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Neonatal Abstinence Syndrome Nonpharmacological Intervention Education for Healthcare Professionals Caring for Newborns

Darby Harvey
Pittsburg State University, daldrich@gus.pittstate.edu

NEONATAL ABSTINENCE SYNDROME NONPHARMACOLOGICAL INTERVENTION EDUCATION FOR HEALTHCARE PROFESSIONALS CARING FOR NEWBORNS

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Darby Harvey

Pittsburg State University

Pittsburg, Kansas

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NEONATAL ABSTINENCE SYNDROME NONPHARMACOLOGICAL INTERVENTION EDUCATION FOR HEALTHCARE PROFESSIONALS CARING FOR NEWBRONS

An Abstract of the Scholarly Project by
Darby Harvey

Neonatal abstinence syndrome has increased significantly in the United States over the past few decades due to the increase of maternal substance abuse. The overall goal of caring for these infants is effective management of the withdrawal symptoms, including both pharmacological and nonpharmacological interventions. However, nonpharmacological interventions have been shown to improve infant outcomes and reduce length of hospitalization. This project sought to increase healthcare professionals' knowledge and confidence regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions when caring for infants diagnosed with neonatal abstinence syndrome through the provision of an educational presentation. This study utilized a one-group pretest-posttest design with healthcare professionals caring for newborns in a hospital setting. Healthcare professionals were recruited via convenience and snowball sampling through social media platforms. Participants' knowledge and confidence were measured before, after, and six-weeks following an educational presentation. According to the findings, the educational presentation improved healthcare professionals' knowledge and confidence regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions when caring for an infant diagnosed with neonatal abstinence syndrome. These findings determine that education can be beneficial for increasing healthcare professionals' knowledge and confidence regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions.

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CHAPTER I

Introduction

Over the past few decades the United States has been in the midst of an opioid epidemic. This epidemic has not discriminated and has significantly affected pregnant women, which has consequently caused an increase in infants being exposed to drugs in-utero. This epidemic has resulted in infants being born and going through withdrawal shortly after birth. This withdrawal is known as neonatal abstinence syndrome. "Neonatal Abstinence Syndrome (NAS) is the result of sudden discontinuation of fetal exposure to substances [legal or illegal] that were used or abused by the mother during her pregnancy" (Kocherlakota, 2014, p. e547). This post-withdrawal syndrome produces both behavioral and physiological signs and symptoms in the neonate, resulting in longer hospital stays and increased cost of care.

Infants born suffering from NAS are typically admitted to a hospital's Neonatal Intensive Care Unit for an extended period of time to reduce withdraw symptoms and stabilize the infant before discharge home. Treatment of NAS can include both pharmacological interventions, most commonly morphine (Kocherlakota, 2014, p. e554), and nonpharmacological interventions. However, "because of the complex nature of withdrawal […] there are currently no uniformly accepted pharmacological interventions or standardized regimens for the management of NAS" (Kocherlakota, 2014, p. e554).

Nonpharmacological interventions are less controversial, less expensive, and have the potential to reduce the average length of stay (Grossman, Berkwitt, Osborn, Xu, Esserman, Shapiro, & Bizzarro, 2017, p.e4).

Significance of Clinical Problem

As the United States faces an increase in the use of, and dependence on, controlled substances, especially opioids, the risk of infants being born with neonatal abstinence syndrome also increases. According to Chiang, Okoroh, Kasehagen, Garcia-Saavedra, and Ko (2019), the increase in NAS is attributed to the increase in maternal opioid use, including misuse of prescribed opioids, use of illicit opioids such as heroin, and the use of medication to help assist in the treatment of opioid use disorders such as methadone. In 2000, opioid use in pregnant women was 1.1 per 1000 hospital deliveries and has since increased to 6.5 per 1000 in 2014 (Chiang et al., 2019, p. 1193). "In the past 10 years, rates of newborns diagnosed with NAS have risen fivefold in the United States, from 1.5 per 1000 hospital births in 2004 to 8.0 in 2014" (Chiang, et al., 2019, p 1193) As the maternal use of opioids and illicit drugs continues to rise, the incidence of NAS will also continue to rise, leading to more infant hospitalizations in the Neonatal Intensive Care Unit, longer hospital stays for infants, and an increase in the cost of healthcare for these infants.

According to Kocherlakota (2014), infants that are born with exposure to opioids while in-utero and are consequently diagnosed with neonatal abstinence syndrome can exhibit an adverse and wide variety of symptoms affecting the autonomic nervous system, central nervous system, respiratory system, and the gastrointestinal system. NAS can present with many different signs and symptoms ranging from mild to severe. The

withdrawal symptoms that may manifest include, but are not limited to, “fever, sweating, tachypnea, tremors, poor eating, weight loss, seizures, crying […]” (Allen, Prunty, Babcock, Attarabeen, & Patel, 2018, p. 1750), excessive sneezing, excessive yawning, excessive sucking, vomiting, diarrhea, and excoriations throughout the body (Kocherlakota, 2014, p. e551- e552). Each symptom can manifest in varying degrees and extremes, or may not manifest at all. Depending on the severity of these symptoms, many infants require a prolonged and costly hospitalization in NICUs.

The average length of stay for infants suffering from NAS was “16 days and those requiring pharmacologic treatment had a mean length of stay of 23 days” (Patrick, Davis, Lehman, Cooper, 2015, p. 5) resulting in high healthcare costs. According to Corr and Hollenbeak (2017), the significant increase in NAS admissions has resulted in a large increase in annual healthcare costs. The annual healthcare related costs in 2003 for infants with NAS were $61 million with a total of 67,869 hospital days. In 2012, the annual costs had increased to $316 million with a total of 291,168 hospital days (Corr & Hollenbeak, 2017, p. 1593). In comparison to an infant not affected by NAS, hospital stays were three and a half times longer and cost three times more in infants suffering from NAS.

Significance to Nursing

Nurses working in the Neonatal Intensive Care Units (NICU) provide direct care to infants diagnosed with NAS. Patient assessments, administering medication treatment regimens, educating family, and providing support to both infants and the family are all tasks that nurses are at the forefront of providing. While caring for these infants does take a collaborative effort between neonatologists, neonatal nurse practitioners, occupational

therapists, physical therapists, speech therapists, social workers, and caregivers, nursing plays a pivotal role. Nurses provide not only bedside care including comforting, feeding, diaper changes, swaddling, and assessments but also care that extends past the bedside, including parent support and education. Unfortunately, care extending beyond the bedside also often includes legal matters that exist within the infant's case.

Neonatal abstinence syndrome symptoms and their severity depend on multiple factors, including: type of drug or drugs used, amount and frequency of drug/drugs used, gestation of infant at birth, and the trimester in which the drugs were used (Kocherlakota, 2014, p. e551). However, "because NAS is a syndrome, there is a wide range of signs that a neonate could display, and clinical assessment of these signs is not standardized across practices" (Chiang, et al, 2019, p. 1193).

The overall goal of caring for these infants is effective management of the withdrawal symptoms. Management can include both pharmacological and nonpharmacological treatment methods. According to Allen et al. (2018), "nonpharmacological therapy may reduce the length of hospitalization, minimizing medication therapy requirements and reduce risk associated with medication therapy in infants" (p. 1750).

Traditionally, neonates suffering from withdrawal are scored based on the presence and severity of withdrawal symptoms. These symptoms are scored based on a specific scoring tool, such as Finnegan Neonatal Abstinence Scoring Tool (FNAST), Lipsitz Neonatal Drug Withdrawal Scoring System, and Neonatal Withdrawal Inventory scoring system (NWI). The Finnegan scoring tool uses a 21-point item measuring symptoms, can be utilized for both opioid and non-opioid withdrawal assessments and

remains the most common tool utilized (Kocherlakota, 2014, p. e553). When utilizing the Finnegan Scoring Tool, symptoms should be scored every three to four hours while the infant is awake. Scoring should also take place after the infant has eaten, before an assessment, during an assessment, and directly following an assessment (Kocherlakota, 2014, p. e553). Treatment protocols may differ from institution to institution, but the higher the score leads to a higher incidence in pharmacological management rather than nonpharmacological interventions. However, the first line of treatment should always be nonpharmacological interventions. Examples of nonpharmacological interventions include comfort measures, tight swaddling with lightweight blankets, providing quiet environments, low lighting environments, massage, encouraging frequent uninterrupted rest periods, rocking, use of a swing, pacifier use, frequent feedings, caregiver rooming in, and if appropriate breastfeeding (Allen et al., 2018, p.1750; Kocherlakota, 2014, p. e553). As a healthcare professional caring for these infants, the role is to provide these nonpharmacological interventions to help the infant improve their symptoms in a more comfortable environment.

Recently, studies began identifying the importance of nonpharmacological interventions and their effects on infant outcomes and length of stay. “The first and foremost goal of NAS care should be to establish an organized protocol with a standardized scoring tool for NAS, as symptoms can be subjective. Nonpharmacological therapy should be included in the protocol” (Allen, et al., 2018, p. 1750). Nonpharmacological interventions are less controversial, less expensive, and can lead to earlier discharges from the hospital. According to Kocherlakota (2014),

“Nonpharmacological therapy is the first line in all cases [and] can be attempted in all infants before pharmacological therapy” (p. e553).

Specific Purpose

The purpose of this Doctor of Nursing Practice (DNP) Scholarly Project was to educate healthcare professionals caring for newborns diagnosed with Neonatal Abstinence Syndrome on nonpharmacological interventions. Pharmacological interventions can pose risks to the infant, while nonpharmacological interventions do not possess the same potential adverse effects. The introduction of nonpharmacological intervention education can aid in the standardization of treatment interventions for NAS infants. This education for healthcare professionals can also be utilized to help educate parents/family caregivers about the signs and symptoms of NAS and the appropriate interventions to help provide comfort to the infant before initiating pharmacological management.

Theoretical Framework

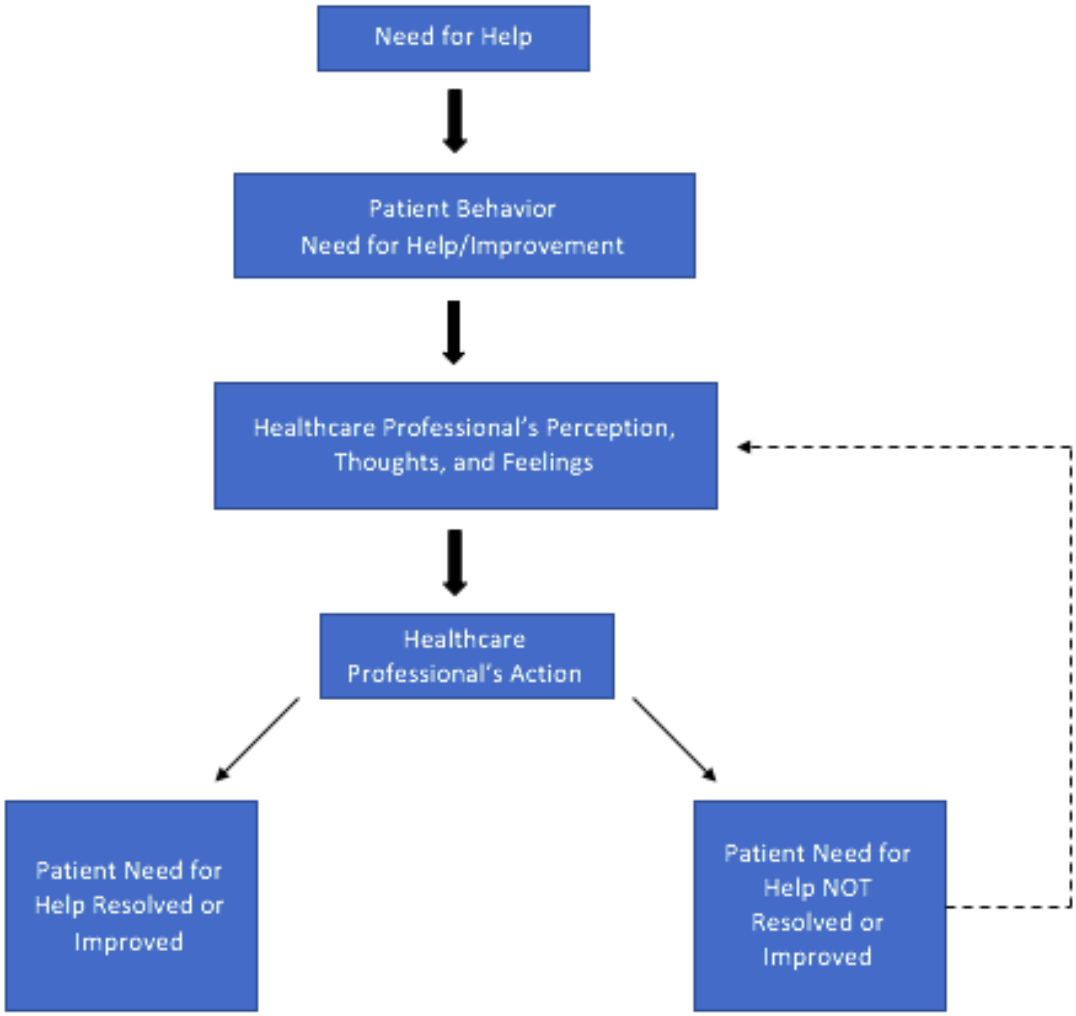
The theoretical framework chosen for this project is Orlando's Nursing Process Discipline Theory (Figure 1). This theory focuses on a patient’s needs. The healthcare professional’s role in this theory is to help discover and meet the immediate needs of the patient, which would result in a positive outcome (Petiprin, 2016, para. 3). Healthcare professionals must use their own intuition and critical thinking skills in order to discover and meet the needs of the patients. This theory "focuses on the interaction between the [healthcare professional] and patient, perception validation, and the use of the nursing process to produce positive outcomes or patient improvement" (Petiprin, 2016, para. 9).

The major assumptions from Orlando's Nursing Process Discipline Theory (Petiprin, 2016, para. 8) that apply to this project include:

- When patients are unable to cope with their needs on their own, they become distressed by feelings of helplessness.
- In its professional character, nursing adds to the distress of the patient.
- Patients are unique and individual in how they respond.
- Nursing offers mothering and nursing analogous to an adult who mothers and nurtures a child.
- The practice of nursing deals with people, environment, and health.
- Patients need help communicating their needs; they are uncomfortable and ambivalent about their dependency needs.
- The [healthcare professional-patient] situation is dynamic; actions and reactions are influenced by both the nurse and the patient.
- The patient is unable to state the nature and meaning of his or her distress without the help of the [healthcare professional], or without him or her first having established a helpful relationship with the patient.
- Any observation shared and observed with the patient is immediately helpful in ascertaining and meeting his or her need, or finding out that he or she is not in need at that time.
- [Healthcare professionals] are concerned with the needs the patient is unable to meet on his or her own.

Figure 1

Theoretical Framework Model



Note: Adapted from Orlando's Nursing Process Discipline Theory

Practice Questions

The following are the practice questions that the DNP Scholarly Project will address.

1. Prior to an educational offering, how frequently are healthcare professionals caring for newborns in the hospital setting completing a Finnegan Score on newborns born to women who tested positive for substances known to cause NAS?
2. Prior to an educational offering on the nonpharmacological management of NAS, which interventions are healthcare professionals caring for newborns in the hospital setting implementing?
3. Will implementation of nonpharmacological intervention education improve the knowledge of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?
4. Will implementation of nonpharmacological intervention education improve the confidence of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?

Definition of Key Terms

Key terms used throughout the DNP project are listed and defined below.

- Caregivers - The persons who will be caring for the infant diagnosed with NAS outside of the hospital setting.
- Finnegan Neonatal Abstinence Syndrome Scoring Tool (FNAST) - A scoring tool used to quantify the symptoms of Neonatal Abstinence

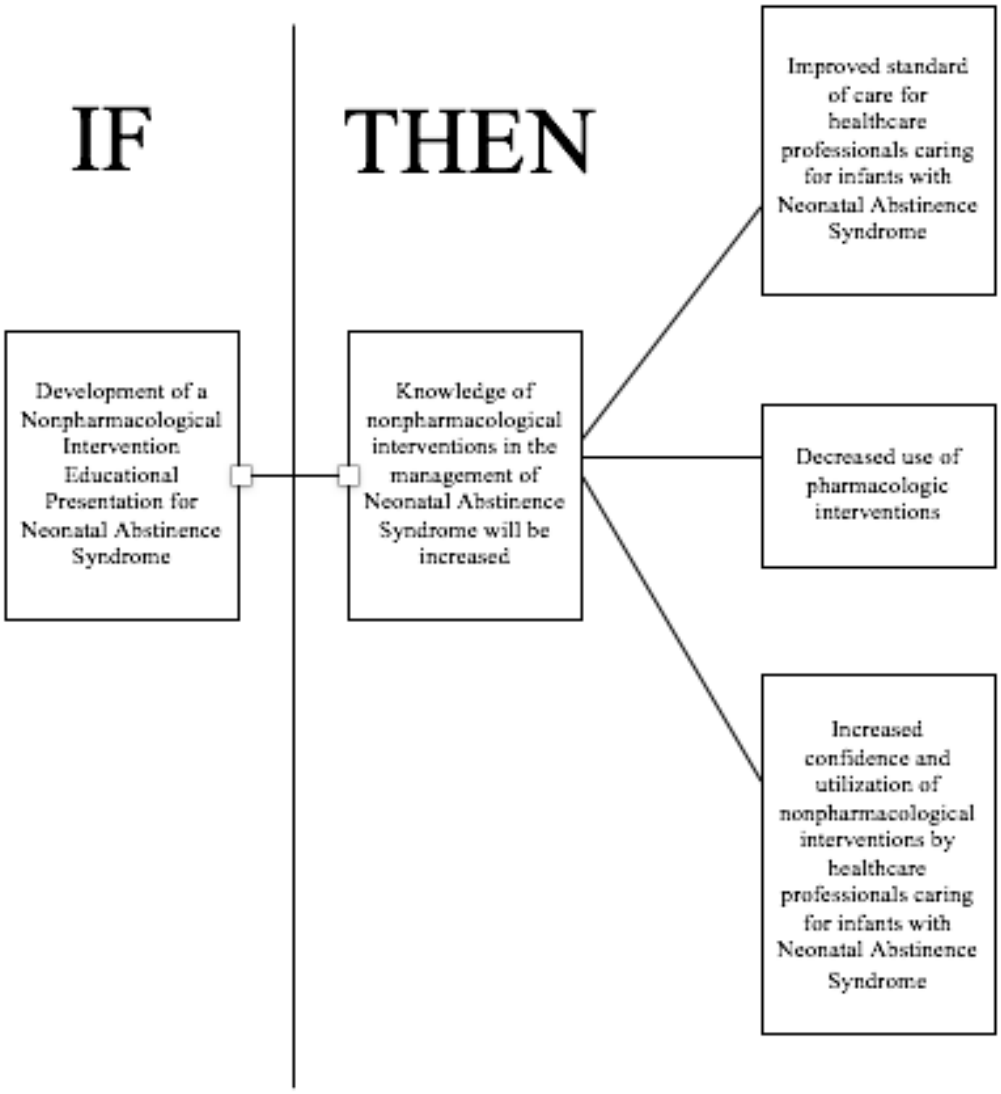
Syndrome. This tool helps to direct care towards nonpharmacological or pharmacological interventions.

- Healthcare Professionals - The persons who care for an infant diagnosed with NAS while admitted to an inpatient care facility, including certified nurse aids, registered nurses, lactation consultants, social workers, physician's assistants, nurse practitioners, and physicians.
- Neonatal Abstinence Syndrome - The result of sudden discontinuation of fetal exposure to substances, legal or illegal, that were used or abused by the mother during her pregnancy (Kocherlakota, 2014, p. e547).
- Neonatal Intensive Care Unit (NICU) - A unit within a hospital that specializes in the care of critically ill infants.
- Nonpharmacological Intervention Education - An educational presentation utilized by healthcare professionals and caregivers to help identify appropriate nonpharmacological interventions for infants with NAS.

Logic Model

Figure 2

Logic Model



Summary

Neonatal abstinence syndrome is a complex condition that affects infants who were exposed to legal and illegal substances in utero. The exposure to these substances results in withdrawal from the substance or substances. Potential symptoms that may be experienced include excessive sweating, fevers, high-pitched cry, poor feedings, tremors, excessive sucking, excessive sneezing, excessive yawning, and excoriations throughout the body.

Neonatal abstinence syndrome is an unfortunate consequence of the increasing opioid epidemic within the United States. The goal of this project is to offer alternative and effective treatment strategies for neonatal abstinence syndrome—through the introduction of education addressing nonpharmacological interventions that can help comfort the infant and manage symptoms that manifest during the withdrawal period. This education will be aimed to help aid healthcare professionals and caregivers in their care practices.

CHAPTER II

Integrated Review of the Literature

As stated in the introductory chapter, the incidence of neonatal abstinence syndrome has increased drastically in the past decade, which is attributed to the increased incidence of maternal substance abuse (Chiang et al., 2019, p. 1193). Recent research has guided changes in clinical practice guidelines, moving from treatment of NAS with pharmacological measures to first line therapy being nonpharmacological interventions. Research has shown improved patient outcomes, reduced length of stay, and improved bonding with caregivers with the implementation of nonpharmacological interventions (MacVicar & Kelly, 2019). The increased incidence of NAS should provide the motivation for healthcare providers to improve treatment interventions.

A review of the literature related to NAS was conducted using CINHAL PLUS with full text and UpToDate electronic databases. Search terms that were utilized included “neonatal abstinence syndrome,” “neonatal abstinence syndrome and management,” “neonatal abstinence syndrome and nonpharmacological interventions,” “neonatal abstinence syndrome and length of stay,” “neonatal abstinence syndrome and cost of care,” “neonatal abstinence syndrome treatment,” and “neonatal abstinence syndrome and incidence.” Utilizing these terms and phrases, the articles were reviewed for relevance, and selected accordingly. Publication dates utilized for this literature

review ranged from 2010 to 2020. Ancestral research was also performed by utilizing the reference lists of the selected articles. This ancestral research allowed for the identification of new sources of information. The review of literature gave insight on neonatal abstinence syndrome, nonpharmacological interventions for neonatal abstinence syndrome, the link between nonpharmacological interventions and infant outcomes, the link between nonpharmacological interventions and infant length of stay, and financial burdens due to neonatal abstinence syndrome.

The purpose of this literature review was to gain knowledge on neonatal abstinence syndrome, symptoms scoring tools, management of NAS including pharmacological and nonpharmacological interventions, and healthcare expenditures due to NAS. The knowledge obtained in the literature review will be presented to healthcare professionals caring for newborns in a hospital setting through an educational offering as part of the scholarly project. By increasing the nonpharmacological intervention knowledge of healthcare professionals caring for newborns in a hospital setting, newborns suffering from neonatal abstinence syndrome will receive higher and improved quality of care while hospitalized.

Neonatal Abstinence Syndrome

"Neonatal Abstinence Syndrome (NAS) is the result of sudden discontinuation of fetal exposure to substances [legal or illegal] that were used or abused by the mother during her pregnancy" (Kocherlakota, 2014, p. e547). This post-withdrawal syndrome produces both behavioral and physiological signs and symptoms in the neonate, resulting in longer hospital stays and increased cost of care. The subsequent sections of this

chapter will review NAS incidence, the impact of NAS signs and symptoms, scoring tools, management, cost of care, and length of stay in relation to an NAS diagnosis.

Incidence. As previously stated, substance abuse disorders among pregnant women have increased dramatically in the past decade, consequently resulting in increased incidence of neonatal abstinence syndrome. Between the years 2004 and 2010, the incidence of newborns diagnosed with NAS increased fivefold, which has inevitably increased the number of newborns requiring longer hospitalization and specialized care (Chiang et al., 2019, p. 1193). The diagnosis of NAS is a result of the abrupt discontinuation of substances used by a mother during pregnancy (Kocherlakota, 2014, p. e548) and has spread across socioeconomic statuses (Washington & Wilson, 2019, p. 48).

Impact and Symptoms. Many different substances, legal or illegal, can result in NAS. These substances include prescription opioids, heroin, cocaine, methamphetamines, methadone, buprenorphine, antidepressants, anxiolytics, synthetic narcotics, hallucinogens, and kratom. (Artigas, 2014, p. 510; Kocherlakota, 2014, p. e549; & Jansson, 2020, p. 2). Infants exposed to these substances while in-utero have the potential of NAS after birth, which can lead to a variety of problems. These problems include gastrointestinal, metabolic, and central nervous system effects (Allen et al., 2018, p. 1750).

According to the literature, symptoms of NAS can vary vastly and are dependent upon multiple factors such as last maternal substance use, substance type, amount, half-life, and singular or polysubstance exposure (Cook & Fantasia, 2019, p. 359; Kocherlakota, 2014, p. e551). NAS can present with many different signs and symptoms ranging from mild to severe. Presentation of signs and symptoms can include tremors,

irritability, excessive, high-pitched and inconsolable crying, diarrhea, jitteriness, agitation, short or irregular sleep patterns, hypertonia, myoclonic jerks, seizures, increased heart rate and respiratory rate, temperature instability, sweating, frequent sneezing, frequent yawning mottling, nasal flaring, nasal stuffiness, poor feedings, regurgitation, excoriations, hyperphagia, excessive sucking, and poor weight gain (Artigas, 2014, p. 511; Cook & Fantasia, 2019, p. 358; Kocherlakota, 2014, p. e551-e552).

Symptom Scoring Tools. Assessments and the use of scoring tools allows for providers to initiate appropriate interventions when treating NAS. The most frequently utilized scoring tool is the Finnegan Neonatal Abstinence Scoring Tool (FNAST); however, other scoring tools include Lipsitz Neonatal Drug Withdrawal Scoring System, and the Neonatal Withdrawal Inventory (NWI) scoring system (Artigas, 2014). NAS scoring tools help healthcare professionals and caregivers to quantify the severity of NAS symptoms and therefore guide treatment. Additionally, according to Cook and Fantasia (2019), hospitals have started to adopt a new assessment tool that focuses less on numerical scoring and more on the behavior of the neonate. This scoring method is referred to as the Eat, Sleep, Console (ESC) method and focuses primarily on nonpharmacological interventions. This project utilized the Finnegan Scoring Tool.

The Finnegan Scoring Tool was developed by Loretta Finnegan in 1975 as both a clinical and investigative tool (Zimmerman, Nötzli, Rentsch, & Bucher, 2010). The tool assesses “central nervous system hyperirritability, gastrointestinal dysfunction, respiratory distress and vague autonomic signs in a semi quantitative way” (Zimmerman-Baer et al., 2010, p. 524). The tool includes a list of 21 different symptoms that an infant

may display while experiencing NAS. The 21 symptoms are given a score based on manifestation and severity to quantify severity. Once an infant "scores greater than or equal to 12 at two consecutive assessments, or greater than or equal to a score of 8 at three consecutive assessments, pharmacological intervention is initiated" (Cook & Fantasia, 2019). Appropriate education and training for healthcare providers and caregivers is essential for providing consistency while performing NAS assessments and assigning scores.

Management

Management of NAS is an important factor in overall infant outcomes and can include both pharmacological and nonpharmacological interventions. Treatment modalities should begin with nonpharmacological interventions followed by pharmacological interventions when withdrawal symptoms are unable to be reduced by nonpharmacological interventions.

Pharmacologic. According to Kocherlakota (2014), there is no uniformly accepted standardized protocol or regimen for the management of NAS with pharmacological interventions. However, literature is consistent in stating that morphine is the most commonly utilized medication (Cook & Fantasia, 2019, p. 361; Jansson, 2020, p. 14; Kocherlakota, 2014, p. e554). Other medications that can be utilized include methadone, buprenorphine, clonidine, and phenobarbital (Cook & Fantasia, 2019; Kocherlakota, 2014). Though medication modalities can help to reduce withdrawal symptom severity, the use of pharmacological therapy ultimately increases average length of stay and associated healthcare costs (Grossman et al., 2017). With proper

education and training, the utilization of these medications can be avoided with the use of intensive nonpharmacological interventions.

Nonpharmacological. Nonpharmacological interventions should always be first line therapy for management of NAS and require "thorough evaluation of the newborn's behaviors and responses to interactions and the environment to determine the need for specific soothing techniques" (Artigas, 2014, p. 511). Nonpharmacological interventions have been shown to reduce the length of hospitalizations, minimize medication therapy, improve infant outcomes, and ultimately reduce healthcare associated costs (Allen et al., 2018; Kocherlakota, 2014). Examples of nonpharmacological supportive care include gentle handling, on demand feedings, swaddling, dim light, low noise, frequent feedings, utilizing high calorie formulas, holding, cuddling, manual rocking, aromatherapy, massage therapy, skin-to-skin contact, pacifier use to promote "self-soothing", caregiver rooming-in, breastfeeding, and increasing parent/caregiver infant care (Allen et al., 2018; Artigas, 2014; Cook & Fantasia, 2019; Jansson, 2020; Kocherlakota, 2014; MacVicar & Kelly, 2019). These interventions should be utilized by parents, caregivers, volunteers, and healthcare professionals to improve quality of care for infants diagnosed with NAS. If withdrawal symptoms are not well controlled with current interventions, the caregiving team must re-evaluate and adjust interventions accordingly.

Cost and Length of Stay. A quality improvement initiative developed and implemented by Grossman et al. (2017) and a multidisciplinary team showed a reduced average length of stay for infants diagnosed with NAS by implementing intensive nonpharmacological interventions. The multidisciplinary team initiated four main nonpharmacological interventions. These interventions included placing infants in low

stimulation environments with dim lighting and reduced noise, engaging parents in the care of the newborns by encouraging rooming in and feeding on demand, training staff to view nonpharmacological interventions as equivalent to pharmacological interventions, and encouraged breastfeeding of all infants unless contraindicated due to illicit drug use (Grossman et. al., 2017). Conclusions of the quality improvement initiative showed that by modifying how infants with NAS are managed the average length of stay is reduced from an average of 23 days to an average of six days and overall quality of care was improved substantially.

Similarly, in a mixed study review of 14 studies on nonpharmacological interventions for infants diagnosed with NAS, MacVicar and Kelly (2019) found that the implementation of nonpharmacological interventions led to a reduction in length of hospitalization and a decreased need for pharmacological interventions. Each study showed a decrease in length of stay and a decreased need for pharmacologic therapy when nonpharmacological interventions were initiated early.

Healthcare Expenditures. As the incidence of maternal substance abuse and NAS increase, the more hospitalizations and healthcare costs also increase. According to a retrospective, observational study completed by Corr and Hollenbeak (2017), between 2003 and 2012, the number of infants born and hospitalized with a diagnosis of NAS increased fourfold. This fourfold increase resulted in a total of 67,869 hospital days and $61 million in healthcare costs in 2003 compared to 291,168 hospital days and $316 million in healthcare costs in 2012 (Corr & Hollenbeak, 2017, p. 1590). By 2014, the healthcare costs of NAS had increased to $462 million (Winkleman, Villapiano, Kozhimannil, Davis, & Patrick, 2018, p. 1).The study conducted by Corr and Hellenbeak

(2017) concluded that this increase included the length of stay being 3.5 times longer for NAS diagnosed infants versus infants without NAS. The average cost of admission and hospital stay for a newborn not affected by NAS was an average of $18,518.72 compared to the average cost of admission and hospital stay for an infant not affected by NAS of $5,429.28 (Corr & Hollenbeak, 2017, p. 1593-1595).

According to a quality improvement initiative to improve the quality of care NAS infants received by utilizing nonpharmacological interventions by Grossman et al. (2017), the average length of stay for all infants with NAS was 17 days and the average length of stay for infants with NAS requiring pharmacological management was 23 days. Grossman et al. (2017) concluded that by initiating nonpharmacological interventions in the treatment of NAS, the average length of stay and average cost of stay was significantly decreased.

Summary

The review of literature revealed that though there are significant benefits of utilizing nonpharmacological interventions in the care of NAS, there is still a gap in practice protocols and guidelines. Pharmacological therapy has traditionally been known to help reduce the symptoms of NAS, but at what cost? The literature remained consistent in concluding that nonpharmacological interventions promote parent/caregiver bonding, improve infant outcomes, reduce length of hospitalizations, and ultimately reduce healthcare expenditures. The positive outcomes of nonpharmacological interventions included in this literature review provided significant evidence that NAS can be managed successfully while also reducing length of hospitalizations and reduced healthcare costs. Healthcare professionals providing care to infants diagnosed with NAS have a duty to

advocate and participate in the development of improved evidence-based guidelines and protocols to improve infant outcomes by utilizing nonpharmacological interventions in the treatment of neonatal abstinence syndrome.

CHAPTER III

Methodology

The increasing incidence of neonatal abstinence syndrome should be of great concern to healthcare providers, especially for healthcare professionals caring for newborns that are diagnosed with NAS. Healthcare professionals caring for newborns are in a position to help improve infant outcomes and reduce not only length of stay but also reduce healthcare costs when caring for infants diagnosed with NAS by utilizing nonpharmacological interventions. The goal of this project was to increase healthcare professionals' confidence, knowledge of, and intent of utilizing nonpharmacological interventions in the treatment of NAS. Through an educational presentation, healthcare professionals caring for newborns in a hospital setting will be better equipped and prepared to care for infants diagnosed with NAS, which will ultimately improve patient care and outcomes. This chapter details the design of the scholarly project.

Project Design

This study was designed to determine if the knowledge and confidence of healthcare professionals caring for newborns in the hospital setting would increase after an educational presentation was provided. This educational presentation introduced and explained neonatal abstinence syndrome and nonpharmacological interventions that can be implemented when treating an infant with NAS. The education was provided in a

voice recorded PowerPoint presentation. The educational presentation included a pre/post-test survey, as well as a follow-up posttest survey occurring six weeks later. The focus of the study was to increase the utilization of nonpharmacological interventions when caring for infants diagnosed with NAS by increasing healthcare professionals' knowledge and confidence. Nonpharmacological intervention knowledge and confidence levels were screened before the educational presentation, immediately after the educational presentation, and again six weeks post educational presentation.

The educational presentation was provided to healthcare professionals who care for newborns in a hospital setting. Prior to the educational presentation, a pre-test survey was provided to participants to determine their current knowledge, confidence, and utilization of nonpharmacological interventions while caring for infants diagnosed with NAS. The posttest and six-week follow-up posttest assessed if the educational presentation increased the healthcare professionals' knowledge and understanding of NAS, confidence in providing nonpharmacological interventions, and the intent to utilize nonpharmacological interventions when caring for infants diagnosed with NAS.

Setting and Participants

The target population included healthcare professionals who care for newborns in a hospital setting. The participants were able to access the educational learning program asynchronously at their convenience to gain knowledge of nonpharmacological interventions in the treatment of NAS. A convenience sampling of certified nurse aids (CNAs), registered nurses (RNs), lactation consultants (LCs), social workers, physician's assistants (PAs), nurse practitioners (NPs), and physicians (MD or DO) was utilized. The convenience sample was obtained by contacting colleagues known to work as healthcare

professionals caring for newborns in a hospital setting and asking them to participate. These colleagues were also asked to share the educational presentation and survey link with other healthcare professionals within their personal network, resulting in a snowball technique. E-mail, telephone contact, personal contact, and social media were utilized to recruit participants. All participants who participated in the educational presentation received a pretest and posttest. Participants had the option to complete a six-week follow-up posttest survey if they elected to provide their email address. Inclusion criteria included the participant being a healthcare professional caring for newborns in the hospital setting with a valid healthcare professional license, 18 years of age or older, and English speaking. Exclusion criteria included the participant being younger than 18 years of age, non-English speaking, and healthcare professionals who do not care for newborns in the hospital setting.

Protection of Human Subjects

An Institutional Review Board (IRB) application was submitted to the Pittsburg State University Committee for the Protection of Human Research Subjects (CPHRS) for review and approval. The target population included adult subjects with a healthcare professional license. All surveys were answered confidentially and confidentiality was maintained throughout the research process. There were minimal risks associated with the pretest and posttest. The survey responses remained anonymous.

The project data was obtained through the pretest, posttest, and six-week follow-up posttest. The educational presentation was strictly voluntary and no monetary compensation was provided. The data from the pretest, posttest, and six-week posttest was analyzed using descriptive and t-test statistics to determine if knowledge and

confidence in providing nonpharmacological interventions for the management of NAS increased after healthcare professionals caring for newborns in a hospital setting completed the educational presentation. The pretest, posttest, and six-week follow-up posttest maintained confidentiality and were provided through Qualtrics.

Instruments

This study utilized three online surveys to obtain data including a pretest, posttest, and six-week follow-up posttest if participants chose to provide their email. Each survey was administered through the third-party online survey software Qualtrics. The surveys included a pretest prior to the educational presentation, posttest immediately following the educational presentation, and a six-week posttest. The surveys assessed demographics, knowledge, confidence, and personal thoughts on NAS management and interventions from the participants' experience. The surveys included both forced choice and open-ended questions, as well as a comment section at the end. The data from the pretest, posttest, and six-week posttest was analyzed using descriptive and t-test statistics to determine if knowledge of nonpharmacological interventions increased, confidence in providing nonpharmacological interventions increased, and if nonpharmacological interventions were more frequently utilized. The pretest, posttest, and six-week posttest were reviewed by Pittsburg State University School of Nursing Faculty members to ensure content validity.

Procedure

The timeline of the project was as follows: The proposal was sent to the proposal committee on October 27, 2020. A meeting via ZOOM with the proposal committee took place on November 10, 2020. At this proposal meeting, project content, ideas, and

organizational structure were discussed. On December 1, 2020, Pittsburg State University IRB was approved. The educational presentation, pretest and posttests were then provided and data was collected between December 2020 and January 2021. The proposal defense then took place on April 5, 2021 and consisted of Pittsburg State University School of Nursing Faculty members as well as a member of the Pittsburg State University Department of Psychology and Counseling.

The educational offering was a web-based distant learning opportunity provided through the third-party software Qualtrics. The educational presentation included a pretest, recorded educational presentation, handouts, and posttest. Participants were asked to provide an email address if they were willing to participate in a six-week follow-up posttest. Provision of the email address was optional.

Treatment of Data/Outcomes/Evaluation Plan

Education regarding neonatal abstinence syndrome and nonpharmacological interventions for NAS infants was provided to healthcare professionals caring for newborns in a hospital setting December 2020 through January 2021. Pretest and posttest surveys were utilized to assess individual knowledge, confidence, and current practice. The pretest and posttests included questions over sociodemographic data, knowledge, confidence level, utilization of nonpharmacological interventions, and barriers to care. The pretest and posttests were distributed to participants immediately prior to the education, immediately following the education, and six weeks after the education.

Evaluation Measures Linked to Objectives

The purpose of this study was to evaluate prevailing attitudes, practices, knowledge, and confidence of healthcare professionals regarding current care of infants

diagnosed with NAS. Pretest and posttest surveys were administered via the third-party web-based software Qualtrics. The results of this study were analyzed to determine if knowledge of nonpharmacological interventions increased among healthcare professionals and if there was an increase in the intent to utilize nonpharmacological interventions after the educational presentation was presented.

Methods of Analysis. The data from the surveys was analyzed using descriptive and t-test statistics to determine if knowledge and confidence in the utilization of nonpharmacological interventions for the management of NAS increased after healthcare professionals caring for newborns in a hospital setting completed the education. Descriptive statistics included gender, age, NAS knowledge, and confidence. A paired t-test for summative average was utilized via SPSS to compare average scores of survey responses pre and post NAS education. The pretest and posttests maintained confidentiality and were provided through Qualtrics.

Plan for Sustainability

Sustainability of this project was key in increasing healthcare providers' knowledge and confidence in caring for infants diagnosed with NAS. This education will help healthcare providers provide higher quality of care and stay up to date on current clinical practice guidelines, potentially reducing pharmacological interventions when caring for an infant with NAS. The potential for reduced pharmacological interventions can lead to decreased length of hospitalization stays as well as decreased healthcare costs.

Sustainability will be improved with timing. Strategies for timing include education delivery during provider orientation as well as re-education on an annual basis.

Early education in conjunction with annual education will keep healthcare provider knowledge and confidence high when providing care to an infant diagnosed with NAS.

Summary

The increasing incidence of neonatal abstinence syndrome should be of great concern to healthcare providers, especially for healthcare professionals caring for newborns that are diagnosed with NAS. Healthcare professionals are important advocates to help improve infant outcomes and reduce not only length of stay but also reduce healthcare costs when caring for infants diagnosed with NAS by utilizing nonpharmacological interventions. Studies have shown that the utilization of nonpharmacological interventions in the management of NAS improves overall infant outcomes. The goal of this project was to increase healthcare professionals' knowledge, confidence, and intent of utilizing nonpharmacological interventions in the treatment of NAS by providing education. Through education, healthcare professionals caring for newborns in a hospital setting will be better equipped and prepared to provide care to infants diagnosed with NAS, which will ultimately improve the quality of patient care and outcomes.

CHAPTER IV

Evaluation of Results

The purpose of this Doctor of Nursing Practice (DNP) scholarly project was to educate healthcare professionals caring for newborns diagnosed with neonatal abstinence syndrome (NAS) on nonpharmacological interventions. A pretest was given to healthcare professionals to identify current knowledge, confidence, and utilization of nonpharmacological interventions when caring for newborns diagnosed with NAS. Following the pretest, the researcher provided an educational offering in the form of a voice-recorded PowerPoint presentation through the third-party software Qualtrics. The educational offering introduced and explained neonatal abstinence syndrome, neonatal abstinence syndrome signs and symptoms, medications and drugs that can lead to neonatal abstinence syndrome, and nonpharmacological interventions that can be utilized when treating an infant with neonatal abstinence syndrome. After viewing the educational offering, healthcare professionals completed a posttest to determine if knowledge and confidence of neonatal abstinence syndrome and the utilization of nonpharmacological interventions in the treatment of neonatal abstinence syndrome increased after receiving education on the topic. Healthcare providers were then given the option to participate in a six-week follow-up posttest to determine if knowledge and confidence levels remained increased after the educational offering.

Description of Population

A convenience sampling of healthcare professionals, which included certified nurse aids (CNAs), registered nurses (RNs), lactation consultants (LCs), social workers, physician's assistants (PAs), nurse practitioners (NPs), and physicians (MD or DO) were included in this study. Participants were recruited by contacting colleagues known to work as healthcare professionals caring for newborns in a hospital setting and asking them to participate. These colleagues were then asked to share the educational video and pre/posttest link with other healthcare professionals within their personal network, resulting in a snowball technique. Email, telephone contact, personal contact, and social media platforms were utilized to recruit participants. Inclusion criteria required participants to be healthcare professionals caring for newborns in a hospital setting, at least 18 years of age, and who utilized English as their primary language. Demographic data was divided into age, gender, profession, and length of time caring for newborns in a professional setting.

After pretest and posttest completion, the data was aggregated to form a total sample population of forty-seven participants. The pretest and posttest took place in the months of December 2020 and January 2021 via Qualtrics. Prior to viewing the educational presentation, participants completed a pretest assessing demographics, knowledge, and confidence levels. Immediately following the educational presentation, participants were given a posttest, which had identical questions as the pretest excluding demographic data. The posttest also gave participants the option to provide their email if they were willing to participate in a six-week posttest follow-up. Of the forty-seven participants only thirty participants completed the full pretest, educational presentation,

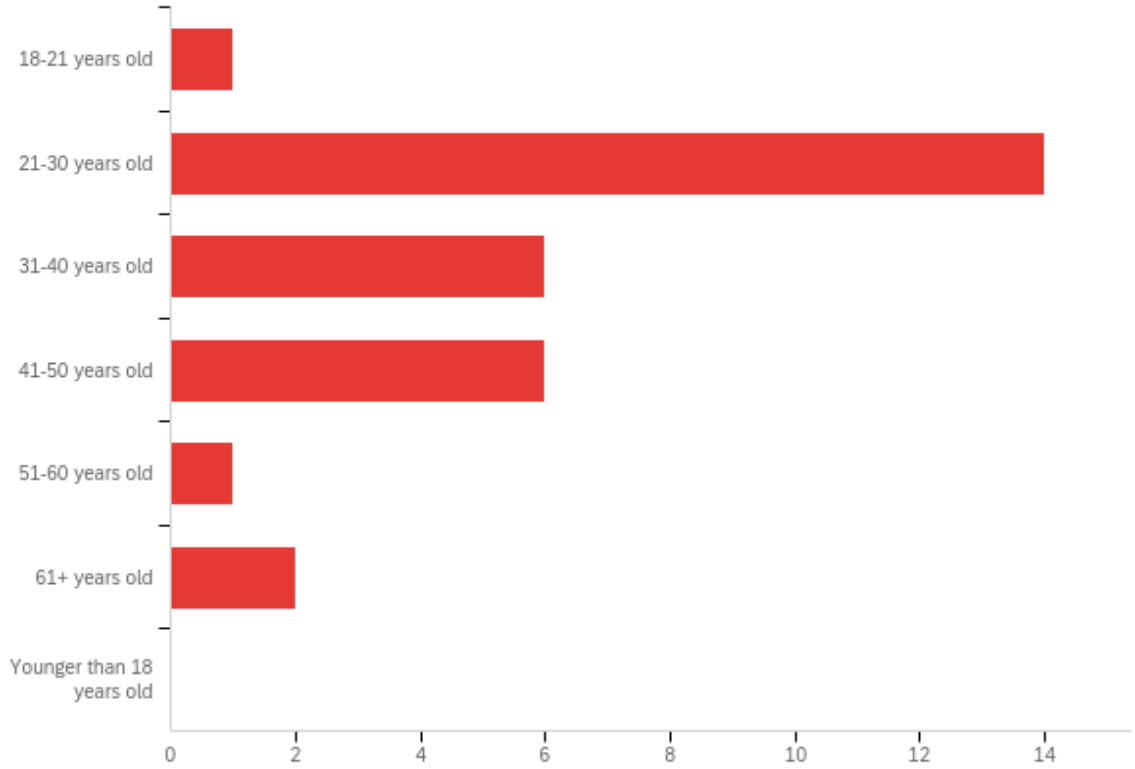
and posttest. Of the thirty participants that completed the full education, eight participants chose to participate in the six-week posttest follow-up.

Six weeks after education, participants were sent an email with the posttest education follow-up, which was identical to the posttest that immediately followed the educational offering. In total, eight six-week follow-up posttests were emailed and five responses were received. For accurate data comparison, the remainder of the data analyzed only compares results of participants who completed both pretest and posttest. The six-week follow-up posttest results were disregarded due to the small sample size.

The thirty total participants of this study all (100%) identified with the female gender and thirty (100%) selected nurse as their primary role. Of the thirty participants, one (3.33%) was between the ages of eighteen and twenty-one, fourteen (46.67%) were between the ages of twenty-one and thirty, six (20%) were between the ages of thirty-one and forty, six (20%) were between the ages of forty-one and fifty, one (3.33%) was between the ages of fifty-one and sixty, and two (6.67%) were sixty-one years old or greater (Figure 3).

Figure 3

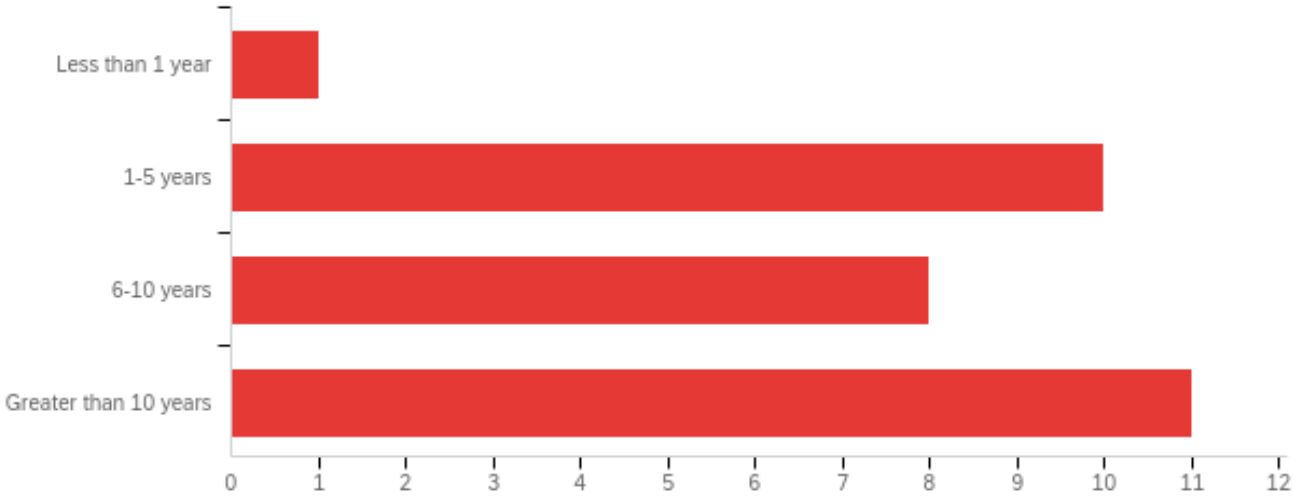
Participant Age



The participants' years of practice caring for newborns in a hospital setting varied. Among the participants, the majority had practiced greater than 10 years (36.67%). Other categories based on years of experience included participants who have been practicing for 6-10 years (26.67%), practicing for 1-5 years (33.33%), and practicing for one year or less (5.71%) (Figure 4).

Figure 4

Participant Years of Practice Caring for Newborns



Analysis of Project Questions

This study utilized a pretest, educational presentation, and posttest with the option to participate in a six-week follow-up posttest to evaluate whether the educational presentation increased healthcare professionals' knowledge of and confidence in utilizing nonpharmacological interventions when caring for an infant diagnosed with NAS. Data from the pretest was compared to the data from the posttest to determine if knowledge and confidence changed. There were four project questions addressed in this project. Each project question will be reviewed individually to ensure it is answered.

Project Question One. Prior to an educational offering, how frequently are healthcare professionals caring for newborns in the hospital setting completing a Finnegan Score on newborns born to women who tested positive for substances known to cause NAS?

First, participants were asked to identify how frequently they care for infants diagnosed with or showing signs and symptoms of NAS. Participants could indicate that

they care for infants diagnosed with NAS or showing signs/symptoms of NAS less than once a month, one to two times a month, three to five times a month, more than five times a month, or that they have never cared for an infant diagnosed with or displaying signs/symptoms of NAS. Of the thirty pretest participants, 43.33% (*n=13*) responded that they care for infants diagnosed with or showing signs/symptoms of NAS one to two times per month. Additionally, 33.33% (*n=10*) selected less than once a month, 20% (*n=6*) selected three to five times per month, 2.86% (*n=1*) selected they had never cared for an infant diagnosed with or displaying signs/symptoms of NAS, and no participants selected more than five times per month. (Table 1).

Table 1

Participant Frequency of Caring for NAS Diagnosed Infants

Frequency of Care	Participants (*n=30*)	Percent (%)
Less than 1 time per month	10	33.33
1-2 times per month	13	43.33
3-5 times per month	6	20.00
Greater than 5 times per month	0	0
Never	1	3.33
Total	30	100.00

Second, participants were asked how frequently the Finnegan Neonatal Abstinence Syndrome Scoring System Tool (FNAST) was being utilized when caring for an infant exposed to substance abuse in utero. Participants could indicate the utilization of the FNAST was occurring every two hours, every three hours, every four hours, every six hours, every eight hours, every twelve hours, as needed, or that their facility utilizes a different scoring tool with instructions to specify which tool. Of the thirty pretest

participants, 13.33% (n=4) indicated they score every two hours, 30% (n=9) indicated that they score every three hours, 20% (n=6) indicated that they score every four hours, 16.67% (n=5) indicated they score as needed, and 20% (n=6) indicated their facility utilizes a different scoring tool (Table 2). The participants that indicated their facility utilizes a different scoring tool stated they utilize the Eat, Sleep, Console Method.

Table 2

Frequency of Utilization of Finnegan Neonatal Abstinence Scoring Tool

Frequency of Scoring	Participants (*n=30*)	Percent (%)
Every 2 Hours	4	13.33
Every 3 Hours	9	30.00
Every 4 Hours	6	20.00
Every 6 Hours	0	0
Every 8 Hours	0	0
Every 12 Hours	0	0
As Needed	5	16.67
Use a Different Scoring Tool	6	20.00
Total	30	100.00

Project Question Two. Prior to an educational offering on the nonpharmacological management of NAS, which interventions are healthcare professionals caring for newborns in the hospital setting implementing?

Study participants were asked to identify nonpharmacological interventions they currently implement when caring for infants diagnosed with or displaying signs/symptoms of NAS. Participants answered the question via an open-ended text entry submission. Participant responses were reported prior to the educational presentation offering. Participants responded with several nonpharmacological interventions which

included rooming-in, consoling, quiet environments, dim lighting, low stimulation, skin to skin, frequent feeds, long rest periods, low noise, tight swaddling, containment, rocking, offering pacifiers, utilizing an infant swing, music therapy, utilizing sucrose, utilizing sensitive formula, clustered care, tummy time, patting, repositioning, and family involvement.

Project Question Three. Will implementation of nonpharmacological intervention education improve the knowledge of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?

The correlation between neonatal abstinence syndrome education pretest and posttest was answered using data collected on pretest questions nine through eleven and posttest questions one through three. The participants were provided a five-point Likert rating scale presenting a statement with a one being very poor and five being very good. The questions were identical for both pretest and posttest. Participants were asked to rate current knowledge of neonatal abstinence syndrome, Finnegan Neonatal Abstinence Syndrome Scoring System Tool, and nonpharmacological interventions utilized for neonatal abstinence treatment. The responses to each of the five knowledge areas from the pretest are in Table 3 and those from the posttest are in Table 4. An overall summative average of participant perception of knowledge pre and post education was compared (Table 5).

Table 3

Pretest Average of Responses to Individual Knowledge Items

Topic	Mean	Std. Deviation
Neonatal Abstinence Syndrome Overall	3.73	0.77
Finnegan Neonatal Abstinence Scoring System Tool	3.67	0.82
Nonpharmacological Interventions for the Treatment of NAS	3.77	0.85

Note. For observed means, *1=very poor; 2=poor; 3=fair; 4=good; 5=very good.*

Table 4

Posttest Average of Response to Individual Knowledge Items

Topic	Mean	Std. Deviation
Neonatal Abstinence Syndrome Overall	4.33	0.83
Finnegan Neonatal Abstinence Syndrome Scoring Tool	4.13	0.85
Nonpharmacological Interventions for the Treatment of NAS	4.47	0.88

Note. For observed means, *1=very poor; 2=poor; 3=fair; 4=good; 5=very good.*

Using a five-point Likert scale from very poor to very good, participants' responses to each individual item were analyzed. Responses were evaluated by the following scores: Very Poor (0-1.49), Poor (1.5-2.49), Fair (2.5-3.49), Good (3.5-4.49), and Very Good (4.5-5). All the mean individual responses for each item on the pretest and posttest fell between 3.5 and 4.49 or having "good" perception of knowledge both before and after the presentation. However, there was an increase in the respondents' perception of knowledge after the educational presentation.

Table 5

Summative Average of Knowledge Items

	Mean	*N*	Std. Deviation
Pre-Summative Average of Knowledge	3.72	30	0.81
Post-Summative Average of Knowledge	4.31	30	0.85

Note. For observed means, *1=very poor; 2=poor; 3=fair; 4=good; 5=very good.*

The pre-summative mean (3.72) indicates that participants had a "good" (3.5-4.49) perception of knowledge of individual items prior to the educational presentation. The post-summative mean (4.31) indicates that participants had an increase of points (0.59) indicating a "good" (3.5- 4.49) perception of knowledge after the educational presentation.

Table 6

Paired Sample Statistics for Knowledge Items

	Mean Difference	Std. Deviation	t	df	Sig. (2-tailed)
Neonatal Abstinence Syndrome Overall	.600	.855	3.844	29	< .001
Finnegan Neonatal Abstinence Syndrome Scoring Tool	.467	.776	3.294	29	.003
Nonpharmacological Interventions for the Treatment of NAS	.700	1.149	3.339	29	.002

Paired Samples t-tests were calculated to see if there were statistical differences between the pre and post measures of participant perceived knowledge after the educational presentation. There was statistical difference between the pre and post measure for participant knowledge level for each knowledge item, neonatal abstinence syndrome overall (t= 3.844, $p < .001$), Finnegan Neonatal Abstinence Syndrome Scoring

Tool (t= 3.294, p = .003), and nonpharmacological interventions for the treatment of NAS (t= 3.339, p = .002).

Project Question Four. Will implementation of nonpharmacological intervention education improve the confidence of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?

The confidence level of healthcare professionals was assessed with the pretest questions twelve through fifteen and posttest questions four through seven. Participants were asked to rate their current confidence in caring for an infant diagnosed with NAS, recognizing signs/symptoms of NAS, utilizing the Finnegan NAS scoring system tool, and implementing nonpharmacological interventions. The participants were provided a three-point Likert scale to rate their confidence in four areas of care. Responses were evaluated by the following scores: Not Confident (0-1.00), Somewhat Confident (1.01-2.00), and Completely Confident (2.01-3). On both the pretest (Table 7) and posttest (Table 8), all the mean individual responses fell between 2.01 and 3.00 or Completely Confident. An overall summative average of participant perception of confidence pre and post education was compared (Table 9).

Table 7

Pretest Average of Responses to Individual Confidence Items

Topic	Mean	Std. Deviation
Caring for an Infant Diagnosed with NAS	2.13	0.62
Recognizing signs/symptoms of NAS	2.47	0.56
Utilizing the Finnegan Scoring System Tool	2.27	0.68
Implementing Nonpharmacological Interventions when Caring for NAS Diagnosed Infant	2.23	0.56

Note. For observed means, *1=Not Confident; 2=Somewhat Confident; 3=Completely Confident.*

Table 8

Posttest Average of Responses to Individual Confidence Items

Topic	Mean	Std. Deviation
Caring for an Infant Diagnosed with NAS	2.60	0.49
Recognizing signs/symptoms of NAS	2.73	0.44
Utilizing the Finnegan Scoring System Tool	2.50	0.50
Implementing Nonpharmacological Interventions when Caring for NAS Diagnosed Infant	2.77	0.42

Note. For observed means, *1=Not Confident; 2=Somewhat Confident; 3=Completely Confident.*

Table 9

Summative Average of Confidence Items

	Mean	N	Std. Deviation
Pre-Summative Average of Confidence	2.28	30	0.61
Post-Summative Average of Confidence	2.65	30	0.46

Note. For observed means, *1=Not Confident; 2=Somewhat Confident; 3=Completely Confident.*

The pre-summative mean (2.28) indicates participants were "completely confident" (2.01- 3) prior to the educational presentation. The post-summative mean (2.65) shows participants had an increase of points (0.37), indicating that participants remained "completely confident" (2.01- 3) after the educational presentation.

Table 10

Paired Sample Statistics for Confidence Items

	Mean Difference	Std. Deviation	t	df	Sig. (2-tailed)
Caring for an Infant Diagnosed with NAS	.467	.507	5.037	29	< .001
Recognizing Signs/Symptoms of NAS	.267	.521	2.804	29	.009
Utilizing the Finnegan Scoring System Tool	.233	.568	2.249	29	.032
Implementing Nonpharmacological Interventions	.533	.571	5.113	29	< .001

Paired Samples t-tests were calculated to determine if there were statistical differences between the pre and post measures of participant perceived confidence after the educational presentation. There was statistical difference between the pre and post

measure for participant confidence for each item, caring for an infant diagnosed with NAS (t= 5.037, p < .001), recognizing signs/symptoms of NAS (t= 2.804, p = .009), utilizing the Finnegan Scoring System Tool (t= 2.249, p = .032), and implementing nonpharmacological interventions (t= 5.113, p < .001).

Additional Results

In the pretest, participants were asked to identify the biggest challenge when caring for an infant diagnosed with or displaying signs/symptoms of NAS. The responses included having to care for other couplets or infants/not having enough time to adequately care for all patients, parent compliance with plan of care, appropriately managing signs and symptoms the infant is displaying, parent involvement, inconsistent care among the care team, being nonjudgmental towards parents, inconsistent scoring between nurses, determining level of severity, early recognition of signs/symptoms, parent and healthcare professional education.

In the posttest, participants were asked to identify any new knowledge they had gained from the educational presentation. The responses included learning new information on signs/symptoms, medications, and nonpharmacological interventions, frequency of Finnegan scoring tool, and healthcare costs due to neonatal abstinence syndrome. The education also included bedside guides that could be utilized when caring for infants diagnosed with NAS. Participant comments stated that the bedside guides would be very useful for education and utilization when needed.

Summary

Data analysis was completed using IBM SPSS Statistics. Descriptive analysis was utilized for quantitative and qualitative data interpretation. Prior to education, results of

the pretest indicated that healthcare professionals would benefit from receiving further education about neonatal abstinence syndrome and nonpharmacological interventions when treating infants diagnosed with NAS. After the educational offering, participants indicated their knowledge and confidence in caring for newborns with NAS and utilizing nonpharmacological interventions as a treatment method had increased.

The purpose of this project was to increase the education provided to healthcare professionals regarding neonatal abstinence syndrome and the nonpharmacological interventions that should be utilized when caring for infants diagnosed with NAS. Findings from this study indicate the need for increased neonatal abstinence syndrome and nonpharmacological intervention education to healthcare professionals caring for newborns in a hospital setting.

CHAPTER V

Purpose

The purpose of this project was to increase the education provided to healthcare professionals regarding neonatal abstinence syndrome (NAS) and the nonpharmacological interventions that should be utilized when caring for infants diagnosed with NAS. The study obtained data from healthcare professionals caring for newborns in the hospital setting by utilization of a pretest and an identical posttest without demographic questions. The pretest measured baseline participant knowledge and confidence of neonatal abstinence syndrome and nonpharmacological interventions prior to education being provided. The posttest measured participant knowledge and confidence after the educational presentation. An identical six-week follow-up posttest was optional for study participants; however, from the thirty study participants, only eight participants indicated they would partake in the six-week follow up posttest, and only five participants completed the six-week follow-up posttest. Therefore, the six-week follow-up posttest results were disregarded.

Relationship of Outcomes to Research

Four research questions were examined for this project. Each question was answered thoroughly and completely. The following research questions were examined.

- Prior to an educational offering, how frequently are healthcare professionals caring for newborns in the hospital setting completing a Finnegan Score on newborns born to women who tested positive for substances known to cause NAS?
- Prior to an educational offering on the nonpharmacological management of NAS, which interventions are healthcare professionals caring for newborns in the hospital setting implementing?
- Will implementation of nonpharmacological intervention education improve the knowledge of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?
- Will implementation of nonpharmacological intervention education improve the confidence of healthcare professionals caring for infants diagnosed with NAS in the hospital setting?

The first question was examined by descriptive statistics percentages and frequencies. Participants were asked to identify how often the participant cares for an infant diagnosed with or displaying signs or symptoms of neonatal abstinence syndrome. The participants were then asked to identify how frequently the Finnegan Neonatal Abstinence Scoring System Tool is utilized when caring for an infant diagnosed with or displaying signs or symptoms of neonatal abstinence syndrome. The participants had a selection choice of every two hours, every three hours, every four hours, every six hours, every eight hours, every twelve hours, as needed, or that a different scoring tool is utilized. According to Cook & Fantasia (2019), “Finnegan scoring is started within 24 hours of birth and serial assessments are completed every 3 to 4 hours when the newborn

is awake and fed. Neonates who do not require pharmacologic intervention should have scoring completed for 4 consecutive days [and] neonates who require medication to treat withdrawal symptoms are scored throughout treatment and for 48 to 72 hours after medication is ceased" (p. 359). Participants who responded that a different scoring tool was utilized were asked to identify the scoring tool. Of the participants (*n=6)* who selected the option of utilization of a different scoring tool, all participants (*n=6*, 100%) responded that the Eat, Sleep, Console (ESC) method is utilized. According to a study conducted by Grossman, Lipshaw, Osborn, and Berkwitt (2018), "infants managed by using the ESC approach were treated with morphine significantly less frequently than they would have been by using the [Finnegan Scoring] approach. The ESC approach is an effective method for the management of infants with NAS that limits pharmacologic treatment and may lead to substantial reductions in length of stay." Categorical data was applied to find the frequency and percentages of each measure.

The second research question was examined by text analysis. Participants were asked the open-ended question "what nonpharmacological interventions do you implement when caring for an infant diagnosed with or displaying signs/symptoms of NAS?" Participant responses were varied and some responses had similar nonpharmacological interventions identified. Responses were examined and listed to gain further insight into participants' current practices. Examples of nonpharmacological supportive care measures include gentle handling, on demand feedings, swaddling, dim light, low noise, frequent feedings, utilizing high calorie formulas, holding, cuddling, manual rocking, aromatherapy, massage therapy, skin-to-skin contact, pacifier use to promote "self-soothing", caregiver rooming-in, breastfeeding, and increasing

parent/caregiver infant care (Allen et al., 2018, p. 1750; Artigas, 2014, p. 512; Cook & Fantasia, 2019, p. 360; Jansson, 2020, p. 10-13; Kocherlakota, 2014, p. e553; MacVicar & Kelly, 2019, p. 434-435).

The third research question was answered by comparing pretest and posttest surveys. Participants were asked to rate current knowledge of neonatal abstinence syndrome, Finnegan Neonatal Abstinence Syndrome Scoring Tool, and nonpharmacological interventions for neonatal abstinence on a five-point Likert-type scale, “very poor,” “poor,” “fair,” “good,” or “very good.” Each category was coded using numerical data 1-5 starting at number one (very poor) to number five (very good).

The summative mean of the data collected for knowledge revealed an increase in participant response by 0.59 points. The standard deviation increased when comparing the pretest (0.81) and the posttest (0.85). These findings indicate that participants perceived more knowledge of individual items after the educational presentation. However, the standard deviation increase indicates greater variability on the posttest versus the pretest. In a previous study conducted by Lucas and Knobel (2012), knowledge of neonatal abstinence syndrome and the Finnegan Neonatal Abstinence Syndrome Scoring Tool was increased when clinical practice guidelines and education were introduced to neonatal intensive care unit (NICU) nurses working in a level three NICU.

The fourth research question was answered by comparing pretest and posttest surveys. Participants were asked to rate current confidence of caring for an infant diagnosed with neonatal abstinence syndrome, recognizing signs/symptoms of neonatal abstinence syndrome, utilizing the Finnegan Neonatal Abstinence Syndrome Scoring

Tool, and implementing nonpharmacological interventions when caring for an infant diagnosed with neonatal abstinence syndrome. Participants were asked to rate confidence on a three-point Likert-type scale, “not confident,” “somewhat confident,” and “completely confident.” Each category was coded using numerical data 1-3 starting at number one (not confident) to number five (extremely confident).

The summative mean of the data collected for confidence revealed an increase in participant response by 0.37 points. The standard deviation decreased when comparing the pretest (0.61) and the posttest (0.46). These findings indicate participants perceived greater confidence of individual items after the educational presentation. The standard deviation was low, indicating less variability on the posttest compared to the pretest.

Observations

General observations noted during the project include poor completion rates. Participants were recruited via convenience and snowball sampling via social media platforms. The study had a total of forty-seven participants; however, only thirty participants completed the full study. The study also had a six-week posttest option in which only eight of the thirty participants indicated interest. Of the eight participants that indicated interest in the six-week follow-up posttest, five participants responded.

The survey indicated increased knowledge and confidence in all measures. The measure with the least increase on both knowledge and confidence involved “recognizing signs and symptoms of NAS” and “utilizing the Finnegan NAS scoring tool.” The measure with the greatest increase on both knowledge and confidence involved implementing and utilizing nonpharmacological interventions in the treatment of NAS.

This indicates all measures are being met, but curriculum involving signs and symptoms and scoring tools should be re-evaluated for future educational designs.

Evaluation of Theoretical Framework

The data from this research supports Orlando's Nursing Process Discipline Theory of focusing on the patient's needs. Orlando's theory provides a framework for identifying and addressing the immediate needs of the patient, resulting in positive outcomes. This theory "focuses on the interaction between the [healthcare professional] and patient, perception validation, and the use of the nursing process to produce positive outcomes or patient improvement" (Petiprin, 2016, para. 9). Participants from this study are seeking tools and resources to improve their knowledge and confidence when utilizing nonpharmacological interventions when caring for infants diagnosed with or displaying signs/symptoms of neonatal abstinence syndrome.

Evaluation of Logic Model

The logic model of this study identified the goal of this project, which was to increase the knowledge of nonpharmacological interventions in the management of neonatal abstinence syndrome by utilization of an educational presentation. The goal was obtained by utilization of a pretest, educational presentation, and a posttest. The study results show that education is beneficial for increasing knowledge and confidence regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions when caring for infants diagnosed with or displaying signs/symptoms of neonatal abstinence syndrome.

Limitations

The method chosen for the research participants was a one group pretest-posttest design using descriptive statistics, mean, and standard deviation. One limitation in the study included poor participation resulting in a sample size of thirty participants. The project timeline of December 2020 through January 2021 may have contributed to the smaller sample size. A larger timeline would be beneficial for a larger sample size. Another limitation is the potential for participant bias due to the nature of the topic. There was no sampling bias because participants were recruited by use of a convenience and snowball sampling via social media platforms. A final limitation to the study is there is no universal protocol for education and treatment of neonatal abstinence syndrome. Therefore, education, knowledge, confidence, and tools vary significantly between healthcare facilities. This was a small study with a convenience sample size of thirty and therefore cannot be generalized. This study should be repeated with a larger sample population for more accurate results.

Implications for Future Projects and Research

Evaluation of healthcare professionals' knowledge and confidence regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions in the treatment of neonatal abstinence syndrome is a cost-effective method to obtain a baseline for educational needs regarding the topic. The prevalence of maternal substance abuse resulting in neonatal abstinence syndrome continues to increase at an alarming rate in the United States. Between the years 2004 and 2010, the incidence of newborns diagnosed with NAS increased fivefold, which has inevitably increased the number of newborns requiring longer hospitalization and specialized care (Chiang et al., 2019, p.

1193). Therefore, increased education for healthcare professionals regarding neonatal abstinence syndrome should be utilized to provide better understanding and care to infants diagnosed with NAS. This research could be replicated with additional educational programs.

To improve the design for this project, the author could focus the education on specific nursing units to better assess educational needs and improvement upon completion of the project. The author could also utilize follow-up surveys at varying intervals to assess for knowledge retention and utilization of education in practice.

Implications for Practice, Health Policy, and Education

The results of this study indicate there is a need for increased education regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions in the management of neonatal abstinence syndrome. Study outcomes were positive with a posttest mean of (4.31) on knowledge and a posttest mean of (2.65) on confidence. These results indicate that education is beneficial for improving knowledge and confidence regarding neonatal abstinence syndrome and nonpharmacological interventions. Recommendations to nursing practice could include the incorporation of neonatal abstinence syndrome and nonpharmacological intervention education curricula on an annual basis for healthcare professionals who care for newborns in a hospital setting. Implementation of annual education could potentially increase overall knowledge and confidence resulting in improved patient outcomes.

The results of this study and future studies can be utilized for healthcare professionals to advocate for increased educational opportunities and funding regarding neonatal abstinence syndrome. Legislative involvement could make education

mandatory, provide better funding for educational opportunities, and provide continuity between nursing units throughout the United States who care for infants diagnosed with neonatal abstinence syndrome.

Summary

The purpose of this project was to increase healthcare professionals' confidence, knowledge of, and intent of utilizing nonpharmacological interventions in the treatment of NAS. Through education, healthcare professionals caring for newborns in a hospital setting will be better equipped and prepared to care for infants diagnosed with NAS, which will ultimately improve patient care and outcomes. Nonpharmacological interventions have been shown to reduce the length of hospitalizations, minimize medication therapy, improve infant outcomes, and ultimately reduce healthcare associated costs (Allen et al., 2018; Kocherlakota, 2014).

This project included a study utilizing a pretest, educational presentation, and a posttest. The pretest indicated the need for increased education regarding neonatal abstinence syndrome for healthcare professionals caring for infants in a hospital setting. After the educational presentation, the posttest results indicated an increase in knowledge and confidence levels of healthcare professionals regarding neonatal abstinence syndrome and the utilization of nonpharmacological interventions when caring for infants diagnosed with NAS. This study will hopefully encourage healthcare professionals to partake in further educational opportunities to help improve knowledge of and confidence in utilizing nonpharmacological interventions.

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APPENDIX

Appendix A
Pretest

For the following items, please select the letter by the answer that best represents you (one per item).

1. Are you a healthcare provider that cares for newborns in the hospital setting?

    A. Yes
    B. No

2. What gender do you identify as?

    A. Female
    B. Male
    C. Prefer not to answer

3. What is your current age?

    A. Younger than 21 years old
    B. 21-30 years old
    C. 31-40 years old
    D. 41-50 years old
    E. 51-60 years old
    F. 61+ years old

4. What is your current role in caring for newborns?

    A. Nurse Assistant
    B. Nurse
    C. Lactation Consultant
    D. Advanced Practice Nurse
    E. Physician Assistant
    F. Physician

5. How long have you worked as a healthcare professional caring for newborns?

    A. Less than 1 year
    B. 1-5 years
    C. 6-10 years
    D. Greater than 10 years

6. How frequently do you care for infants diagnosed with or showing signs and symptoms of Neonatal Abstinence Syndrome?

    A. Less than 1 time a month
    B. 1-2 times a month
    C. 3-5 times a month
    D. More than 5 times a month
    E. I have never cared for an infant diagnosed with or showing symptoms of NAS

7. How frequently do you utilize the Finnegan Neonatal Abstinence Syndrome Scoring System when caring for an infant exposed to substance abuse while in-utero?

    A. Never
    B. Every 2 hours
    C. Every 3 hours
    D. Every 4 hours
    E. Every 6 hours
    F. Every 8 hours
    G. Every 12 hours
    H. As needed
    I. My facility uses a different scoring tool (Please Specify) _____

8. During the past year, have you participated in an educational program about NAS?

    A. Yes
    B. No

Neonatal Abstinence Syndrome Knowledge

Using the scale below, please select the number that best represents your knowledge of NAS.

Very Poor = **1** Poor = **2** Fair = **3** Good = **4** Very Good = **5**

How do you rate your current knowledge of:

9. Neonatal Abstinence Syndrome	1	2	3	4	5
10. Finnegan Neonatal Abstinence Syndrome Scoring System	1	2	3	4	5
11. Nonpharmacological Interventions for NAS	1	2	3	4	5

Using the scale below, please select the following number that best represents your confidence level.

Not Confident = **1** Somewhat Confident = **2** Completely Confident = **3**

How do you rate your current confidence with:

12. Caring for an infant diagnosed with NAS	1	2	3
13. Recognizing signs/symptoms of NAS	1	2	3
14. Utilizing the Finnegan NAS Scoring System	1	2	3
15. Implementing nonpharmacological interventions	1	2	3

16. What nonpharmacological interventions do you implement when caring for an infant diagnosed with or displaying signs/symptoms of NAS? (Please answer below)

_____

_____

_____

17. What do you find to be the biggest challenge when caring for an infant diagnosed with or displaying signs/symptoms of NAS? (Please answer below)

_____

_____

_____

18. Please provide additional comments.

_____

_____

_____

Appendix B
Posttest

Neonatal Abstinence Syndrome Knowledge

Using the scale below, please select the number that best represents your knowledge of NAS.

Very Poor = **1** Poor = **2** Fair = **3** Good = **4** Very Good = **5**

After viewing the educational offering, how do you rate your knowledge of:

1. Neonatal Abstinence Syndrome 1 2 3 4 5
2. Finnegan Neonatal Abstinence Syndrome Scoring System 1 2 3 4 5
3. Nonpharmacological Interventions for NAS 1 2 3 4 5

Using the scale below, please select the following number that best represents your confidence level.

Not Confident = **1** Somewhat Confident = **2** Completely Confident = **3**

After viewing the educational offering, how do you rate your confidence with:

4. Caring for an infant diagnosed with NAS 1 2 3
5. Recognizing signs/symptoms of NAS 1 2 3
6. Utilizing the Finnegan NAS Scoring System 1 2 3
7. Implementing nonpharmacological interventions 1 2 3

8. What new knowledge have you learned after viewing the educational offering?

9. Please provide additional comments.

10. If you are willing to participate in a 6 week follow up survey, please provide your email. The only use of your email address will be to send the 6-week follow-up survey link.

Appendix C
6 Week Posttest

Neonatal Abstinence Syndrome Knowledge

Using the scale below, please select the number that best represents your knowledge of NAS.

Very Poor = **1** Poor = **2** Fair = **3** Good = **4** Very Good = **5**

How do you rate your current knowledge of:

1. Neonatal Abstinence Syndrome 1 2 3 4 5
2. Finnegan Neonatal Abstinence Syndrome Scoring System 1 2 3 4 5
3. Nonpharmacological Interventions for NAS 1 2 3 4 5

Using the scale below, please select the following number that best represents your confidence level.

Not Confident = **1** Somewhat Confident = **2** Completely Confident = **3**

How do you rate your current confidence with:

4. Caring for an infant diagnosed with NAS 1 2 3
5. Recognizing signs/symptoms of NAS 1 2 3
6. Utilizing the Finnegan NAS Scoring System 1 2 3
7. Implementing nonpharmacological interventions 1 2 3

8. What nonpharmacological interventions do you implement when caring for an infant diagnosed with or displaying signs/symptoms of NAS? (Please answer below)

9. What do you find to be the biggest challenge when caring for an infant diagnosed with or displaying signs/symptoms of NAS? (Please answer below)

10. Has the educational guide for nonpharmacological interventions in the treatment of infants with NAS changed how you provide care for these infants? If yes please explain.

11. Please provide additional comments.

Appendix D
Neonatal Abstinence Syndrome Bedside Tools

DRUG	ONSET OF SYMPTOMS	DURATION OF SYMPTOMS
OPIOIDS		
Heroin	24 hours- 2 days	8-10 days
Methadone	2-3 days	30 days or more
Buprenorphine (Subutex)	24 hours- 3 days	28 days or more
Prescription Opioids (oxycodone/hydrocodone	24 hours – 4 days	10- 30 days
NON-OPIOIDS		
SSRIS (Celexa, Lexapro, Zoloft, Paxil, Prozac)	24 hours- 2 days	2-6 days
Tricyclic Antidepressants (Elavil, Sinequian, Vivactil, Pamelor, Anafranil, Surmontil, Amoxapine)	24 hours – 2 days	2-6 days
Methamphetamines	24 hours	7-10 days
Inhalants/nicotine	24 hours – 2 days	2-7 days
Caffeine	24 hours- 2 days	1-7 days

Baby's Behavior	How You Can Help
Prolonged Crying	• Hold baby skin to skin or swaddled in light blanket close to parent's body • Lower the lights and turn off loud noises • Use purposeful touch (stroking, or tickling can be irritating). • Hold baby swaddled in a "C" or fetal position with baby's back to you facing outward at a blank wall. Gently sway from side to side. • Hum and gently rock from side to side. • Watch for prolonged crying, which may cause baby to vomit.
Easily Upset or Bothered	• Keep the room quiet and dim. Avoid loud music, TV/screen-time, texting, phone calls, and conversations. • Try not to touch or wake the baby. • Swaddle baby in a light blanket, but help him stay contained with hands close to his face. • Hold baby close to your body, and console him if he is upset.
Sleeplessness	• Limit visitors and keep the room quiet. • Soft, gentle music and rocking may help. • Keep diaper area clean and dry. Use diaper cream to prevent diaper rash. • Feed baby when he's hungry (small/frequent meals may be needed).
Difficult or Poor Feeding	• Feed small amounts often. If breastmilk supply is low, supplement with formula to help infant feel satisfied. • Feed in a quiet, low-lit room with few distractions. • Focus on baby. Avoid being on the phone or having conversations while baby eats
Excessive Rooting or Sucking	• Offer a pacifier if baby has just eaten and still wants to suck • Keep baby's hands clean. Do not use lotions or creams. • Keep baby swaddled and comforted • Offer a small meal
Spitting up or Vomiting	• Use a bulb syringe to clean out baby's mouth • Change bedding and clothes to keep baby comfortable. • Burp baby often throughout feedings and offer rest breaks. • Offer smaller meals more often if large volumes cause vomiting • Respond to crying and offer comfort.
Sneezing, Stuffy Nose, or Breathing Problems	• Keep baby's mouth and nose clean. Note any spit-up or mucus. Stuffiness is often swelling/edema and cannot be suctioned. • Dress baby in light T-shirt or onesie and swaddle in a light blanket. • Feed baby slowly and offer rest breaks and burping with each feeding. • Always place baby on its back to sleep • If baby is awake hold him upright, fully supporting his head.

Special Care Plan for: (Baby's Name)	
Breast milk/Formula:	
Diaper Care:	
Supportive Therapy:	
Family Support Team:	
Common Symptoms and Stress Cues Infant Displays:	
Effective Calming Interventions:	
Primary Nursing Staff:	
Social Work Support/Plans:	