

NEONATAL ABSTINENCE SYNDROME, INCREASING SURVEILLANCE IN
NEWBORNS

by

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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Abstract

The purpose of this project was to improve nursing staff's knowledge of Neonatal Abstinence Syndrome, identifiable risk factors, how to screen for Neonatal Abstinence Syndrome, and how to report positive findings from the Neonatal Abstinence Syndrome screen. The goal for implementation of this intervention was to improve the rates of Neonatal Abstinence Syndrome screening in the newborn nursery.

The background included staff education on how to initiate the NAS screening tool, newborns at risk will have a nursing staff who are hypervigilant to any abnormalities and the need for any interventions beyond normal newborn care. When infants are identified for NAS, they are then placed under ongoing surveillance by the hospital staff and the pediatric provider.

The methods used in this quality improvement project had a comparative design that was developed around an education intervention provided to the nursing staff. Once the education was provided, a retrospective chart audit was performed. The purpose of this method was to compare the NAS scoring pre-education to a hypothesized improvement in NAS scoring after the education delivery.

The results of the study were obtained within a 20 bed Level II nursery within a regional medical center that serves a city of approximately 29,000 along with multiple outlying communities. The vulnerable newborn population has been falling through the cracks with inconsistent surveillance and undereducated nursing staff regarding Neonatal Abstinence Syndrome. This small, controlled environment was the ideal size for a quality improvement project that aims to improve surveillance based on the presence of risk factors. This quality improvement project used a comparative quantitative research method to determine statistical

significance for the intervention provided in evaluating pre-intervention data with post-intervention data.

In conclusion, with the significance in the increase in NAS screening rates post-education to pre-education, and a significant power analysis, this study showed evidence of a true change. In summary, there was statistical evidence to show an increase in NAS screening after the educational intervention as initially hypothesized.

Neonatal Abstinence Syndrome, Increasing Surveillance in Newborns

There are growing numbers of individuals who suffer from opioid addiction in the United States. Within this epidemic, there is an often forgotten yet highly vulnerable population showing long-term effects of this opioid crisis. Antenatal exposure, or fetal access to opioids via the placenta during pregnancy, has seen an overall increase nearly five-fold from the year 2004 to the year 2014 (Devlin et al., 2020). This opioid exposure by the fetus during pregnancy is abruptly halted at delivery, resulting in various symptoms. These symptoms manifested in a newborn after delivery are known as Neonatal Abstinence Syndrome (NAS) (Devlin et al., 2020).

In 1975, a scoring system was developed to help assess and monitor symptoms in newborns (Gomez-Pomar et al., 2017). This study discussed that the scoring system is called the Finnegan Neonatal Abstinence Scoring System (FNAS), or NAS screening tool. This tool's purpose is early recognition of NAS so that interventions may be promptly initiated (Devlin et al., 2020). As Gomez-Pomar et al., pointed out, the NAS screening tool evaluates an infant on 21 different characteristics and scores each of those categories in intervals that most often correlate with the infants feeding schedule every three to four hours. Also, a score of eight, three or more times, or 12, two or more times, would cause the provider to initiate pharmacological interventions (2017).

Through personal experience in the newborn nursery of a local community hospital, opioid-dependent mothers were regularly delivering opioid-dependent infants. There had been an observation of inconsistent or sometimes even an omission of the scoring tool used to assess these newborns appropriately. If an appropriate NAS screening was not done, then the NAS

signs were not recognized, and interventions were never initiated (Delvin et al., 2020). Evidence has already proven in other healthcare settings what has been suspected in this setting that inadequate training and inconsistent nursing interpretation of the tool lead to the insufficient screening of newborns (Agana et al., 2020).

Personal Phenomenon Experience

For the past 13 years, the number of mothers delivering infants under the influence of controlled substances has been observed to be on the rise. These infants are irritable, and the mothers often have trouble bonding with their newborn for several reasons. The first reason is that the infants are often inconsolable, and the mothers do not know how to appropriately care for a child with a high level of irritability. Mothers with a history of drug abuse often have inadequate social support systems. Without a traditional family dynamic, these mothers often choose not to breastfeed their infant, which cuts down on the maternal/infant bonding through skin-to-skin contact. Lastly, mothers with a history of drug abuse are often becoming irritable while in the hospital, not being able to consume the illegal substances they often use regularly. These irritable infants are usually sent home with the mother and a social services referral along with a dysfunctional family dynamic. Once the pediatrician sees the infant for their first exam nearly a week after hospital discharge, details and maternal history are lost. This scenario puts the infant at a disadvantage by not providing thorough surveillance of the infant's risk factors due to maternal substance abuse in utero. While there is a NAS scoring tool available through the electronic medical record (EMR) in this healthcare setting, its use was inconsistent with the most nursing staff. The suspicion was that the nursing staff was undereducated not only on how to use it but the vital role it plays in diagnosing delays later in the child's developmental process.

Project Intent

The purpose of this scholarly project was to deliver data that will assist the hospital in policy development that will guide the hospital nursing staff on when to initiate the NAS scoring tool. A literature review has shown that there was little to no difference in training through simulation or by video but a consistent need for further FNAS utilization training (Agana et al., 2020). When there is one infant in the United States diagnosed every 30 minutes with Neonatal Abstinence Syndrome, there must be better preparation of hospital nursing staff to be able to recognize those symptoms soon after delivery (Timpson et al., 2018). Some of the characteristic's infants can present with when suffering from NAS include seizures, tremors, temperature instability, excessive spitting, watery stools, poor feeding, irritability, excessive movements, excoriation, prolonged crying, and poor sleep patterns (Timpson et al., 2018). When the NAS tool is utilized due to maternal substance abuse or suspected substance abuse, a consistent scoring method is imperative to standardizing neonatal treatments including both pharmacological and nonpharmacological treatments (Timpson et al., 2018). The aim of the project was that through staff education on NAS screening tool guidelines, there would be better surveillance of newborns by the appropriate utilization of the NAS scoring tool and earlier recognition of the need for advanced interventions.

Practice Improvement

For this project, as a requirement of the Doctor of Nursing Practice (DNP) curriculum, practice improvement was the goal. Through the evaluation of pre-intervention use of the NAS tool compared to post-intervention use of the tool, the effectiveness of the education intervention was evaluated (Reavy, 2020). An organizational theory of change was utilized. A specific change

theory that could have been used successfully in this situation was the Contemporary Change Theory (White et al., 2020). In 1996, John Kotter developed eight steps that could be used, including establishing a sense of urgency, creating a team to work towards a vision and strategy, clear communication of that vision, the introduction of the goal to the nursing staff, develop short term goals to work towards, consolidate the new changes, and institutionalize the new approach in the form of a new policy for unit implementation (White et al., 2020). The planned steps that were carried out within this theoretical framework include collaborating with the assigned chair, professor, hospital educator, department supervisor, and pediatricians to discuss the problem and prepare for an improvement strategy. First was the delivery of a unit wide education intervention focusing on providing staff education, including the significance of NAS use for better health outcomes for newborns and overall health care cost-effectiveness. Next there was a specification of the date for staff initiation of the new NAS screening tool use. Lastly a retrospective chart audit was conducted looking at a specified time frame before the education as well as the same amount of time evaluated after the education was delivered. In this retrospective review, the charts were assessed for statistically significant increases seen in the utilization of the NAS screening tool for infants with risk factors for NAS based on their maternal history. Once the project was completed, results were reviewed with the initial collaboration team so that the initiation of a unit policy based on statistically significant data can be completed and put into permanent practice on the unit.

Background Significance

To better appreciate this practice improvement project, it helps to understand the background on what makes this significant. An NAS diagnosis has been shown to cost 1.5 billion

dollars annually in the United States (Agana et al., 2020). The NAS screening tool was originally developed to assess infants of mothers who had known use of narcotics, including heroin and methadone during pregnancy, but newborns are becoming exposed to more controlled substances, including benzodiazepines, barbiturates, selective serotonin reuptake inhibitors, and opioids (Oei & Wouldes, 2020; Corr & Hollenbeak, 2017). Children exposed to cocaine and methadone in utero have shown statistical evidence of neurological abnormalities and developmental delays (Serina, Peterson, & Rosen, 2018). The appropriate use of the NAS screening tool is imperative for the identification of infants with NAS in order for appropriate treatment and interventions to be initiated (Agana et al., 2020). Besides more accelerated pharmacological interventions for high-scoring neonates, nonpharmacological interventions such as increased family involvement, more frequent breastfeeding, and prolonged infant holding can be initiated with a family-centered shift in treatment (Buczowski et al., 2020). Hypervigilance by a primary care provider in children with a history of NAS can lead to quicker referrals for developmental therapies. With this improvement project, more accurate and consistent scoring was the goal, but the indirect future outcomes of that goal may include more timely interventions for infants with NAS, improvement in family-centered care, and lowering of the economic impact NAS has on the healthcare system in the United States.

Significance

It is essential for any evidence-based research to be implemented into practice; one must first understand the significance that research has. That significance expands from the central unit where the research was first put into practice to all of healthcare with its lasting impacts on its target population. As advanced practice providers utilize this research, they must understand

the background of why it was developed, the process by which it was developed, and its appropriate incorporation into their specific field of nursing, advanced practice and throughout the health care discipline.

Nursing

Even in this ever-progressing profession, nurses can take wisdom from one of the most significant nursing contributors, Florence Nightingale. In her (1946) text, *Notes on Nursing*, she discussed how the experienced observer watches diseases and ailments in patients, but through holistic care, it is not the symptoms of illness that we can treat, but through the delivery of fresh air, light, quiet, or warmth. The patient must be placed in an environment that promotes healing. In the care of newborns who are being monitored for symptoms of withdrawal, quiet and warmth are imperative to their transition into extrauterine life and initial growth and developmental patterns. This project is supported by the foundation that our profession was built upon.

As individuals in any professional arena work towards expertise in their field, nurses also possess this trait that is referred to as patterns of knowing. This was first discussed by Barbara Carper and further developed by Chinn and Kramer (2013) to explain what nursing knows and how it is known. These five patterns of knowing include ethics, personal knowing, aesthetics, empirics, and anticipatory knowing.

Emancipatory Knowing

Nurses in the newborn nursery setting are caretakers of the most vulnerable population of patients. These infants require a knowledgeable healthcare provider to anticipate their every need and be able to discern any variations from a normal newborn transition to extrauterine life. Emancipatory knowing as discussed by Chinn and Kramer as the awareness of social, political,

and cultural norms, understand why those norms exist, and possession of the ability to critically reflect on disparities in one of these groups (Chinn & Kramer, 2013). The ability to recognize the inequality within the newborn nursery leads healthcare providers to develop a change that supports infants in reaching their full potential throughout childhood. By understanding that newborns are being born and developing withdrawal symptoms after the placental supply of controlled substances is cut off, nurses can begin to use their emancipatory knowledge through the utilization of the NAS screening tool to identify those at risk. Once infants are identified, interventions can be implemented to establish more equitable conditions comparable to infants who are not born with drug withdrawal symptoms.

Ethics

According to Chinn & Kramer, emancipatory knowledge is based upon normal vs. abnormal and how to respond accordingly. Ethics is founded on the nurse's moral foundation. This plays a role in the nurse's decision making to utilize the NAS screening tool or not. If a mother delivers a newborn, is negative for any controlled substances, but has little or no prenatal care, the nurse's moral obligation to the infant is to screen for NAS. Even though there is no concrete evidence of drug use, the lack of prenatal care puts the infant at risk, and the nurse has a responsibility to ensure the infant is appropriately screened. Another example of ethics in relation to this DNP project involves a situation where a mother has had prenatal care, delivers a term newborn, and there was no reason to drug test the mother, but the infant begins to show positive signs of NAS, a screen should be warranted. A nurse may consider the fact that there are no known risk factors for drugs, but that infant is the nurse's top priority and deserves advocacy through screening.

Personal Knowing

For a nurse to be able to provide holistic care that includes nurturing the spiritual beliefs, feelings, and values of their patients, they must have a solid foundation of their own beliefs. This concept falls under the category of personal knowing and the therapeutic relationship discussed by Chinn and Kramer. Nurses who have a strong understanding of their personal beliefs and feelings will be more thoughtful when they make decisions based on their own values (Marquis & Houston, 2009). This method of knowing is important in this project because every individual has a set of beliefs when it comes to the stigma of maternal substance abuse. When a nurse can acknowledge their own feelings, they can appropriately categorize them as personal and then set them aside to deliver quality care equally to all patients regardless of substance abuse history. Therefore, this project has the potential to strengthen the personal knowing of health care providers through detailed training that can help eliminate bias on which infants are screened because of the development of specific screening criteria.

Aesthetics

Often nursing is focused on scientific reasoning and evidence-based practice, but nursing is actually a beautiful balance of art and science. This is the concept of aesthetics. Nurses can draw on their own personal experiences, both personally and professionally, that can aid in sparking creativity and riding the fluidity of many situations that arise in healthcare (Chinn & Kramer, 2013). In the context of this DNP project, aesthetics can be evidenced by a mother who has tested positive for controlled substances at delivery and whose infant is being screened for NAS with the indicated tool. When the nurse takes the infant to the mother's room, the mother has a desperate look on her face that the nurse immediately recognizes and addresses by

providing quality care and educating the mother on the importance of maternal/infant bonding for infants with NAS. This is the artistic side or nursing intuition that is often unspoken in the profession but is crucial to foster positive patient interactions.

Empirics

As Chinn & Kramer discussed, in opposition to the art of nursing examined with aesthetic knowing, empirics of knowing is, in fact, the scientific backbone of how we carry out evidence-based research. In this DNP project, a problem has been identified. Empirical knowledge will be relayed to nursing staff through evidence-based research in the process of educating them on the importance of utilizing the NAS screening tool and when and how to use this specific tool in the newborn nursery.

Healthcare

The purpose of a DNP project was to make an impact on patient outcomes, and often those are directly related to an improvement within the healthcare system. To better understand the positive outcomes that came from this DNP project involving consistent and accurate utilization of the NAS scoring tool, it was important to look at the project implications on a micro-, meso-, and macro-level. To start looking at the micro-level, it was important to understand that this included the day-to-day goings-on between nurse and patient. While this project attempted to make a significant positive impact in the life of newborns, it also needed to attempt to have an insignificant impact on the already heavy workload of a nurse caring for multiple infants in the newborn nursery. The nurses in the selected healthcare facility utilized the electronic medical record (EMR) Meditech. It was standard of practice to round on and document that rounding data on each infant every two hours in the EMR. The EMR system already had the

NAS scoring tool built into its program. Therefore, on the micro-level, this project implementation had significant impact on a newborn's outcome while simultaneously had little to no impact on a nurse's already hectic routine in the newborn nursery.

The meso-level of significance for this DNP project included its value on a group instead of an individual. This hospital setting had nurses and ancillary staff working in 12-hour shifts, including 12 hours during the day (7 a.m. to 7 p.m.) and 12 hours during the night (7 p.m. to 7 a.m.). Any other requirements for coming to the hospital were not widely accepted by staff, and there was no availability of discretionary funding to pay staff to come in for additional unit-specific education. Therefore, the meso-level scale of significance was with the DNP student's ability to hold multiple education sessions during the nursing staff meetings before shifts begin with the approval of the unit manager to train all nursery staff without taking away patient care or having hospital staff on the clock for more than previously scheduled hours. This made the meso-level significant to the nursing staff as well as unit management for not requiring any of the unit budgets for implementation.

The macro-level of influence the DNP project had on the pediatric population of the selected community includes cost-effectiveness of early identification through appropriate screening. When infants are identified to be at risk for delays in their growth and development, preventative measures can be put into place, such as referrals to developmental preschools or speech, physical or occupational therapies earlier in childhood to prevent a delay instead of more frequent therapies needed to correct a significant deficit. This is a cost savings on a state level because in Arkansas, all children who qualify for any therapy, also qualify for Medicaid healthcare reimbursement.

Advanced Practice Nursing

Knowledge of growth and development is a trademark for the pediatric primary care provider. Without a strong understanding of when each age-related milestone should take place, a provider is unable to recognize any abnormal patterns or delays in development. When a newborn has a history of NAS, they are at risk for delays in development. Those specific milestones are often observed in an age range because no two children develop at the exact same rate; however, if a provider knows the history of NAS, they can act earlier in the observation of a slower developing skill and therefore provide the child with resources to prevent delays instead of trying to treat a delay. Prevention is the cornerstone of primary care, and pediatrics is no exception; therefore, this DNP project was another tool in the provider's preventative healthcare arsenal.

Support of Project

The hospital chosen as the setting for this project was a 170-bed acute care hospital. The facility prided itself on its Joint Commission accreditation and service to the local community. The women's and children's (W/C) department served the expectant women and their infants with a team of five board-certified obstetricians and six board-certified pediatricians. This project required chart reviews for both mothers and infants, so full support of both teams of physicians was imperative to its success. After conversations and support from the unit manager, the plan was to present the project at the women's and children's monthly physician staff meeting. There was an ongoing conversation with the hospital nurse educator who supported the idea and who also assisted the student in getting formal approval from the hospital's Quality Director since there was not a formal internal review board (IRB). Although formal permission

and approval were not final at this point, all conversations with the individuals mentioned were positive and showed nothing but support for the student and the topic chosen. The team consisting of DNP faculty, the DNP chair, physicians, and hospital administration were assembled along with a professional mentor/stakeholder for the DNP student.

Benefit of Project to Practice

The practice setting chosen for this DNP project was a community hospital newborn nursery. Through experiences working in this healthcare setting for many years, there was a continuous issue with nurse retention, and increased observation of maternal substance abuse, and a reduction in infants taken into foster care related to positive maternal drug screens. While nurses did not have a role in the legal proceedings of the consequences of maternal substance abuse, there was still an obligation to the newborn to provide quality, evidence-based care. Through better staff education on how to initiate the NAS screening tool on qualified infants, these newborns had a nursing staff who became hypervigilant to any abnormalities and the need for any interventions beyond normal newborn care. When infants were identified for NAS, even in a milder form that does not require pharmacological interventions, they were then placed under ongoing surveillance by the hospital staff and the pediatric provider. This surveillance would follow them through their growth and development of childhood to recognize the need for therapeutic intervention that may be essential for an appropriate developmental timeline. When these children are identified earlier, preventative measures can be put into place instead of retroactive therapy referrals for children to catch up to where they should be on the developmental spectrum.

Conclusion

With a growing opioid epidemic, an often-forgotten population is the infant born to drug-addicted mothers. Through this DNP project, a purpose was identified in the form of better surveillance for infants born in a local community hospital who may have been at risk for neonatal abstinence syndrome. A proposed practice improvement intervention was developed, and through the various patterns of knowing, the DNP student along with the unit nurses worked through self-awareness of knowledge as the implementation of the appropriate use of the NAS screening tool was organized. The significance to nursing, the world of healthcare on multiple scales, and the importance to advanced practice were all identified. Through the support of faculty, DNP chair, hospital administration, nursing staff, and other identified stakeholders, this project had the potential to have a long-term positive effect on infants born at risk for NAS through early identification and intervention implementation.

Chapter Two: Literature Review

One of the most vulnerable patient populations nurses have the privilege of caring for is newborn infants. Nurses advocate for neonates before they are even delivered. The newborn nurse's assessment can make a lasting impact on the growth and development of that infant throughout childhood. Understanding the significance of nursing assessment, symptom identification, and pharmacological and nonpharmacological intervention is crucial for infants exposed to opioids and other controlled substances in utero. This literature review evaluated the key themes associated with the early identification of neonatal abstinence syndrome (NAS) by the nursing staff. Those themes included assessment skills, specific NAS tools being utilized, and the education population. Along with the key themes found throughout the literature, this review also evaluated the gaps and limitations for significance. The following Population, Intervention, Comparison, Outcome, and Time (PICOT) question guided the literature review: In infants at risk for NAS (P), will an educational intervention to use a NAS screening tool (I); as compared to no educational intervention (C); increase identification of infants for NAS (O); three months post-intervention as compared to rates three months pre-intervention with findings influencing NAS policy development (T)? The purpose of this chapter is to discuss the literature and evidence that is relevant and supports this quality improvement project.

Search History

The initial search history consisted of key terms including "neonatal abstinence syndrome," "neonatal abstinence scoring," "neonatal abstinence tool," "maternal substance abuse," "newborn withdrawal," and "infant withdrawal symptoms." The initial search produced over twenty articles, with five quality articles selected for review. To further narrow the search,

specific information that included the key phrases were entered without the use of Boolean terms: "clinical practice guidelines neonatal abstinence syndrome," "neonatal abstinence syndrome scoring by nurses," "neonatal abstinence syndrome screening," and "training nurses to use the NAS tool." This search produced five quality articles to include in the literature review. Ten primary research articles chosen for the literature review were published within the last five years because of parameters set within the search criteria as 2016-2021. In addition, all have been peer-reviewed per search criteria specifications. The Maryville University Library was utilized to retrieve all research articles through the following databases; Cumulative Index of Nursing and Allied Health Literature (CINAHL), CINAHL Plus, Complimentary Index, Medline, Medline Complete, ScienceDirect, Journals@OVID, and Supplemental Index. The literature search yielded a total of 10 publications that supported the evidence to conduct this quality improvement project.

Integrated Review of Literature

For evidence-based practice implementation, the ability to review and synthesize literature is imperative. The significance of reviewing existing literature is to see what has been done before, what can be duplicated, what gaps were found, and lastly, to give credit to the original authors of the work. Upon initiation of the literature review regarding neonatal abstinence scoring techniques, specific themes were observed among the existing research. The first of those themes includes assessment skills and the ability to identify characteristics of neonatal abstinence syndrome. The next theme is the scoring techniques in assigning a numerical number based on the assessment findings. More than one scoring method was found, including the Finnegan Neonatal Abstinence Scoring (FNAS) tool and the Eat, Sleep, Console (ESC)

model, so the different variations will be evaluated throughout the theme. Lastly, the methods for delivering the education and the population that the education targeted will be the last theme evaluated.

Assessment Skills to Identify NAS

Advanced nursing assessment skills are imperative to the appropriate diagnosis of neonatal abstinence syndrome (Adrian et al., 2020; Agana et al., 2020; Bogen et al., 2017; Clark, 2019; Cook et al., 2017; Gadomski et al., 2018; Timpson et al., 2018; Wachman et al., 2018). The systems are divided into three categories, including central nervous system (CNS) disturbances, metabolic/vasomotor/respiratory disturbances, and gastrointestinal disturbances (Agana et al., 2020; Timpson et al., 2018). Within these three categories, there are specific symptoms that must be noted to identify infants at risk. Some of those CNS symptoms include excessive high-pitched cries, a decrease in the infant's sleeping pattern between feeds, hyperactive reflexes, tremors, increased tone, excoriation, and jerks and convulsions (Agana et al., 2020; Timpson et al., 2018). Some of the metabolic, vasomotor, and respiratory disturbances in a neonatal abstinence assessment include sweating, hyperthermia, frequent yawning, mottled skin, nasal congestion, sneezing, and tachypnea (Agana et al., 2020; Timpson et al., 2018). The gastrointestinal symptoms that the provider must watch for include excessive sucking, poor feeding, vomiting, and watery stools (Agana et al., 2020; Timpson et al., 2018). Without a background in NAS, these subtle symptoms individually may not be alarming, but with a trained provider, these can be quickly noticed and scored to gauge the severity of withdrawal that the infant is experiencing.

Throughout the literature, there were findings regarding the assessment of a newborn when neonatal abstinence syndrome was suspected. The score assigned to an infant regarding their assessed NAS symptoms determines if the infant needs pharmacologic interventions, nonpharmacologic interventions, or no interventions at all (Agana et al., 2020; Cook et al., 2017; Parlaman et al., 2019; Timpson et al., 2018; Wachman et al., 2018). The significance of proper assessment techniques not only benefits the infant's health outcomes, but it is also more cost effective in regard to treatments and length of stay (Gadomski et al., 2018).

The comfort level of health care providers doing the assessment was evaluated in several methods. Survey methods determined this comfort level. In some literary works, nurses were surveyed before the education regarding NAS scoring to see if the researchers could identify the most difficult areas to score using the NAS screening tool (Timpson et al., 2018). Similarly, another study used the survey method to evaluate barriers to proper care delivery for those assessing newborns for NAS (Adrian et al., 2020). On a broader scale, one study conducted used the survey method to evaluate the standardization of neonatal abstinence screening policies among multiple healthcare facilities (Bogen et al., 2017). The survey method was used in numerous instances to assess the healthcare team's confidence in their ability to evaluate infants for the presence of NAS. Overall, the survey proved to be an effective and standard method for this baseline evaluation.

Validity and Reliability of the FNAS and ESC

In 1975, the Finnegan Neonatal Abstinence Screening (FNAS) was developed. It was later modified in 1986 and remains the most widely used tool for assessing an infant for withdrawal symptoms (Agana et al., 2020). Not only is it the most commonly used, but it has

also been the most validated tool to date (Agana et al., 2020; Bogen et al., 2017; Clark, 2019; Gadomski et al., 2018; Timpson et al., 2018; Wachman et al., 2018). Because of the consistency of use throughout the literature, the FNAS, or NAS screening tool, was utilized in the project. The FNAS tool has 21 scored items and was condensed from the original NAS tool, with 32 items. In this study performed by Agana et al. (2020), the staffs' ability to score consistently comparing the training done by video versus the demonstration, the FNAS tool was selected for infant assessment.

Another quality improvement article that was reviewed utilized the FNAS tool while watching a video of an infant having withdrawal symptoms (Clark, 2019). The FNAS scores were then evaluated for accuracy. In assessing nurses' FNAS scores beforehand, comparing it to the same scenario being scored after the education, the FNAS scores after the education showed a significant reduction in errors (Timpson et al., 2018). While physicians and nurses make up the majority of healthcare team members who utilize the NAS screening tool on infants, one article reviewed demonstrated the benefits of parental involvement when scoring infants with neonatal abstinence syndrome (Gadomski et al., 2018). In that particular study, not only was the healthcare team educated on using the NAS screening tool, but the infants' parents were also included in the assessment and scoring of symptoms. When a more comprehensive evaluation was taken of multiple healthcare facilities, only 88% of them had written protocols in place regarding the management of NAS (Bogen et al., 2017). 92% of those hospitals used a version of the Finnegan Neonatal Abstinence Screening tool.

While the FNAS tool was the most common form of scoring found in the review of the literature regarding NAS, an emerging alternative began to show up in some of the research. The

FNAS was still a standardized scoring method, but some facilities are beginning to transition to a function-based assessment known as the Eat, Sleep, Console (ESC) assessment model (Wachman et al., 2018). Eating, sleeping, and console ability were components of the FNAS; however, this new model was easier for both hospital staff and the parents for family-centered care. The goal of using the ESC model protocol was to promote improved nonpharmacological care for infants with NAS transitioning to the more care-based scoring system (Parlaman et al., 2019; Wachman et al., 2018).

In developing educational opportunities for hospital staff as a part of this Doctor of Nursing Practice (DNP) project, there was an existing NAS screening tool template built into the hospital's electronic medical record. The project's goal was to provide confidence for the nursing staff in the appropriate use of the NAS screening tool, while incorporating elements of the ESC model into parental involvement and education. The hope was that the long-term outcomes would produce better parental participation as a direct result of improved nursing confidence in assessing and scoring infants using the NAS screening tool.

Inservice Methods and Target Audience

The basis of this project was to evaluate an educational intervention regarding the appropriate use of the NAS screening tool. Several instances were discovered in the literature where similar educational interventions were also delivered to healthcare team members regarding the assessment of NAS. One specific study showed no difference in the evaluation of the nurses' assessment skills after the education was delivered by various methods (Agana et al., 2020). While one group received training through video simulation, the other group was able to receive their training with a high-fidelity mannequin, yet the assessment techniques after the

training remained similar. Another instance regarding the education of the healthcare team caring for infants utilized both slides and a training video to enhance their assessment skills of NAS (Clark, 2019).

There was a strong recurring theme among the literature about the assessment skills of healthcare professionals who care for newborns and are responsible for identifying neonatal abstinence syndrome. (Agana et al., 2020; Clark, 2019; Timpson et al., 2018; Wachman et al., 2018; Gadowski et al., 2018; Cook et al., 2017; Parlaman et al., 2019). The clinical practice guidelines regarding NAS were what all education was based upon. There was a common level of confidence increase following the clinical practice guideline-based education regarding neonatal abstinence syndrome (Cook et al., 2017). Therefore, the goal of this project was to incorporate the most current clinical practice guidelines into the delivery of updated assessment techniques that are both convenient for the nursing staff and are based upon current evidence-based research to ensure its success.

The real underpinning for this project was found in the review of the educational methods used and those targeted by that education. The initial assumption was that nurses would be the sole focus, but that was not found to be the case throughout the survey of previous work regarding quality improvement of NAS assessments and scoring. Healthcare is evolving into an interdisciplinary team approach to delivering quality care, and the research regarding NAS screening was no exception to this global shift.

The most common group to receive training throughout the literature was the nurses tasked with caring for newborn infants (Clark, 2019). An increasing group to be included in the assessment training for infants at risk for neonatal abstinence syndrome was the parents

(Buczowski et al., 2020). This shift had taken place to provide a more holistic plan with continuity of care upon discharge (Gadomski et al., 2018). Another group emerging in the research who did not prove to have as much experience were pediatric physicians and medical/pediatric physicians. While a study was conducted to enhance their assessment skills, the true revelation was that they are more skilled in the management of NAS but had little to no experience performing a thorough assessment for the identification because of their historical reliance on nursing staff for that information (Agana et al., 2020). The last of the targets of NAS education includes a group of healthcare facilities that were members of the Better Outcomes Through Research for Newborns (BORN) network. The target was to identify how the NAS education was delivered and if it was routinely conducted (Bogen et al., 2017).

After reviewing the most common target, healthcare members, for NAS education in the healthcare setting, it was significant to the project to assess the various methods for the delivery of that education. The most frequent method was the comparison of delivery techniques. In multiple articles, education was delivered by video or demonstration, and the accuracy of the NAS scoring was analyzed to see which method proves more advantageous for accurate scoring (Agana et al., 2020; Clark, 2018; Timpson et al., 2018). A similar method that incorporated self-reflection was the study conducted by Clark (2019); when the nurses watched a video of an infant having NAS symptoms, they scored the infant using the NAS screening tool, received an education session, then scored the infant again. With both intervals of scoring the infant, the nurses were also able to give a self-assessment of their confidence level in their ability to score. This gives a more introspective look at assessment skills and helps the learner to evaluate personal strengths and weaknesses. Another similar study discussed the video and scoring to

allow for nurses to verbally identify areas of difficulty before offering the education session (Timpson et al., 2018). Adrian et al. (2020) also assessed the confidence of the nurses, both in the target NICU and current members of the National Association of Neonatal Nurses (NANN), for at least the past six months, using specific determinants of implementation behavior questionnaire in their interview process to obtain both qualitative and quantitative data on the topic of NAS scoring techniques.

When critiquing the literature, it was imperative to evaluate both the who and the what within the available research, but the how was the most influential to the future success of the project. How will this research influence the structure, implementation, and outcomes of this specific project aimed at improving the assessment skills of nurses in a small community hospital? The overwhelming idea utilized throughout the research was the significance of self-reflection by the nurses. This self-reflection came at different intervals throughout the education process, but the justifications remain the same. By taking an introspective look at personal insecurities regarding NAS scoring, the education can be better received in those areas of wavering assessment skills.

The most common and most successful methods found in the research targeting nurses included self-assessment of NAS scoring skills, education regarding the appropriate methods for scoring infants, and the provision of an opportunity to practice those scoring techniques using either a video or simulation model. By incorporating education with the current clinical practice guidelines, the indirect results were hoped to be an incorporation of parental involvement in the ongoing assessments. Lastly, in the development of this educational program, there was an anticipated surge in the number of infants scored for NAS once nurses' confidence is increased.

This warranted increased pediatrician involvement, and therefore the pediatric medical team was considered and up to date with the development of the educational program.

Literature Critique

A literature critique is essential for determining the appropriateness of research for the topic being evaluated. Using the method of critique, the reader used a non-biased method of assessing the strengths and weaknesses of the work. Critically evaluating the research identifies the gaps and limitations. A strong critique is essential for objectivity in choosing relevant research for a new project.

Strengths and Weaknesses

The strength of research has no standard formula, but it is grounded in the methodology and limited by the presence of bias (Reavy, 2016). Strength was identified at various levels throughout the literature reviewed regarding NAS. The highest level of research design and methodology is the randomized control trial. This methodology was used in work by Agana et al. (2020) thus, providing rigorous evidence for this project. Gadomski et al. (2018) showed strength in the sample selection using only ICD-9 and ICD-10 codes in the EMR. The sample was selected by diagnosis, and then the length of stay was calculated from the point of diagnosis. This eliminated the bias, and the study had full Institutional Review Board (IRB) approval.

The weaknesses associated with this literature review were few. However, one weakness noted was several of the publications did not use diverse samples, and only one facility was used to conduct the research (Clark, 2019; Timpson et al., 2018). This negatively impacts generalizability. It was also found that two of the publications did use convenience sampling that also impacts the generalizability of the findings (Clark, 2019; Wachman et al., 2018).

Gaps and Limitations

Research can often be limited by bias, even if it is unintentional (Reavy, 2016). Bias is often the result of the interpretation being a deviation of the truth based on the researcher's status, position, or viewpoint. One of the limitations found within the work of Adrian et al. (2020) was in the criteria for participants. There was a minimum of a 6-month membership to the National Association of Neonatal Nurses (NANN) required for participation, but there was no discussion on how this process was verified. This leads to questions about the validity of the answers. Another limitation found in the literature was the participation of hospitals within the BORN network (Bogen et al., 2017). The basis for that research was to survey and evaluate the percentage of hospitals that had existing NAS protocols. The limitation or bias that was found in the review was that the only hospitals included in the survey were existing members of an optional organization that promoted better outcomes for newborns. This showed that there was already an investment in maintaining clinical practice guidelines that promoted better health outcomes for newborns. If other hospitals were included in the study who were not members of such an organization, the results could have been drastically different regarding the percentage of hospitals with existing protocols in place. One last significant limitation found within the research was with the clinical practice guidelines implemented by Cook et al. (2017). The goal was not to increase NAS identification, but instead to identify the length of stay, length of treatment, and nurse's knowledge and confidence. While the research findings were beneficial to this DNP project, the clinical outcomes were not aligned with one another.

The most common gap found throughout the literature was the inclusion criteria for initiating the NAS screening protocol. An example of this was found in the work of Parlaman et

al. (2019). A NAS diagnosis was given to infants who showed withdrawal symptoms after a known or suspected exposure to opioids in utero. There has been very little evidence-based data found on the specific criteria for initial screening of infants for NAS. This is challenging for nurses, but improved assessment skills will assist them in the appropriate initiation of NAS screening.

Concepts and Definitions

Neonatal Abstinence Syndrome (NAS): "Significant physiological and behavioral signs involving multiple-organ systems including the central nervous system; autonomic nervous system; and pulmonary, cardiac, and gastrointestinal systems following a prenatal exposure to opioids and other nonopioid drugs" (Agana et al., 2020, p. 1).

Finnegan Neonatal Abstinence Scoring System (FNASS): "a scoring system that is used as a tool to direct the need for pharmacologic therapy in infants with NAS" (Buczowski et al., 2020, para. 3).

Eat, Sleep, Console (ESC): "A function-based assessment tool that focuses on the evaluation of how well the infant eats, sleeps and demonstrates comfort" (Wachman et al., 2018, p. 2).

Neonatal Intensive Care Unit (NICU): A specialized intensive care unit that focuses on the stabilization of sick and premature newborns. (Stanford Children's Hospital, 2021).

Better Outcomes Through Research for Newborns (BORN): "The BORN network is a national collaborative of pediatric clinicians and researchers who evaluate neonatal care in the birth setting and, in the transition to home" (Bogen et al., 2017, p. 2).

Clinical Practice Guideline: "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances" (Institute of Medicine, 201, p. 1).

Theoretical Framework

Theoretical principles are the foundation on which evidence-based practice is built. For any researcher, regardless of field, there must be an adoption of theory and a substantial understanding of how the theory can help with knowledge advancement. In the field of nursing, it is no secret that the entire profession was built by nursing theorists such as Florence Nightingale and the influence a patient's environment had on their healing, or Jean Watson and the development of the science of caring. For a DNP student to identify a problem, develop a solution based on a review of literature, and implement strategies for improved patient outcomes, there must be an adoption of change. Change can be difficult for any profession, but student nurses are taught the theoretical foundations of change in their current nursing curriculum.

An important theory regarding the change that was instrumental in the success of this DNP project is Roger's Diffusion of Innovation Theory (Rogers, 2003). Roger's theory was first developed to identify how change diffuses across a social system or population. The goal of this diffusion is a changed behavior or outcome. This theory aligns perfectly with the goal of this project, to improve the nurse's knowledge and confidence in using the NAS screening tool.

There are five key participants in the Diffusion of Innovation Theory (Rogers, 2003). Each key role can be directly related to the target population that this DNP project was addressing. The first key player is the Innovator. This role has already been carried out by the researchers who asked the initial questions, carried out the work, and published their findings.

The next role is the Early Adopter. This DNP student best identified with the early adopter because of the recognition of a needed change and the ability to develop strategies to achieve that change. The next role is the Early Majority. The early majority was represented by the DNP faculty, the DNP Chair, and the unit management at the hospital, who all agreed to this project's implementation within their facility. While the early majority is typically those not in leadership, who adopt new strategies after seeing positive evidence, in this particular facility, the majority of the nursing staff was assigned the role of Late Majority. Historically, this unit had not been receptive to innovation and is consistently skeptical of change. The last of the five groups are the Laggards. There were a handful of nurses with representation on both day and night shifts that required a higher level of convincing in the necessity of the change for better patient outcomes. It is believed that the adoption by the laggards will not solidify until the policy development at the end of the project.

The overall diffusion of innovation was dependent on the nurse's awareness of the need, the decision to adopt, the initial use to test, and the continued use (Rogers, 2003). The rate of the diffusion was dependent on the strength of the evidence presented by the DNP student and the level of creativity and enthusiasm in which it was presented. It was the belief of this DNP student that the Rogers Diffusion of Innovation Theory can be successful in the implementation and evaluation of nurse education regarding appropriate NAS scoring in newborns.

Conclusion

Neonatal abstinence syndrome is a common diagnosis seen in the newborn nursery. When looking for ways to improve the care these infants and their families receive, evidence-based research must be consulted. Based on a review of the literature, the most common themes

found were the assessment skills of not only the nurses but other members of the interdisciplinary team. The consistency of scoring is crucial to determining appropriate methods of treatment, including both pharmacological and nonpharmacological interventions. Nurses, physicians, and parents should all be included in the assessment and scoring of an infant with suspected NAS utilizing the FNAS or ESC tool. While various methods have been used to increase knowledge regarding NAS assessments and scoring, the video, combined with a self-assessment component, has shown the most consistency with positive results. The research had gaps, but the strength of the literature largely outweighed the limitations. This review has shown that there was substantial evidence to support this undertaking and utilizing the theoretical framework by Rogers, this project aimed to create a lasting impact on the target facility by providing increased nursing knowledge and confidence, which will be reflected in better patient outcomes.

Chapter Three: Methodology

In the United States, one infant is diagnosed with neonatal abstinence syndrome (NAS), related to maternal substance abuse every 30 minutes. With increasing numbers of infants suffering from these withdrawal symptoms, hospital nursing staff must be adequately trained to recognize and address them. The purpose of this study was to increase nursing compliance using the Finnegan Neonatal Abstinence Screening (FNAS), or NAS screening tool through education and implementation of current clinical practice guidelines in the hospital setting at a small regional hospital. The overall aim of this study was to positively affect infants born at risk for developmental issues related to NAS through early identification and intervention implementation.

Significance

With a growing opioid epidemic, an often-forgotten population is the infant born to drug-addicted mothers. Advanced nursing assessment skills are imperative to the appropriate diagnosis of neonatal abstinence syndrome (NAS) (Adrian et al., 2020; Agana et al., 2020; Bogen et al., 2017; Clark, 2019; Cook et al., 2017; Gadomski et al., 2018; Timpson et al., 2018; Wachman et al., 2018). If an appropriate NAS screening is not done, then the NAS signs are not recognized, and interventions are never initiated (Delvin et al., 2020). Evidence has already proven that inadequate training and inconsistent nursing interpretation of the tool leads to the insufficient screening of newborns (Agana et al., 2020). The score assigned to an infant regarding their assessed NAS symptoms determines if the infant needs pharmacologic interventions, nonpharmacologic interventions, or no interventions at all (Agana et al., 2020; Cook et al., 2017; Parlaman et al., 2019; Timpson et al., 2018; Wachman et al., 2018).

The significance of proper assessment techniques not only benefits the infant's health outcomes, but it is also more cost-effective to treatments and length of stay (Gadomski et al., 2018). The FNAS, or NAS screening tool, was the most common tool utilized for scoring (Agana et al., 2020; Bogen et al., 2017; Clark, 2019; Gadomski et al., 2018; Timpson et al., 2018, & Wachman et al., 2018). The purpose of this project was to improve the surveillance of newborns at risk for NAS by providing an educational intervention and then performing a retrospective chart review comparing the rates of screening prior to the intervention to the rates of screening after the intervention.

Methodology

The data was collected from a retrospective review of the electronic medical records (EMRs) of infants born to mothers with risk factors present that could predispose their newborns to having neonatal abstinence syndrome (NAS). When mothers engage in certain activities, their infants are at risk for NAS, which is withdrawal from whatever controlled, illegal, or contraindicated substance while in utero. The focus of this study was to improve the care of newborns by increasing the nursery nurse's knowledge regarding neonatal abstinence syndrome (NAS) and therefore resulting in earlier identifications of infants at risk for developmental delays. There was no direct interaction between the project planner and the patients, only data collected from the electronic medical record (EMR). The newborns were only evaluated via their EMR to assess the influence the education had on the screening status of infants at risk for neonatal abstinence syndrome (NAS), resulting in minimal risk for participation in the project.

Design

The data for this project was obtained from electronic medical records (EMR) of all term

infants (>37 weeks) with documentation of a minimum of one symptom of NAS and not have a diagnosis of any additional medical conditions. The anticipated number of participants who would meet the inclusion criteria extracted from the EMR was 154. According to collaboration with Dr. Pahls, professional statistician, this was the total number of samples needed for appropriate data analysis. The data collection criteria had no discrimination according to genders, races, religions, or socioeconomic backgrounds.

Inclusion Criteria

Inclusion Criteria for the evaluation of participant EMRs to be included in the data collection were as follows:

1. Be at least 37 weeks gestation when born.
2. EMRs three months prior to the intervention and three months post intervention.
3. Must have had at least one correlating diagnosis from the following: maternal history of drug use, late prenatal care (after 16 weeks gestation), limited prenatal care (less than 4 visits), positive maternal drug screen on admission, active alcohol use during pregnancy, active tobacco use during pregnancy, maternal declination of drug testing, placental abruption, poor feeding, excessive sneezing, inconsolable cry, neonatal tremors, intrauterine growth restriction, generalized seizures, hyperthermia, and excoriation.
4. Had received regular feeds via bottle or breast.

Exclusion Criteria

Criteria for the exclusion of participant EMRs in the data collection were as follows:

1. Infants EMR data will be excluded if a diagnosis code is present: oxygen therapy, any

medications other than Vitamin K, Erythromycin, and Hepatitis B, IV therapy, phototherapy, and orogastric or nasogastric tube feedings.

The DNP student conducting the research determined inclusion and exclusion criteria for the newborn population by direct collaboration with the nurse informaticist and data collection continued within the three months period before and three-month period after the education implementation until sufficient samples were obtained. A step-by-step guide to the project plan went as follows:

Step One. After IRB approval, data collection began.

Step Two. A list of inclusion criteria was provided to medical records (or information technology department)

Step Three. The researcher reviewed the data obtained from each EMR provided by hospital nursing informaticist, to determine if inclusion criteria were met. All patient and provider identifiers were deleted. Only data needed to evaluate provider compliance with current guidelines were used.

Step Four. There was a numerical number assigned to each EMR that was used in this project. The EMR was assigned a number, used as an identifier, on the data collection process.

Step Five. The abstracted data used on the data collection sheet constituted the minimum necessary data needed to accomplish the goals of this study. This data collection process did not include any patient identifiers.

Step Six. The data collection process continued until an adequate sample was collected that meet the inclusion criteria within the three-month pre-intervention and three-month post-intervention time period.

Step Seven. After the data collection process was complete, the data collection sheets were destroyed.

Data Collection Instruments

After IRB approval was obtained from Maryville University, the data collection process began. The data collection was abstracted from a retrospective chart review of the EMR's. The raw numerical data was collected within the facility and compiled into an Excel spreadsheet to categorize the inclusion criteria. The researcher stored the list of EMRs that meet the inclusion criteria and the data collection sheet on a password-protected computer that was kept in a locked office belonging to the author of this project. Each EMR received a number on the data collection sheet.

Analysis Plan

This project aimed to identify an increase in NAS scoring after nursing education utilized quantitative statistics. The study was designed to test the difference in two different proportions. Those proportions were the rate of NAS screenings on at-risk infants done pre-education, compared to the rate of NAS screenings on at-risk infants done post-education. For hypothesis testing, an appropriate statistic was selected, and a level of significance was selected and then the computer calculated the probability that the null was true or not using SPSS software (Polit & Beck, 2020).

To determine how a cumulative distribution of a sample fit the theoretical cumulative distribution in the hypothesis, a Chi-square test was used (Tezel et al., 2021). The Chi-square test, in simplified terms, compares two ratios. For this project, however, the Z-test was used as it is a more specific version of the Chi-square test. The property of the Z-test is one-sided instead

of two-sided (Parkinson, 2013). This was an appropriate test because the author was only testing in one direction. With the improved confidence in NAS scoring, there was an anticipated increase in the rate of NAS screenings done on infants at risk for NAS. The expectation was that the ratio of the post-education data collection would be larger, and the Z-test would confirm or negate this through the use of the SPSS software. The formal data report was presented in an excel spreadsheet format.

Resources

For successful implementation of this project, a strong team was essential. The individuals that made up this team included the faculty of the graduate nursing department at Maryville University, the DNP students assigned project chair, Dr. Joanne Kern, and the university statistician, Dr. Mark Pahls. The Maryville University IRB played an influential role in the oversight of the project to ensure patient and participant safety. For initial approval for project implementation, the hospital's chief nursing officer (CNO) as well as the hospital's education coordinator were presented with the plan for quality improvement that the project set out to accomplish. Both parties gave their full support, including a written letter from the hospital CNO. In order to ensure department buy-in, the student recruited support from the Women's and Children's department director and the unit supervisor who both participated as selected community members for the project. The hospital nursing informaticist was an integral part of the project planning in providing methods for safe and compliant data collection methods. After support was achieved from the unit's administration, the student set out to deliver the project focus and goals to the pediatricians and obstetricians who provide care to the patients in

the department selected for project implementation. Once a strong support was achieved, the education was provided to the departments nursing staff.

Budget

For this project, the budget was defined in Table 1. The support of this project was funded by the Doctor of Nursing Practice (DNP) student. All items within the budget were priced at the closest office supply retail chain within the city where the project was conducted (Staples, 2021).

Table 1

DNP Project budget

Budget Item	Number of Items	Cost per Item	Total Cost	Reference for Cost
Paper (HP Bright White) 24 8 ½ x 11 Color Copy Paper, 24lbs, 100 Brightness	2	\$12.49	\$24.98	(Staples, n. d.)
Gift Card Pasta Grill Italian Restaurant	1	\$30.00	\$30.00	N/A
Gift Card Midtown Coffee	2	\$10.00	\$20.00	N/A
Ink (HP 63XL Black High Yield Ink Cartridge) for printing materials.	1	\$39.89	\$39.89	(Staples, n. d.)
Page Protectors (Avery Easy Load Heavyweight Non-Glare Sheet	1	\$43.99	\$43.99	(Staples, n. d.)

Protectors, 8.5" x 11", Clear, 200/Box)				
4-inch Binder (Staples Heavy Duty 4" 3-Ring View Binder with D-Rings and Four Interior Pockets, Black)	1	\$15.99	\$15.99	(Staples, n. d.)
TOTAL COST: \$174.85				

Other expenses were absorbed by the facility agreeing to project completion as a means of quality improvement. Some of these expenses included the cost of training the staff. This was conducted at the monthly staff meeting, so no additional cost was incurred for training. The meetings and consultations were coordinated with work schedules and did not require additional trips to the facility. The capital, including office, computer, electricity, and rent, were available within the facility of project implementation as well. The laptop computer and software that was utilized, Excel and SPSS, have already been purchased by the DNP student for the program. The statistical analysis was utilized by a statistician who is on retainer by the graduate nursing program at Maryville University and therefore did not require any additional funding besides the student's tuition and fees.

Timeline

The timeline for this quality improvement project was nine months. Once IRB approval was obtained, there was a three-month period of data collection to evaluate the post-intervention outcomes. IRB approval was also the point at which the three-month retrospective review was done to evaluate pre-intervention outcomes. The start date for data collection was mid-

November. The completion date of all data collected was March 1, 2022. The final report was completed prior to August of 2022.

Protection of Human Subjects

There were no anticipated physical, psychological, social/economic, or legal risks that resulted from participation in this research. The only possible risk included a breach in confidentiality through data collection, but this risk was minimal, and there was constant oversight by the hospital nurse informatic specialist as well as a plan in place to de- identify all data collected. Each chart identified was assigned a numerical representation that does not use any personal identification information. The list was locked in the researcher's office. The researcher was to be only allowed to audit charts under hospital supervision within the hospital. Passwords to access the charts were provided by the information technology (IT) department. Once data collection was complete, the passwords expired, and access was no longer possible. The abstracted data was organized without personal identifiers and presented to the Maryville University statistician for a collaborated analysis.

Conclusion

This quality improvement project aimed to achieve earlier identification of NAS in infants. For the successful implementation of a quality improvement project, a strong team is essential. The author assembled a team of experts in their various fields that provided assistance, guidance, and oversight throughout this project. A retrospective chart review was the methodology that was carried out. This quality improvement project employed a quantitative, exploratory study design with the aid of a retrospective chart review. Inclusion and exclusion criteria were specified, and the statistical plan was established. Once the analysis was completed,

a successful outcome of improved NAS scoring was achieved.

Chapter Four: Data Results and Analysis

Through nursing education, the main purpose of this project was to improve NAS screening rates for infants with risk factors in the newborn nursery at the designated facility. The implied intent was to improve childhood outcomes through recognition of NAS, which can lead to earlier interventions for delays identified in the primary care setting. The project hypothesized that through nursing education, there would be an increase in appropriate NAS screening in the newborn nursery for infants with identified risk factors.

The project was a quality improvement project. The comparative design was developed around an education intervention provided to the nursing staff. Once the education was provided, a retrospective chart audit was performed. The risk factors for NAS were organized by diagnosis code. In collaboration with the nurse informaticist, a search was performed within the date range that began three months prior to the education intervention and ended three months after the education intervention. The infants with correlating diagnosis codes were audited for the presence of a neonatal abstinence screening assessment tool on their chart worklist. The charts pulled within the date ranges and correlating diagnosis codes were placed in the pre-education category and post-education category and were designated NAS screen done vs. no NAS screen done. The purpose of this method was to compare the NAS scoring pre-education to a hypothesized improvement in NAS scoring after the education delivery. The question guiding this project was as follows: In nurses delivering patient care to newborns in the Women's and Children's department of a local community hospital, would an education intervention to address the appropriate initiation and use of the neonatal abstinence syndrome (NAS) screening tool compared to a specific time period prior to the education result in an increase in the appropriate

and timely use of the tool in a specified time period after the education was provided and therefore identify more infants at risk for NAS?

Methods of Evaluation

The first step in the process was to obtain approval from the internal review board (IRB) within the facility where this project was set to take place. After communication with the education coordinator and the chief nursing officer (CNO), the project coordinator was informed that the acute care facility did not have an official IRB. In the place of IRB approval, an official letter of approval was received from the CNO of the hospital granting permission as well as support for the proposed project aimed at improved patient outcomes. Later in the process, official university IRB approval was obtained. This project was designated as exempt Category IV due to the absence of interaction with human subjects and regulations outlined by the university IRB. Once permission was granted from the facility, the education was provided to the nursing staff on the Women's and Children's unit regarding the appropriate use of the neonatal abstinence syndrome (NAS) screening tool. The education was based on current evidence-based practice and with the design of the study including a retrospective chart review, approval of the university IRB was not obtained prior to the education delivery model. Once the university IRB approval was formally obtained and the specified time frame post-education had passed, the chart review was initiated. The ethical considerations included protecting patient privacy through collaboration with the hospital nurse informaticist. No informed consent was required for the retrospective chart audit because there was no direct interaction with patients. The data collected was deidentified giving each patient a strategic numerical identifier that did not include any identifiable patient data. The data that was collected by hand on a pre-printed table that

organized patients as pre-education, post-education and had columns for selection including risk factors for NAS that were initially discussed in the IRB application. The risk factor ICD-10 codes, along with the date ranges of two months prior to the education intervention and two months after the education intervention were used as search criteria by the nurse informaticist. Reports of this search criteria was downloaded onto a USB thumb drive that the project director was able to go through and evaluate for inclusion criteria under the supervision of the nurse informaticist. This thumb drive was returned to the nurse informaticist at the end of the data collection day and did not leave the department within the facility. All data was evaluated while in the health informatics department located in the basement of the hospital. All data was deidentified by assigning a numerical value to each patient and categorizing as pre-education or post-education, selecting which risk factor was present, and then sorting them according to NAS screen done or not done. The initial sample size was less than the desired amount for project validity. After a discussion with the nurse informaticist and a meeting with DNP Chair, it was decided that an amendment to the original IRB approval would be sought. One of the barriers to data collection is the absence of documented risk factors in infant charts. The nurse informaticist discovered that the documented risk factors were often located in the physician note within social services consult order. The IRB amendment was submitted to include social services consult search as well as an additional month pre-educational and post-education. This amendment was approved, and the new search criteria included three months prior to the education and three months after the education intervention delivery.

The projects outcomes were evaluated by a retrospective archival data collection from the Meditech electronic medical record with full collaboration and supervision from the hospital

nurse informaticist. There was a total of 70 infant charts evaluated based on the presence of risk factors. There were several who were eliminated based on previously determined exclusion criteria. All infants who were excluded were because of a gestational age of less than 37 weeks at the time of risk factor documentation. If no exclusion criteria were listed, the infants with risk factors within the predetermined time frame were collected and categorized as pre-education or post-education and as NAS done or NAS not done.

Validity and Reliability

Triangulation is one research method strategy that uses multiple sources to ensure the study outcomes are as comprehensive and accurate as possible (Moon, 2019). The validity and reliability of the data collection was ensured through data source triangulation. Not only were the diagnosis codes for risk factors searched within the electronic medical records for mothers and infants within the specified time frame of the study, but the social services consultation orders were also evaluated for any documentation for a history of maternal drug use. The initial data collection showed an inconsistency in documentation for NAS risk factors but through collaboration with nurse informaticist, it was discovered that all mothers with a known history of drug use had a social services consult ordered by the physician along with a note describing why the consult was being ordered. This allowed for a more reliable sample of infants with NAS risk factors during the second day of data collection. The evidence of validity should be obtained within the context of what data is being studied, therefore the measure of how many infants had documented risk factors also had a documented NAS screening present within their EMR were evaluated (Lenz et al., 2010). The EMR at this facility has an NAS screening tool built into it but the nurses must go into the record and add it to the infant's worklist. Any time a NAS is

completed, it is available to view on the infant's worklist. While most pediatricians documented that NAS scoring was being evaluated in their progress notes, the worklists were always evaluated for the presence of an NAS screening to ensure validity of the study.

Quality

The quality of the data was ensured by having two separate individuals collaborate for appropriate inclusion in the data collection. The nurse informaticist collected the initial data set and the project planner went through each collected chart to evaluate for appropriateness of study inclusion. Data was transcribed independently by the researcher. The original transcription included a predesigned table where data was hand recorded. The sections included Population, Intervention, Risk Factors and Evaluation. Each of these was divided into subcategories including "Identification" under population where each chart was given a numerical value that was unidentifiable to the patient identification. "Pre-Education" and "Post-Education" columns were located under the intervention section. A "NAS Screening Initiated" column was the only column under the evaluation heading. The risk factors were subdivided into columns to select for each chart evaluated. Those columns included the following:

1. Drug screen ordered on mother
2. Drug screen ordered on infant
3. Mother positive for drugs during pregnancy
4. Maternal admitted drug use
5. Maternal smoker
6. Limited prenatal care
7. No prenatal care

8. Suspected drug use based on infant
9. Social services consult ordered for mother
10. Social services consult ordered for infant

This data was collected by hand into the predesigned table. Once data was collected over two separate occasions in the health informatics department of the hospital under supervision of the nurse informaticist, the data was then condensed into an excel document. This document determined pre-education, post-education, risk factor, and NAS initiated. Ultimately, the second tier of data consolidation streamlined the information. From here the data was then tallied by hand and presented to the collaborative statistician. The data was presented in this consolidated excel document as well as in raw fraction form. The total number of charts evaluated pre-education that had risk factors present with NAS screening completed compared to the number of charts evaluated post-education that had risk factors present with NAS screening completed. This nominal data was run through SPSS software in the form of a z-test to determine whether the distribution of the test statistics could be approximated by a normal distribution. The sample size for a z-test must be at least 30 or greater and the data collected included 66 samples therefore the appropriate test added to the quality of the study results.

Ethics of Implementation

The initial project design was discussed with the chief nursing officer, hospital nurse educator, unit director, unit managers and physicians to ensure that there were no ethical issues present that had not been identified by the project designer. After full hospital approval, the university IRB application was submitted as exempt status due to no patient interaction and this application was approved. This study consisted of a retrospective chart review. Another way the

ethical compliance was followed was through the collaboration with the nurse informaticist. This member of the research team collected files based on dates and inclusion criteria therefore researcher was not blindly searching through all available patients in the hospital EMR. This search was completed in the health informatics department under direct supervision. The data collected by hand was de-identified by assigning a numerical value to each chart that was not associated with any patient identifiers. This data table was kept locked in a file cabinet after collection and only retrieved for data analysis. There were no identified conflicts of interest in the data collection process.

Data Analysis

This project evaluating the effectiveness of an educational intervention as a means of improving the usage of the NAS screening tool utilized the SPSS software for statistical analysis. In addition to the software, consultation and collaboration was carried out with Dr. Mark Pahls, the program statistician at Maryville University. Besides previously discussed data that was not considered in project results related to specified exclusion criteria, all data was utilized. This quality improvement project used a comparative quantitative research method to determine statistical significance for the intervention provided in evaluating pre-intervention data with post-intervention data. The data was collected from the electronic medical record (EMR) within the facility. The search criteria were first narrowed down into the patient type, specifically patients in the newborn nursery (NBN) and then by specific date ranges of two months prior to the intervention and two months post intervention. After initial data collection, the data collector did not have the desired number of samples so an amendment to the internal review board (IRB) application was obtained and therefore the search criteria were expanded to include three months

prior to the intervention and three months post intervention. The charts were then searched for the presence of a risk factor that had been specified in the inclusion criteria. When a NBN chart within the date ranges had a risk factor present, then the patient worklist was evaluated for the initiation of the NAS screening tool. All data was collected retrospectively under the supervision of the hospital informaticist.

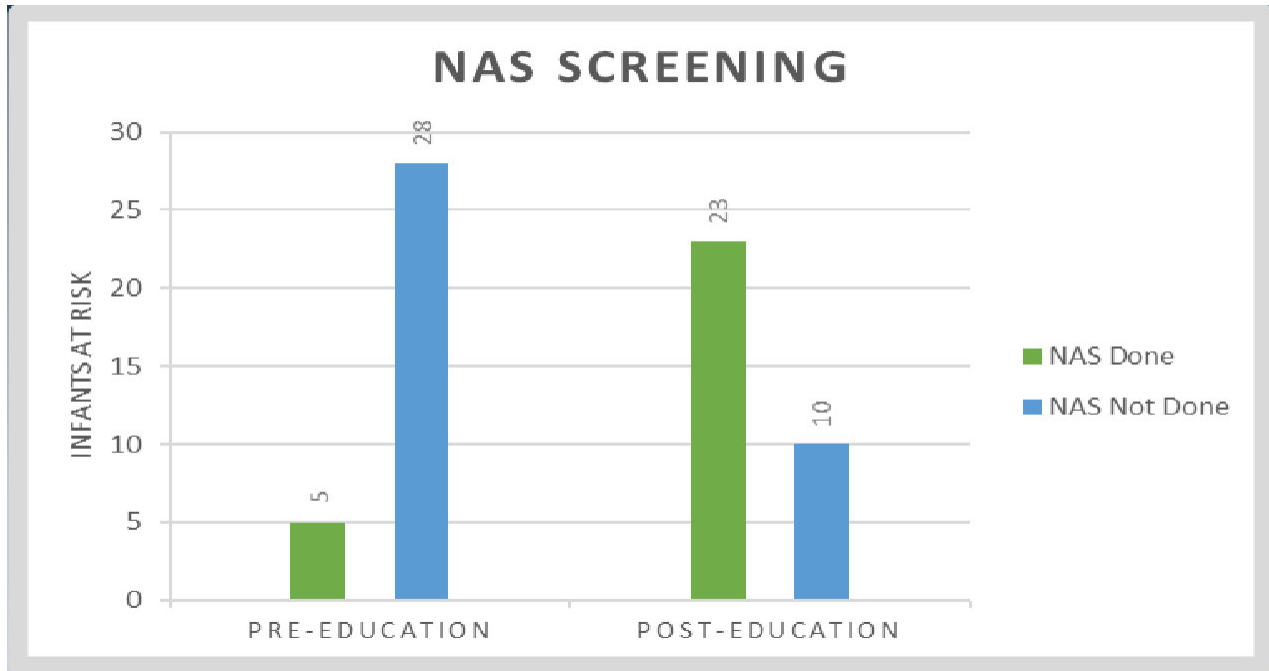
Quantitative Methods and Outcomes

Manually collected data from the EMR was carried out by the project planner with the assistance of the hospital informaticist. Reports were ran within the EMR to collect any newborns with ICD-10 codes correlating with specified risk factors for NAS. These charts were collected into a PDF file format. From this file, charts were able to be reviewed within the EMR for the specific risk factor and the presence or absence of an NAS screen. Data was originally collected by hand into a preformatted table. This data was then simplified into pre-intervention and post-intervention data. Data was presented to Dr. Pahls and discussed thoroughly. Data was synthesized using SPSS and the Z-test method. This method evaluates the relationship of two proportions when a specific relationship is suspected in the outcome. The ratio of NAS screenings completed on infants with risk factors pre-intervention was statistically compared to the ratio of NAS screenings completed on infants with risk factors post-intervention as presented.

Table 2

EMR Findings

	Pre-Intervention N=33	Post-Intervention N=33
NAS Screen Initiated	5	23
No NAS Screen Done	28	10

Figure 1*Comparison of EMR Data***Outcomes**

A sample size of at least 30 was needed for successful Z-test analysis. The total sample exceeded the required minimum number of samples and the total collected was 66. The exact same number was collected in the pre-intervention group compared to the post-intervention group, 33 in each. The pre-intervention sample size was $N=33$ with $n=5$, resulting in a proportion of 0.15. The post intervention sample size was $N=33$ with $n=23$, resulting in a proportion of 0.70. The average proportion of the study is 0.42 with a $z=4.48$. The p-value of less than 0.0001 is less than the level of significance of 0.05.

Variable of Time

The data outcomes give significant information to suggest an increase in the ratio from pre-intervention to post-intervention. The confidence interval estimation of the difference in the

two proportions was 95%. This confidence interval suggested the true change in ratio from pre-intervention to post-intervention, thus concluding there was significant evidence to show a change in one direction. The overall power of the study was 0.9999 which is considered statistically strong. **Table 3**

Data Input for Lower Tail Z Test for the Difference of Two Proportions

Hypothesized Difference	0
Level of Significance	0.05
Post Intervention ber of Items of Interest	23
Sample Size	33
Post Intervention Number of Items of Interest	5
Sample Size	33

Table 4

Calculations for Z Test

Group 1 Proportion	0.696969697
Group 2 Proportion	0.151515152
Difference in Two Proportions	0.545454545
Average Proportion	0.4242
Z Test Statistic	4.4831
Upper Tail Test	
Upper Critical Value	1.6449
p-Value	0.0000
Confidence Level	95%
Z Value	-1.9600
Std. Error of the Diff. between two Proportions	0.1015
Interval Half Width	0.1989
Confidence Interval	
Interval Lower Limit	0.3466
Interval Upper Limit	0.7443

Note: The confidence interval suggests the true change in ratio from pre to post intervention. Since zero is not included with the interval, we have significant evidence to show a change in one direction.

Table 5

Z test-Proportions: Difference Between Two Independent Proportions

Analysis:	Post hoc: Compute achieved power	
Input:	Tail(s)	One
	Proportion p2	0.69697
	Proportion p1	0.151515
	a err prob	0.05
	Sample size group 1	33
	Sample size group 2	33
Output:	Critical z	1.644854
	Power (1-B err prob)	0.999667

Results

The study was conducted in a 20 bed Level II nursery within a regional medical center that serves a city of approximately 29,000 along with multiple outlying communities. The hospital is privately owned by a hospital management company and is a for-profit facility. Within the community, substance abuse is on the rise and the effects of this epidemic are becoming evident in the nursery setting. While this community has a growing substance abuse problem, there are limited resources available in both the criminal and rehabilitation fields. Because of the lack of community and medical resources, it is becoming increasingly apparent that this issue is being overlooked instead of being addressed in the maternal and newborn hospital setting. The vulnerable newborn population has been falling through the cracks with inconsistent surveillance and undereducated nursing staff regarding Neonatal Abstinence

Syndrome. This small, controlled environment was the ideal size for a quality improvement project that aims to improve surveillance based on the presence of risk factors. With support from department stakeholders, an education intervention was developed with two in-person learning opportunities, an online on-demand learning opportunity, as well as the development of a screening manual to keep in the nursery as a permanent reference. According to current clinical practice guidelines, infants with maternal risk factors should be screened even if no confirmation of positive maternal or neonatal drug screen is present. Through familiarity with these clinical practice guidelines, it became apparent to the project planner that the nursing staff was not fully aware of not only the risk factors that could implicate an infant having NAS, but also some of the more subtle signs of NAS that when observed, could warrant a screen at any time during the infant's hospitalization.

An education intervention was developed for all staff in the women's and children's department. The idea behind incorporating additional staff beyond those in the newborn nursery, is the significance of communication among the healthcare team. When a nurse in labor and delivery observes a potential risk factor, they can alert the nursery so that initiation of the NAS is not delayed at birth. Likewise, when a post-partum nurse observes a mother sneaking off the floor to go smoke and no other member of the healthcare team knew there was a maternal history of tobacco use, they again can alert the nursery staff to initiate an NAS screen on the infant. Quality measures for this project aimed to improve the staff's knowledge of NAS, identifiable risk factors, how to screen for NAS, and how to report positive findings from the NAS screen. The goal for implementation of this intervention is to improve the rates of NAS screening in the newborn nursery.

Intervention

The department that the quality improvement was designed for holds a monthly staff meeting where each employee is required to attend at one of the three options available, the day shift meeting, the night shift meeting, or the streamed meeting on the units private Facebook page. Each staff member must sign a form stating they attended one of the three meetings and that they are responsible for the information provided in the meeting. This was the best opportunity to reach all staff in a limited time frame. The education began with introducing NAS and the process for screening infants for withdrawal. The risk factors for NAS were presented with full explanation on what warrants a screen as displayed in Figure 2. The actual signs of NAS were discussed and some of the symptoms were differentiated from normal newborn findings to give the entire group a continuity in their assessment techniques displayed in Figure 3. There are a variety of experience levels among the staff in the department, so the concept of neonatal withdrawal was reviewed. The diagram in Figure 4 was provided as a decision tree for all staff regardless of their level of experience. Lastly, the intervention itself was discussed. The NAS screening tool is already built into the hospital EMR. Any time there is an initial risk factor identified, the tool must be added to the worklist by the nurse caring for the infant. Once the tool is added to the worklist, the EMR prompts nursing staff to assess for NAS every 4 hours. The paper version was also used as a teaching tool for the education intervention to show the actual scoring techniques for an NAS assessment as seen in Figure 5.

Figure 2*Risk factors from education intervention*

Maternal history of drug use.	Active tobacco use during pregnancy
Late prenatal care (after 16 weeks gestation).	Maternal declination of drug testing
Limited prenatal care (less than 4 visits).	Placental abruption
Positive maternal drug screen on admission.	Intrauterine Growth Restriction (IUGR)
Active alcohol use during pregnancy	

Figure 3*NAS Symptoms from education intervention*

CNS	Metabolic/ Vasomotor/ Respiratory	Gastrointestinal
Excessive or high pitch cry	Diaphoresis (sweating)	Vomiting
Tremor	Nasal stuffiness	Diarrhea
Increased tone	Fever	Dehydration
Frequent yawning	Mottling	Poor weight gain
Sneezing	Temperature instability	Poor feeding
Seizures	Tachypnea	Uncoordinated and/or constant sucking
Excoriation		

Figure 4

Decision tree from education intervention

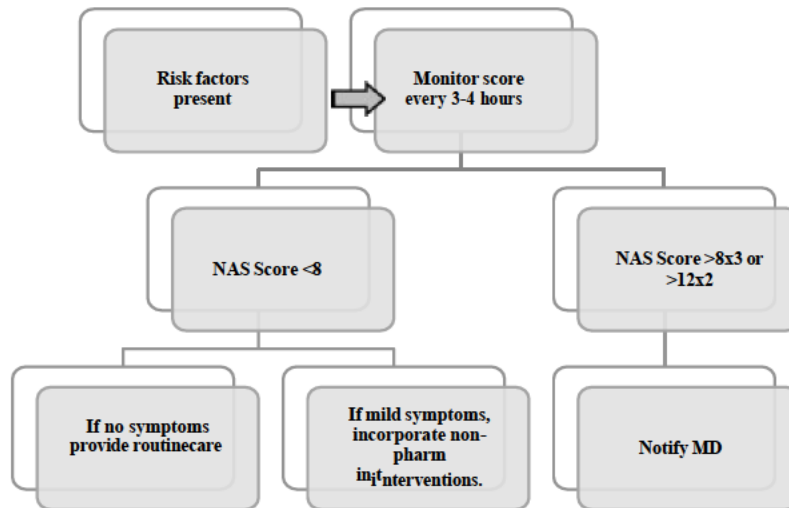


Figure 5

NAS scoring tool from education intervention

MRN	NAME	DOB							
SIGNS Observations from past 3-4 hours. Start new scoring sheet each calendar day.		Birth Weight: _____ grams (x 90% = _____ grams) Daily Weight: _____ grams							
DATE:	SCORE	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
High pitched cry: inconsolable >15 sec. OR intermittently for <5 min.	2								
High pitched cry: inconsolable >15 sec. AND intermittently for ≥5 min.	3								
Sleeps <1 hour after feeding	3								
Sleeps <2 hours after feeding	2								
Sleeps <3 hours after feeding	1								
Hyperactive Moro	1								
Markedly hyperactive Moro	2								
Mild tremors: disturbed	1								
Moderate-severe tremors: disturbed	2								
Mild tremors: undisturbed	1								
Moderate-severe tremors: undisturbed	2								
Increased muscle tone	1-2								
Excoriation (indicate specific area): _____	1-2								
Generalized seizure	8								
Fever ≥37.2°C (99°F)	1								
Frequent yawning (≥4 in an interval)	1								
Sweating	1								
Nasal stuffiness	1								
Sneezing (≥4 in an interval)	1								
Tachypnea (rate >60/min.)	2								
Poor feeding	2								
Vomiting (or regurgitation)	2								
Loose stools	2								
<90% of birth weight	2								
Excessive irritability	1-3								
Total score									
Initials of scorer									

Printed Name	Signature/Title	Initials	Printed Name	Signature/Title	Initials

Change Implementation

With the development of this project, the project planner had the intention to promote policy change within the department by identifying infants through NAS screening that were overlooked prior to the quality improvement intervention. Through collaboration with unit stakeholders and Maryville faculty, the decision was made to focus on improving screening rates initially and let the results of the project spur policy development upon completion. The

department management was fully supportive of the project but adopting change was not historically characteristic of this unit's culture. Because the newer management in the department were exemplar change agents, their enthusiasm and display of urgency toward this project attributed to the staff accepting the introduced change for the betterment of their patients. The process of the change introduced through this project is detailed in Table 5 and gives the timeline for the progression and evolution of the project plan.

Table 6

Timeline of DNP Project

March-May 2021:	Narrowing of project topic Chapter 1 Phenomenon of Interest
May-Aug 2021:	Chapter 2
Aug-Dec 2021:	IRB Approval Education Intervention
Jan-May 2022:	Chapter 3 Retrospective Data Collection
May-June 2022:	Chapter 4
June-August 2022:	Chapter 5

Upon completion of Chapter 4, the statistical analysis, showing the success of the project outcomes, will be presented to the women's and children's department. This step falls into the sixth step in Kotter's Change Model and presents the short-term win in the form of successful implementation of increasing NAS screening rates (Kotter, 2012). Once the DNP program is completed in its entirety, Chapters 1-5 will be presented to the unit in the hopes of building on the change. Once this success has been relayed to the staff, the final step of Kotter's Change Model is to anchor the change in the culture. The anticipated cultural shift is in the development

of an official NAS screening policy based on the clinical practice guidelines, quality improvement measures and statistical analysis within this successful DNP project.

Barriers and Facilitators

The unintended consequences of this project identified the lack of documentation within the electronic medical records of mothers with significant risk factors. The original data collection resulted in fewer samples than expected. After deliberation and discussion with the nurse informaticist, it was discovered that the majority of the mothers with risk factors such as previous drug history or suspected drug use were consistently being referred to social services. There was no other evidence in their chart for this substantial information except in the note for the social services consult. This was taken back to the IRB for full approval to incorporate the use of the social services order as part of the search criteria.

The main limitation of the study was the smaller than anticipated sample size. Due to this finding, a request was made to the IRB to expand the date ranges for the retrospective chart review. Once the dates were expanded, an adequate number of samples were obtained, but still not as many as the project planner had originally anticipated through collaboration with the Maryville statistician. Besides the inadequate documentation of risk factors and a smaller than expected sample size, the project had no significant barriers to successful implementation.

Summary

The purpose of this study was to increase Neonatal Abstinence Screening in the newborn nursery for all infants with identified risk factors. The intervention for this study consisted of the multimodal delivery of NAS education to the nursing staff within the women's and children's department at the site facility. After the education delivery, a retrospective chart review was

conducted to compare the screening rates pre-education as compared to screening rates post-education to evaluate the effectiveness of the education intervention. Outcomes were evaluated in the three months prior to the education and three months post-education by searching Meditech, the hospital specific electronic medical record. Statistical significance was discovered within the data collected through an observation of a 55% increase in screening infants with risk factors after the education intervention was delivered.

The study showed statistical strength in that the number of samples collected were appropriate for the type of test performed. The test resulted in a true one directional change which is the purpose of the z test method of analysis. With the significance in the increase in NAS screening rates post-education to pre-education, and a significant power analysis, this study showed evidence of a true change.

The outcomes of this study show an increase in NAS screening for infants with risk factors post-education intervention with correlating statistical significance. Throughout the data collection process, barriers, limitations, facilitators, and strengths were identified. The selected study time frame, access to hospital resources by the researcher through employment, and seamless collaboration with hospital nurse informaticist played a role in the outcomes of this study. Implications for practice, policy development, and recommendations to improve the intervention have also become evident. These topics will be discussed further in the next chapter.

Chapter Five: Discussion

The implementation and retrospective chart review of this quality improvement project took place between August 17, 2021, and February 17, 2021. The design was developed due to an observation of poor compliance in neonatal abstinence screening on infants in the newborn nursery. There were previously no formal guidelines in place that specified exactly what risk factors need to be screened for neonatal abstinence syndrome (NAS), how to screen and what the significance of screening is for each infant. This project aimed at earlier identification of NAS through education on the NAS screening process for all staff in the women's and children's department at a regional medical center in Russellville, AR.

Interpretation of Findings

The project itself was designed around answering the question "In infants at risk for neonatal abstinence syndrome (NAS), will an educational intervention increase screening of infants with NAS risk factors three months post intervention, compared to the rates of infants with risk factors screened before the intervention. When these infants are identified early, timely interventions and referrals can be put in place in order to eliminate or slow the progression or any delays that may be the result of NAS related to maternal substance abuse during pregnancy.

The results of the study show the true disparity that was present prior to the education intervention with the knowledge base of the nursing staff on the importance of NAS screening and how policy directly impacted the NAS screening rates. The results of this study were similar to those in the literature review that identified both knowledge and confidence deficits with nurses performing the NAS screening. Nurse education is crucial for assessment skills and knowledge of interventions relating to the NAS diagnosis and access to education material

increases screening accuracy and consistency (Adrian et al., 2020). One project showed that the nurses who participated agreed that education on NAS assessment improved their ability to identify and accurately assess NAS symptoms in neonates (Cook et al., 2017). In alignment with what was found in the review of literature, proper education was delivered, and a significant increase was observed in the screening rates for neonatal abstinence syndrome during this project.

In contrast, this study did not incorporate a formal survey to assess specific barriers to proper screening such as the paper survey used to survey neonatal intensive care nurses and newborn nursery staff where the nurses were given a NAS screening tool asked to identify the five most difficult areas to score on the screening tool (Timpson et al., 2018). Another study used the qualitative method to survey nurses using open ended questions to evaluate their perceptions and help to identify barriers that prevent consistent and accurate screening (Adrian et al., 2020). A study that used simulation as an educational tool focused on NAS screening education surveyed the nurses after the intervention to evaluate their perceived comfort and competency after participating in the intervention (Agana et al., 2020). This project instead addressed the barriers from the literature review in the education intervention. The results were an increase in screening therefore a direct correlation was made between the barriers identified in the literature review and this project.

The strengths of this project included the facilities enthusiasm and support of the project. There was an immediate backing from hospital management as well as department management and this helped to solidify the buy in from the nursing staff on the importance of the outcomes of this project. Not only was the leadership in full support, but the information technology

department was also engaging and eager to assist with this quality improvement measure through the data collection process. The most important strength of this project was the working relationship the project planner had with the facility and staff as a nurse currently working on the unit. This gave the planner firsthand knowledge of the current screening barriers as well as the most personable way to go about education delivery. The planner was not an outsider and therefore had credibility with the staff which allowed for unit investment in the project from the start.

Study Limitations

This project had a positive outcome in improving the NAS screening rates of infants in the newborn nursery but like any project, it had its share of imperfections as well. The limitations of the study included the physician documentation which led to unidentified maternal risk factors which ultimately contributed to a smaller sample size than initially anticipated. Some of these limitations were addressed in the education as ways that staff could help identify undocumented risk factors, but there is no way to accurately evaluate how effective this was.

As far as generalizability of the project, this was a project that was simple yet effective and could easily be recreated at a wide array of facilities. This project did not have anything facility specific except leadership cooperation. This design could also be used for a variety of topics using an education intervention and pre-post evaluation of documentation.

The sustainability of the project is not a guarantee since the planner no longer works in the facility. While there was an initial celebration of short-term wins, there is currently little to no incentive to continue with diligent screening until a policy is put in place. The long-term goal

of this project was to contribute positive data for policy development and if that is successful, there will be guaranteed sustainability.

Post-Implementation Insights

The barriers to this project were the small sample size. This is more than likely related to the lack of proper documentation of maternal risk factors. One of the unintended findings of the project was the lack of physician acknowledgement of maternal substance abuse directly related to the lack of resources for those mothers and babies within this community.

The facilitators of this project included the NAS screening tool already being built into the hospital EMR. This prevented the project planner from having to work on the development of that tool within an existing EMR. Instead, the education included informing the staff how to initiate the tool within their shift worklist. Another facilitator was constant communication with the department management on how to best deliver the education for department buy in. Lastly the willingness of the nurse informaticist to assist with data collection made the biggest impact on the success of this project. Without safe and timely data collection, there would not be positive results to present.

Interpretation

Evaluation of results leads to an outcome identified as the knowledge deficit of nurses on the significance, use, and interpretation of the NAS screening tool. The observations prior to the project implementation were that there was inconsistency among the nurses. Some used the tool sparingly and others did not even know about the tool at all. Even when the NAS tool was initiated, it was underutilized. The tool was only used when there was a positive maternal drug screen on admission to the labor and delivery unit. Along with the inconsistency in using the

NAS tool, there was also an inconsistency in performing maternal drug screens upon admission. There are no specific parameters for who gets tested and who doesn't. The review of literature showed a much larger scope of maternal risk factors that could potentially lead to NAS in newborns. This project's focus was on the newborn population so the decision was made to provide education on the variety of maternal risk factors that could contribute to NAS in a newborn and how to initiate the NAS screening tool when any of those risk factors are present.

The comparable data collected showed an improvement in the use of the NAS screening tool after the education. There was a wider variety of maternal risk factors documented that prompted the initiation of the tool confirming the lack of knowledge about NAS prior to this project. While there was statistically significant improvement in screening rates, there is still a casual suspicion that the sample could have been larger if risk factors were documented appropriately.

For improvement of the outcomes in this project, there needs to be ongoing education on the NAS screening tool for nurses, but the most significant improvement newborn surveillance would be to improve the surveillance in the labor and delivery or even the prenatal period. If there was better documented communication between physicians and practitioners who saw these patients throughout their pregnancy and the hospital staff responsible for the safe delivery and transition to extrauterine life for the newborn, it is certain that newborn surveillance would continue to improve.

Implications

The implications to the project "Neonatal Abstinence Syndrome, Increasing Surveillance in Newborns" is incorporated in the title itself, surveillance. While the project focuses on the

initial surveillance in newborns as they are screened after birth, the long-term implications include continued surveillance. When an infant is identified to have NAS through proper screening, they are statistically at risk for developmental delays and learning disabilities (Agana et al., 2020). Before the implementation of this project, an informative session was held between the project planner and the hospital pediatricians. The long-term goal is to continue surveillance later into childhood. When a slight deficit is noticed in a child pediatric providers will often watch and wait if its early in the child's developmental stage. With a child who has had a known diagnosis of NAS or significant risk factors for NAS that may not have prompted a formal diagnosis, those kids can be referred for interventions at the first implication of a delay.

The facility where the project was carried out does not currently have a policy regarding NAS screening. With the positive statistical evidence of NAS screening improvement after the educational intervention, the hope of the project planner is that there is enough evidence to influence policy development for consistent NAS screening of newborns. An assessment was taken of multiple healthcare facilities and only 88% of them had written protocols in place regarding the management of NAS (Bogen et al., 2017). This project planner's official recommendation is that there needs to be a policy developed that finalizes the last step of Kotter's change model (Kotter, 2012). By implementing a policy, the intervention will officially establish permanence.

This project focused on quality improvement by offering an intervention and then evaluating the improvement in care after the intervention compared to before the intervention. There was a significant improvement. Going forward, the implications are to communicate the

findings within the statistical outcomes in hopes that the quality improvement can continue in the direction of practice implications that have been identified.

Recommendations & Conclusion

This project focused on increasing surveillance in newborns, so the most immediate recommendation is for policy development that ensures there is continued screening in place for infants at risk for neonatal abstinence syndrome. An NAS policy will provide consistency and permanence leading to long-term improvement in patient outcomes. Once a policy is developed, the next focus is on improved communication before and after the hospital admission for delivery of the newborn. The focus should shift to help identify risk factors earlier in the prenatal period through consistent maternal surveillance. The best form of treatment for NAS is prevention of maternal substance abuse, but if that is not possible early identification can help provide mothers with the resources needed to lessen the severity improving the outcomes of their newborns. That communication that is starting earlier needs to continue past the time of discharge and carry over into the outpatient pediatric setting. The providers within the community who care for those newborns as they develop throughout childhood need to be fully aware of the risk factors that impact that child in utero for better intervention delivery. The earlier interventions are provided to a child with identified deficits, the better their long-term outcomes will be as they grow and develop. The goal is happy, healthy children and that can start with identifying neonatal abstinence syndrome in the newborn nursery through proper screening techniques and knowing what to do next.

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