orientated, total patient care, and primary nursing care. These models are not only used for nursing care but can be applied to other medical professionals, specific patient populations, and chronic conditions (Hughes, 2008). The surgical NNP core team was a major change in care practice due to the need to improve communication and continuity of care of surgical infants in a Level IV NICU.

Phase One

Before the implementation of the surgical NNP core team, the nursing model used for the NNPs was a team nursing model consisting of a team leader and team members of all different skills levels and experiences to care for all the infants admitted to the NICU. The unit was staffed with four to six NNPs during the day to care for 40 to 70 infants. The four to six NNPs were split between the north and south sides of the unit. On each side, two to three NNPs would split up the 20-35 infants, making teams of 10-15 infants; however, the infants were not divided based on diagnosis nor NNPs' experiences or knowledge. The NNPs might have to switch back and forth from the north side to the south side depending on staffing. There was no consistency in care from the NNPs unless a NNP was staffed for multiple days in a row and was able to keep the same team but this did not always happen. The NNPs would have to switch teams and sides throughout the six-week schedule rotation.

Phase Two

The surgical NNP core team was developed by the NICU manager and the author of this project. It was brought to the NICU Medical Director and the Director of Advanced Practice. Together, the surgical NNP core team was developed to divide the NNPs into two groups--a surgical team and a medical team. There was no surgical education besides the knowledge the NNPs already had when the surgical team was rapidly implemented. The surgical team stayed on the north side and the medical team or other NNP team stayed on the south side. Along with dividing the NNPs into two groups, the infants who were delivered in the Maternal Fetal Center at the hospital with prenatal surgical diagnosis would be admitted to the north side of the unit where the

NNPs on the surgical team would be scheduled. The surgical NNP core team was implemented on January 1, 2016. When first implementing the surgical team, all NNPs were asked if they would like to be on the surgical NNP core team daily or rotate on the team. Five NNPs volunteered to be on the surgical team and four others volunteered to rotate on the team when needed due to vacations, rotations to other hospitals the NNPs cover, etc.

Phase Three

During the first six months, the surgical team had five NNPs dedicated to the north side with one to two NNPs on during the day Monday through Friday. The teams of NNPs on the north side were also arranged to have the surgical infants on one to two teams depending on the census of surgical diagnosis. All NNPs still had to fulfill their day/night rotation. This led to some non-surgical NNPs having to cover the north side with the surgical infants on nights and weekends. The schedule continued to be on one document altogether as the surgical NNPs were on the same schedule as all other NNPs. This caused some of the surgical and non-surgical NNPs' shifts to be moved to cover short days, leading to inadequate coverage of surgical NNPs for surgical infants. Inadequate coverage was also experienced due to NNPs leaving the group due to personal reasons, vacations of surgical NNPs who then needed to be covered by non-surgical NNPs, and maternity leave.

Phase Four

As the first few months progressed, more coverage was needed on the surgical team due to acuity and census. After six months of having the surgical NNP core team, the surgical team was increased to six NNPs during the day. There were still non-

surgical NNPs covering some nights and weekends but overall, most shifts were covered by surgical NNPs. The NNP schedule comes out three to four months before each rotation for sign up and is released about two weeks after the sign up with the permanent schedule. This was challenging due to the need to plan ahead with surgical NNP rotations and last-minute switches due to personal events. Switching shifts between surgical NNPs was not allowed due to short staffing, which led to more non-surgical NNPs covering the north side where the surgical infants were located. This was very frustrating for non-surgical NNPs who would have to bounce back and forth between the different teams.

Phase Five

After the first year of having the surgical NNP core team, the scheduling was improved by separating the sign-up schedule document of surgical NNPs from the non-surgical NNPs. This way when signing up for shifts and moving shifts to cover holes in the schedule, the surgical NNPs were only looking at the surgical schedule. A few holes in the schedule still needed to be covered by non-surgical NNPs but they were known in advance and highlighted on the schedule so the NNP who was scheduled knew ahead of time. Coverage of surgical NNPs was increased by using 9-10 NNPs on the surgical team each rotation.

The need for surgical education was also noticed with newly hired graduate NNPs. Verbal feedback was obtained from both the surgeons and the NICU attending and fellows about the lack of surgical education to new graduates rotating on the surgical NNP core team. The author of this project approached the NNP education team about the need for education, how the surgical team came to be, and education on basic surgical

management. As a result, the NNP education team developed a new graduate NNP Fellowship Program for all new NNP hires that included education days. The education team agreed this was needed for new hires and granted the author permission to provide surgical education through a one-hour lecture during the new graduate NNP Fellowship Program lecture day.

The author developed a PowerPoint based on the literature research done for this project on the need of a primary nursing care model, the impact of patient outcomes and communication, and the policies and guidelines used for management of gastroschisis, bowel obstructions, and esophageal atresia and tracheoesophageal fistula. The author also performed pre- and posttests to evaluate the education and helped develop further education for the new graduate program. The author collaborated with the surgical nurse practitioner who works with the surgeons on what they felt was needed when educating new graduates. With only an hour for the lecture material, the information needed to be short and concise to provide education needed and wanted by both the NNP education team and surgeons. This education was implemented on September 15, 2017. The author created a relaxed environment and welcomed questions throughout the lecture. She also asked new graduate NNPs who were further in their orientation to share stories about their experience orientating on the surgical team and what positive and negative events they had encountered. This brought up great discussions between the author and new graduate group.

Results of Phases

One year after the implementation of the surgical neonatal nurse practitioner core team, 9-10 surgical NNPs now rotate days and nights to cover the north side. The NNP

schedule was also separated into two documents--the surgical neonatal nurse practitioner core team schedule and the medical/non-surgical team schedule, resulting in better coverage of surgical infants by surgical NNPs.

In September 2017, surgical education was implemented in the New Graduate NNP Fellowship Program including a lecture on how the surgical team was developed and management of three surgical diagnoses. In addition, new graduate NNP orientees were rotated on the surgical team with experienced surgical NNPs who managed surgical infants, thus providing one-on-one surgical management education during orientation. After orientation, new graduate NNPs would continue to rotate on the surgical team with experienced surgical NNPs as mentors.

Key Facilitators and Barriers

Key facilitators that helped make this implementation possible were the guidance of the NICU Medical Director, Director of Advance Practice, and the NNP Manager; the teamwork and flexibility by all NNPs in the unit; and the consistent patience by all medical providers including neonatology attendings/fellows and surgeons. Barriers to this project included scheduling conflicts due to vacations, maternity leave, sick calls, and coverage on nights and weekends; and scheduling conflicts with new graduate orientation on the surgical team.

Unintended Consequences

Throughout the implementation of the surgical NNP core team, both positive and negative issues arose. Positive verbal responses from the NICU attending and fellows regarding the continuity of care were overwhelming. There were some concerns regarding the surgical education of NNPs who were not on the surgical NNP core team

but were rotated onto the team. This was discussed with the author and the NNP Manager; more surgical education to both new graduates and experienced NNPs is planned.

Objective Two Outcomes

The second objective was to assess the surgical education utilizing pre- and posttests of the clinical education day implemented on September 15, 2017 during the New Graduate NNP Fellowship Program lectures. The lecture was developed by the author based on implementing the surgical NNP core team and the surgical management of gastroschisis, TEF/EA, and intestinal obstruction. The pre- and posttests consisted of 15 questions piloted by the NNP education team. A comfort/competent survey was sent to new graduate NNPs, which was also piloted by the NNP education team. The survey was developed by the author to help assess where deficits were in orienting new graduates to the surgical team. It was designed to evaluate comfort and competent levels new graduates had in the middle of their 16-week orientation.

Results

The average mean for the pretest was 76%. The average mean of the posttest was 97.6%. The scores rose by 21.6% after the surgical education lecture. A Wilcoxon matched-pairs test was performed on the scores to determine if a relationship existed between the two correlating measures of the same variable with a limited sample size--the pre- and posttest scores for each individual. From this test, it was concluded a significant difference existed between the median pretest scores and the posttest scores (see Figure 1).

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between PRETEST and POSTTEST equals 0.	Related-Samples Wilcoxon Signed Rank Test	.007	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 1. Hypothesis test summary.

Of the new graduates who responded to the survey, one (12.5%) had zero to two years NICU experience, two (25%) had four to six years experience, and five (62.5%) had greater than six years experiences. Two new graduates (40%) had been working as new NNPS for zero to two months and three (60%) had been working for two to four months. One (20%) new graduate disagreed with feeling comfortable and competent with managing a NICU team of 8-10 patients with surgical interventions. Four new graduates (80%) agreed they felt comfortable working with the surgical team managing surgical infants, but only three (60%) felt competent working with the surgical team. Four new graduates (80%) felt comfortable communicating with the surgical team and three (60%) felt competent communicating with the surgical team. The response as how to improve the New Graduate NNP Fellowship Program and surgical team mainly focused on more education and experience with more orientation on the north side working with an experienced mentor. There were also responses about teaching during rounds in a nonjudgmental way and making solid interdiction to both the NICU and surgical teams who had new graduate NNPs: “More in-depth education,” “More orientation on the north side,” “More teaching during rounds,” and “A solid introduction

to the surgical team that we are new graduates." These responses are being taken into account on ways to improve the surgical orientation and education lectures.

Key Facilitator and Barrier

The key facilitator was the NNP education team for developing the New Graduate NNP Fellowship Program, reserving meeting rooms for lectures, and their time and passion for nursing education. The main barrier was the author's schedule.

Unintended Consequences

After the surgical lecture and seeing the results of the pre- and posttests, the NNP education team proposed to include more surgical education including education by a surgeon, if possible. There was also discussion on having the surgical PPN help provide surgical education.

Objective Three Outcomes

The third objective was to assess hurdles in implementation if able to step back and improve utilization of change. Throughout the implementation of the surgical NNP core team, hurdles were experienced by the author and the NNP manager; these were assessed, evaluated, and discussed. If changes needed to be made, they were implemented by the author and NNP manager.

One of the biggest hurdles faced was the schedule. Full coverage could not be provided to the surgical NNP core team when it was first implemented due to available NNPs who desired to be on the surgical team and also schedule requirements of NNPs including weekends and nights. This hurdle was overcome in the beginning by providing coverage Monday-Friday days. This was still an issue due to self-scheduling, vacations, sick days, maternity leave, etc. After more NNPs were recruited onto the surgical NNP

core team, more coverage was provided days and nights. Once the schedule was separated into surgical and medical/non-surgical teams, the most coverage and the best continuity of care could be provided. There were still holes in coverage due to vacations, sick days, maternity level, etc., but less than before.

Another hurdle faced was the lack in surgical education by NNPs who were not routinely on the surgical NNP core team. This was addressed by including surgical education in the New Graduate NNP Fellowship Program. The surgical lecture was only able to address three surgical diagnoses on the first few days of management due to time limitations. This education was only given to the new graduates who attended the lecture day.

If able to improve the utilization of change, this author would have increased the number of NNPs on the surgical NNP core team to be able to provide more coverage at the beginning of implementation. She also would have provided surgical education to all NNPs before implementing the surgical NNP core team and continue the education every few months to help new hires who wanted to rotate on the team and be educated on new research on surgical management.

CHAPTER V

RECOMMENDATIONS AND IMPLICATIONS FOR PRACTICE

Throughout the implementation and evaluation of the surgical NNP core team, barriers and obstacles were encountered. These hurdles were faced by evaluating the issues, critical thinking of options to overcome the issues, and new implementation of change.

Recommendations

As determined by the pre- and posttests, surgical education was shown to improve knowledge in new graduate NNPs going to work in a unit with surgical infants. This showed more surgical education will be needed--not just during the orientation phase but should continue for both new graduates and experienced NNPs who might not have had prior experience taking care of surgical infants. Comments from the comfort/competent survey indicated most new NNPs wanted more education before coming off orientation: "More in-depth education," "More orientation on the north side," "More teaching during rounds," and "A solid introduction to the surgical team that we are new graduates."

These responses were taken into account and the NNP education team is working on being able to provide more education before the end of orientation. The length of orientation is also being assessed on both the north and south sides of the unit to increase better surgical management while on orientation. Surgical education to all members of

the surgical NNP core team is recommended due to new research on surgical interventions and management.

Multiple approaches were taken when trying to adjust the NNP schedule with implementing the new surgical NNP core team. This was different for each unit based on length of shifts and number of NNPs. Separating the teams of NNPs from the beginning of implementation and having adequate staffing to cover shifts would have helped. A flexible and understanding staff will help when scheduling is difficult.

An unintended consequence that occurred during the implementation of this project was the positive relationship between the surgical fellows and surgical NNPs; this might have been due to working closely with a decreased number of NNPs and seeing the same faces daily. This relationship was not only positive for the unit but also for patient care as work relationships improved. An improvement was also noted by the management teams surrounding the relationships among the NICU attendings, surgical NNPs, and RNs. Again, this might have been due to increased hours working together and seeing the same faces and increased understanding of the different roles of workflow and professional behaviors. This relationship is recommended to help continuity of care and a more pleasurable work environment. Team building between the NICU and surgical teams is also recommended.

Ongoing Monitoring and Evaluation

Ongoing evaluation for this project after the completion of the Doctor of Nursing Practice project would improve the education and scheduling of the surgical NNP core team. The NNP education team has requested feedback from the new graduate NNPs

who have gone through the New Graduate Fellowship Program to discover where the deficits are and how to solve them.

The NNP group will also continue to evaluate the scheduling of the surgical NNP core team and assess possible adjustments to the scheduling process that might improve any barriers encountered. Continuation of this project will help improve the care of surgical infants, enhance the workflow of NNPs, and bring stability to changes in order to adequately measure outcomes such as length of stay and ventilator days of surgical infants. The NNP manager will also network with other NICUs who have separate surgical units to gain guidance and discuss improvements over the months to years.

Essentials of Doctoral Education for Advanced Nursing Practice

It is now recommended that nurse practitioners obtain a doctorate: either the Doctor of Philosophy in Nursing (Ph.D.) or Doctor of Nursing Practice (DNP). The DNP is the favored pathway due to DNP-prepared nurses being able to demonstrate quality improvements in patient care and health practices (American Association of Colleges of Nursing [AACN], 2015). At the doctoral level in an advanced practice role, nurse practitioners are able to integrate nursing science with natural and social sciences, apply theories and concepts to articulate outcomes, develop and implement new quality improvement practices and policies, analyze evidence as best evidence for practice, educate others, and provider leadership to all.

As a practice-focused practitioner, DNP practitioners are able to analyze evidence-based research and integrate the findings to patient care, workflow, and policies. The inclusion of best evidence is used for quality improvement in actual

healthcare settings. According to the AACN (2015), there are eight essentials for obtaining an advanced nursing practice degree

- Essential I: Scientific Underpinnings for Practice. The Doctor of Nursing Practice is a terminal degree with education focused on the complexity of nursing practice that focuses on life-process, well-being, human behaviors and patterns of interaction with their environment, and effects of health status due to positive changes.
- Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking. The Doctor of Nursing Practice helps candidates develop skills to work within organizations to develop policies, practical strategies for change and improvement in quality of care and work balance, and being able to analyze cost-effectiveness of practice outcomes based on risk and improvement of health care.
- Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice. The Doctor of Nursing Practice includes research and scholarly nursing practice that can be applied to help improve health care. A DNP-prepared APN is able to integrate research from diverse sources to unit practice to help implement a change for quality improvement.
- Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care. A DNP-prepared APN is able to provide leadership and communication with partners when it comes to implementing and evaluating programs to improve health care.

They are able to extrapolate data from research and apply it to design, implement, and evaluate new programs based on the need of the network.

- Essential V: Health Care Policy for Advocacy in Health Care. A DNP-prepared APN is prepared to engage in policy development to help meet the needs of the healthcare network and be in the leadership role to help implement the new policy. They are able to analyze proposals and policies and participate on committees to help develop policies to advocate for improvement in health care.
- Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes. In today's healthcare environment, multiple professionals with unique skills and knowledge collaborate together to provide the best care needed for individuals and populations. A DNP-prepared APN is part of this collaboration with overlapping leadership and communication skills of the bedside nurse to now diagnosis and be a managing provider of many different diseases and conditions.
- Essential VII: Clinical Prevention and Population Health for Improving the Nation’s Health. A DNP-prepared APN is prepared to analyze scientific data, synthesize concepts, and evaluate care delivery models to help improve unhealthy lifestyle behaviors that could help prevent death. They are able to engage in the community to help promote prevention and reduce risks of preventable deaths by being leaders and communicating with the community about health prevention and promotion.

- Essential VIII: Advanced Nursing Practice. A DNP-prepared APN is specialized in nursing practice to conduct a complete health assessment in complex situations based on advanced clinical judgment and education, implement and evaluate quality improvement measures based on scientific data, and provide education to the population on health care and also to future nurses who will be the next generation to help improve healthcare.

Five Criteria for Executing a Successful Doctor of Nursing Practice Final Project

A successful DNP project must meet five essential criteria: enhance, culmination, partnerships, implements, and evaluation **(**EC as PIE; Waldrop, Caruso, Fuchs, & Hypes, 2014):

- Enhance. The surgical NNP Core team helps to improve practice outcomes by utilizing more efficient models of care and surgical education. Improvement in surgical education for new graduate NNPs helps develop critical thinking for surgical diagnosis and improvement in the management and care of surgical infants.
- Culmination. The author of this project identified an issue with the care of surgical infants (surgical education), helped to change the model of nursing care of surgical infants, and advocated for surgical education to new graduate NNPs. This new education was developed and implemented in the New Graduate Fellowship Program; it will continue to be revised and used for lectures to help improve the education of NNPs who will rotate on the surgical team.

- Partnerships. The author partnered with the NNP education team, NNP manager, NICU Medical Director, Director of Advance Practice, and Chief Surgeon to make this project successful. Through the implementation of this project, the author had numerous meetings with the aforementioned individuals to collaborate on the best actions needed to provide improvement in patient care and NNP work flow.
- Implements. The author was able to take the best evidence available and apply it to the unit in which she works to help improve patient care and NNP work flow. This has also demonstrated where improvements could be made in education regarding surgical infants and scheduling of surgical NNPS.
- Evaluation. Evaluation of education practice was conducted along with surveying new graduate NNPs' comfort and competence in caring for surgical infants. This newly implemented surgical education has showed an improvement in the new graduate NNPs' knowledge, thus also demonstrating a need to re-evaluate the length of orientation for the surgical team due to comfort and competence levels (Waldrop et al., 2014).

Personal Goals and Contribution to Advanced Practice Nursing

Personal goals of the author after completing this project are to continue to make improvements to the surgical NNP core team, keep re-evaluating how the implementation of the team is having an effect on patient care and NNP workflow, and to assess where changes need to be made for improvements. The author also plans to help the NNP education team with improving the surgical education provided and assess the orientation length. She has also reached out to the new graduate and experienced NNPs who are

thinking of obtaining their DNP and offered her help and assistance with questions and mentor advice.

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APPENDIX A

NEONATAL SURGICAL TEAM VISION/ MISSION STATEMENT

Colorado Institute for maternal fetal Health

Colorado Fetal Care Center

Neonatal Surgical Team Vision /Mission Statement

Our purpose and passion as a multi-disciplinary fetal and neonatal care team is to create and live a culture of trust, collaboration, adaptability, compassion, commitment and transparency to provide comprehensive care to our fetal and newborn patients and their families in their period of greatest need, resulting in the best outcomes globally.
We accomplish this through a multidisciplinary approach with extensive evaluation and follow up and a focus on research, innovation, education and family centered care with a team that knows how to get it done in a mutually respectful manner.

The Team will achieve this vision through the following 10 commitments:

1. We will assume best intentions
2. We will make decisions as a team practicing respectful, collaborative conflict
3. We will not take the actions or behaviors of others personally
4. We will recognize that there is more than one way to approach a situation
5. We will not keep score
6. We will value individual expertise and experience
7. We will trust individual judgment
8. We will seek to have consensus for clinical guidelines
9. We will respect a nuanced approach for complex patients that don't fit into established clinical guidelines
10. We will commit to communication of critical decisions with clinical leaders via group text, and when there is dissension, meet face to face to discuss

Culture in Action:

- Lead by example with open-minded discussions about clinical care, asking "what's your opinion" or "How might we", especially during rounds
- Agree to eliminate <u>all</u> criticism in front of others, including complaints in the workroom and personal attacks. In other words, lead with compassion and ego awareness.
- When a decision cannot be made during rounds, there is an agreement to make the decision with clinical leaders via group text. Most importantly, the decision to resolve an outstanding issue via group text will be communicated to the entire rounding team and the subsequent decision will be communicated back to an NP or RN point person for that patient
- When the surgeon of record makes a significant change to the care plan of the baby outside of formal rounds, the surgeon commits to communicating this change directly to the attending neonatologist.
- Keep RN/NP out of conflict (partially accomplished by #2 and #3 above)
- Inclusion of fellows in decision making should be a priority
- 100% commitment to rounds (<u>No</u> use of personal cell phones or PCDs unless emergency or unavoidable interruption)

APPENDIX B

PRE- AND POST-TESTS

Pre and Post Test (Items highlighted in red are the correct answer – only visible to the test grader)

1. On average, how many minutes per day does a physician verbally communication with nurses?
    1. 1.1 minutes
    2. 2.4 minutes
    3. 3.8 minutes
    4. 4.2 minutes
2. A Gastroschisis is where:
    1. The intestines are located above the diagram, where the lungs are located
    2. The intestines are located outside the abdominal cavity with no sack
    3. The intestines are located outside the abdominal cavity in a sack
    4. The intestines are located inside the abdominal cavity with an atresia
3. Gastroschsis occurs in:
    1. 1 out of every 500-1,000 births
    2. 1 out of every 1,000-4,000 births
    3. 1 out of every 4,000 - 20,000 births
    4. 1 out of every 20,000- 40,000 births
4. What size replogle should be placed for a term infant with gastroschsis?
    1. 8 French
    2. 10 French
    3. 12 French
    4. 14 French
5. After Delivery of an infant with a gastroschisis, the infant should be brought to the warmer and placed_____?
    1. With the Left side down
    2. With the right side down
    3. Prone
    4. Supine
6. Infants with a gastroschisis should be started on Fluids of ___?
    1. 60ml/kg/day
    2. 80ml/kg/day
    3. 100ml/kg/day
    4. 120ml/kg/day
7. T/F: A silo placement is when all the bowel is able to be replaced back into the abdomen right after birth at the bedside by the surgeon.
8. Feeds can be started on a gastroschsis when….
    1. There is generous amounts of green mucus coming out of the replogle, but a normal abdomen assessment
    2. When there is return of bowel function
    3. When there is minimal clear mucus from replogle and return of bowel function
    4. When there is minimal clear mucus from replogle, no return of bowel function, and a distended abdomen

9. The first portion of the small intestine is call the
    1. Pyloric
    2. Duodenum
    3. Jejunum
    4. Ileum
10. How many infants with an intestinal atresia experience Colonic atresia?
    1. <15%
    2. 15-25%
    3. 25-35%
    4. 35-45%
11. In the delivery room, infant with a known intestinal atresia should be managed from a respiratory status with
    1. Positive pressure ventilation with the mask
    2. Positive pressure ventilation with ETT
    3. Neo Puff with mask on 20/5
    4. CPAP of 6 on either NeoPuff or mask
12. Infant who have lost part of their Ileum due to an intestinal atresia, may be as risk for decrease absorption of
    1. Vit A & D
    2. Magnesium
    3. Na
    4. K
13. If an infant has an ostomy, and the ostomy output is increase >20ml/kg/day, as a NNP, you should….
    1. Increase feeding volume by 20/kg/day to make up for the lost calories
    2. Increase feeding volume by 10ml/kg/day and TPN volumes by 10ml/kg/day to make up for the lost calories
    3. Start oral NaCl 1mg q 6 to replace what the infant is losing in the ostomy output
    4. Start replacement fluids of NaCl 1:1 for >20ml/kg/day
14. Cholestatsis can occur infants who
    1. Are receiving long term fortification with human milk fortifier to 24 calories
    2. Are receiving long term oral supplementation of ADEKS and Actigall
    3. Are receiving long term TP feeds of 24 calories Sim Special Care
    4. Are receiving long term TPN and Lipids
15. Infant who are diagnosed with a Esophageal atresia +/- tracheoesophageal fistula would also be worked up for
    1. Treacher Collins
    2. VACTERL
    3. CHARGE
    4. Prader-Willi

APPENDIX C

COMFORT SURVEY

Comfort/Competent New Graduate NNP Survey Questionnaire:

Questionnaire will be given through Survey Monkey online program. The rating on Survey Monkey will be rating the questions on a Likert scale of 1-5, with 1 being strongly disagree and 5 being strongly agree.

Likert Scale: Strongly disagree/ disagree/neutral/ agree/ strongly agree

How many years do you have in NICU experience (both as a RN and NNP)?

- **0-2**
- **2-4**
- **4-6**
- **>6**

How many months have you been a NNP?

- **0-2**
- **2-4**
- **4-6**
- **6-8**
- **>8**

1. I feel comfortable managing a NICU team of 8-10 patients with infants who require surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

2. I feel competent and capable of managing a NICU team of 8-10 patients with infants who require surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

3. I feel comfortable working with the surgical team on the management of infants requiring surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

4. I feel competent and capable working with the surgical team on the management of infants requiring surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

5. I feel comfortable communicating with the surgical team on changes in patient status that pertains to surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

6. I feel competent and capable communicating with the surgical team on changes in patient status that pertains to surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

7. I feel comfortable communicating with the surgical team on changes in patient status that pertains to surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

8. I feel competent and capable communicating with the surgical team on changes in patient status that pertains to surgical intervention.

Strongly disagree/ disagree/neutral/ agree/ strongly agree

9. I feel comfortable communicating with the NICU fellows and "attending" on changes in
patient status that pertains to surgical intervention

Strongly disagree/ disagree/neutral/ agree/ strongly agree

10. I feel capable and competent communicating with the NICU fellows and "attending" on changes in patient status that pertains to surgical intervention

Strongly disagree/ disagree/neutral/ agree/ strongly agree

And one open/ended question:

Please give 2 examples on how the New Graduate NNP Fellowship can improve on making new graduates comfortable and/or competent with the care of surgical infants and working closely with the surgical team.

_____

_____

APPENDIX D

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	September 11, 2017
TO:	Megan Stephany, MSN
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[1118688-1] Implementing a New Surgical Neonatal Nurse Practitioner Core Group
SUBMISSION TYPE:	New Project
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS
DECISION DATE:	September 11, 2017
EXPIRATION DATE:	September 11, 2021

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Megan -

Thank you for submitting a clear and thorough IRB application for your DNP capstone project. There are no requests for additions or revisions.

Best wishes with your study. Please don't hesitate to contact me with any IRB-related questions or concerns.

Sincerely,

Dr. Megan Stellino, UNC IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.