IMPLEMENTATION OF AN EVIDENCE-BASED POLICY AND EDUCATIONAL PROGRAM ON CARING FOR NEONATES WITHDRAWING FROM OPIOIDS: A QUALITY IMPROVEMENT PROJECT

by

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ABSTRACT

The opioid use among pregnant women has increased, which has led to a rise in the rate of Neonatal Abstinence Syndrome (NAS). Infants with NAS are delivered at rural and urban locations throughout the country and require specialized treatment. The rural community access hospitals (CAH) often lack the resources (policy development and education updates) to prepare health care team members for safe care of infants that present with NAS. The purpose of this project was to improve team member confidence when providing care for neonates suspected of substance withdrawal at a CAH in Montana by: (a) developing and implementing a policy on care and treatment of a drug dependent newborn; (b) educating the team providing care to these neonates on the use of NAS scoring tools; and (c) evaluating the education and improved confidence levels of the health care team. A pretest/posttest design was used to evaluate change in nursing knowledge on NAS/scoring tools. The results suggest implementation of a NAS educational program including education regarding the implementation of a corresponding evidence-based policy, has a statistically significant effect on provider and nurse knowledge and confidence about NAS. Specifically, the results suggest NAS education improved provider/nurse knowledge and confidence in caring for neonates affected by NAS.

CHAPTER ONE

INTRODUCTION TO THE PROJECT

Introduction

Neonatal abstinence syndrome (NAS) is an emergent issue due to the increase in prenatal maternal opioid use.

> "A neonate with NAS experiences complex and varied symptoms, including gastrointestinal, autonomic, and central nervous system disturbances, leading to high-pitched crying, poor sleep, irritability, tremors, seizures, hypertonia, hyperreflexia, regurgitation, loose stools, tachypnea, feeding difficulties due to uncoordinated sucking reflexes, sweating, sneezing, yawning, nasal stuffiness, and hyperthermia" (Haycraft, 2018, p.20).

The term NAS is used to describe a neonate experiencing these withdrawal symptoms as a result of exposure to maternal opioid use.

In the United States between 2000 and 2012, the incidence of NAS diagnosis increased from 1.2 to 5.8 per 1,000 hospital births, affecting over 21,000 neonates (Patrick et al., 2012; Patrick, Davis, Lehmann & Cooper, 2015). The four-fold increase cost an estimated $316 million nationally in 2012 (Corr & Hollenbeak, 2017). According to the Montana Office of Epidemiology and Scientific Support, the rate of NAS in Montana neonates increased from 0.8 to 9.0 per 1,000 hospital births between 2000 to 2013 (Montana Department of Public Health and Human Services [MTDPHHS] Montana Hospital Discharge Data System [MHDDS], 2013). The rates of NAS in Montana have increased dramatically, even when compared to the increase on a national level.

Treatment for NAS primarily depends on the severity of withdrawal symptoms and often can be assessed and treated on the postpartum unit. However, some cases

necessitate admission to a neonatal intensive care unit. Critical access hospitals (CAH) often do not have neonatal intensive care units so the care team must have the skills, tools and confidence to identify and monitor withdrawal symptoms. It is imperative for these healthcare workers to have the knowledge of when the infant needs a higher acuity hospital. The care team can be guided on treatment management and level of severity by using a validated, reliable scale to monitor withdrawal symptoms. Current evidence recommends all nursery units develop a policy to address management of neonates at risk of NAS. The policy should include a scoring system and management protocols, supportive care measures, skin care, and breastfeeding recommendations (Jansson, 2018). Current evidence supports the association between a standardized NAS hospital policy and a consistent NAS scoring system with lower length of pharmacologic treatment, length of stay and neonates discharged on medications for NAS (Patrick et al., 2016).

Although a standardized policy suggests improved outcomes in neonates diagnosed with NAS, Romisher, Hill & Cong (2018) suggested the need for NAS specific education programs in addition to the hospital policy. Franza (2016) discussed that educational programs for the care team resulted in increased confidence levels in caring for neonates with NAS and increased confidence in communicating with opioid addicted parents. Education on the guidelines for using the assessment tool provides the care team with consistent and accurate scores for diagnosing NAS and treatment management (Timpson et al., 2018).

Background

The United States opioid drug use has increased four-fold in the past decade. The four-fold increase includes the opioid drug use among pregnant women, which increased 127% between 1998 and 2011 (Reddy, Davis, Ren, & Greene, 2017). The increase in opioid use has led to an increase in obstetric and neonatal complications, including spontaneous abortion, membrane rupture, preeclampsia and NAS (Lind et al., 2017). According to Lucas & Knobel (2012),

> "fetal exposure usually occurs for one of three reasons: (a) mothers are addicted to opioids, either prescribed or illicit; (b) mothers require prescription opioids for another disease process; or (c) mothers receive methadone therapy or other agents to facilitate safe withdrawal from addiction to prescription or illicit opioids" (p.40).

The increased addiction and prescription rate of opioids among the general population has translated to an increase in the pregnant population since many of these addictions and prescriptions occur pre-pregnancy and carry over after the women become pregnant.

Opioids cross the fetoplacental and hematoencephalic barriers and circulate through the fetus during pregnancy (Lucas & Knobel, 2012). As the fetus grows, more opioid is transferred affecting term neonates more than preterm neonates (Raffaeli et al., 2017). When the umbilical cord of a newborn is clamped the newborn is no longer receiving opioids through the placenta and the cascade of opioid withdrawal symptoms begins. The newborn will continue to metabolize and excrete the remaining drug in their system until there is no more circulating drug. Neonatal withdrawal symptoms are seen when serum opioid levels decrease (Lucas & Knobel, 2012).

The American Academy of Pediatrics (AAP) released a policy statement in 2012 reporting that greater than 50% of neonates exposed to opioids will develop NAS (Hudak & Tan, 2012). The report contained many recommendations for the management of NAS. The recommendations included encouraging all hospitals to develop a policy to standardize care for neonates diagnosed with NAS. The policy should include maternal screening of all pregnant women by interview to identify risk factors for opioid use. If the woman is positive for risk factors or suspected of opioid use, the policy should include urine and biological screening of the neonate (urine, meconium or cord tissue) (Hudak & Tan, 2012). A large variation in patient management for these withdrawing neonates remain despite the AAP policy statement release in 2012. In addition to provider expertise, some of these variations among facilities include environmental factors and hospital factors. Environmental factors include mother-infant rooming in and breastfeeding. Hospital-related factors are the assessment tools utilized, noise level of the nursery, policies and protocols. The variations of environmental and hospital factors affect management of withdrawing neonates if the variation does not follow the AAP recommendations (Raffaeli et al., 2017).

The most commonly used assessment tool for identifying, diagnosing and managing NAS in neonates is the Finnegan Neonatal Abstinence Scoring Tool (FNAST). The FNAST was originally developed in 1975 to provide a quantitative evaluation of the clinical status of a neonate withdrawing. The tool assisted in the standardization of assessment and treatment in these infants (Finnegan, Connaughton, Kron & Emich, 1975). The tool breaks down the signs and symptoms into three categories: (a) central

nervous system disturbances, (b) metabolic, vasomotor and respiratory disturbances, and (c) gastrointestinal disturbances. Each category has four to nine assessment items to score (Finnegan et al., 1975). Although this tool has been regarded as a reliable assessment tool, some of the items are subjective, such as excessive irritability or poor feeding. Therefore, education of the observer/assessor and utilizing more than one rater to account for interrater variability are important components to improve consistency (Timpson et al., 2018). Although the FNAST is the most widely used NAS scoring tool, other tools have been developed, such as eat, sleep, console (ESC), Lipitz Withdrawal Scale (LWS) and Maternal Opioid Treatment: Human Experimental Research NAS Scale (MNS).

Statement of the Problem

The opioid use among pregnant women has increased, which has led to a rise in the rate of NAS. Infants with NAS are delivered at rural and urban locations throughout the country. The rural CAH often lacks the resources (policy development and education updates) to prepare health care team members for safe care of infants that present with NAS.

Purpose

The purpose of this project is to improve team member confidence when providing care for neonates suspected of substance withdrawal at a CAH in Montana by: (a) developing and implementing a policy on care and treatment of a drug dependent newborn; (b) educating the team providing care to these neonates on the use of NAS

scoring tools; and (c) evaluating the education and improved confidence levels of the health care team.

Inquiry Question

In providers caring for neonates suspected of drug withdrawal, does implementation of a NAS evidenced-based policy and a NAS education program improve health care provider knowledge, confidence and perceived ability to care for neonates suspected of substance withdrawal as compared to no policy/education?

Conceptual Framework

Meleis' two-part transitions theory was used as a conceptual framework for this project. "The first (part) is an intervention made to facilitate transition and promote well-being and mastery of change consequences...the second and most important part is an understanding of the transition experience itself, for patients and significant others, which is defined as the experience during a passage from one state to another state" ("Transitions theory," n.d., pp.1-2). Meleis (2015) identified change triggers as developmental, situational, health-illness and organizational.

The project applies the first intervention in the transitions theory by providing the health care team with the knowledge and skills to assist the neonate suffering from withdrawal transition to the world outside the uterus. The project addresses the second part of transitions theory by providing education to help understand the transitional change triggers of a neonate transitioning along with the organizational transitions of a new policy. The new evidenced-based policy on the unit provides parent education to

meet the goal of preparing families for the health-illness transition. Interventions will include mobilizing support, and clarifying roles, competences and meanings.

Significance of the Study to Nursing

The significance of this project to nursing is that most of the assessment and management of the neonate affected by opioid withdrawal is within the role and scope of the registered nurse and the advanced practice nurse. The NAS assessment tool is scored by nurses and guides pharmacologic and non-pharmacologic interventions.

Although care of the neonate affected by NAS involves pharmacological interventions, the first line therapy is non-pharmacologic. All of the non-pharmacologic measures can be implemented by a nurse without a provider's order (Raffaeli et al., 2017). All neonates with NAS require a soothing and calm place without overstimulation. Clustered nursing care, swaddling, non-nutritive sucking, music therapy, promotion of breastfeeding, supportive care of the family, promotion of maternal-neonatal attachment are all care interventions within the nursing scope of practice (McQueen & Murphy-Oikonen, 2016). The interventions are linked to shorter hospital stays and less pharmacological management (Reddy et al., 2017). Therefore, a standardized policy implemented as a resource empowers the nurse and care team to carry out the non-pharmacologic measures prior to initiating pharmacologic interventions. Education on the NAS scoring tools provides the nurses the quantitative measure on improvement or decompensation of the neonate.

The implementation of this project is related to the doctor of nursing practice (DNP) role. There are eight DNP essentials that define the foundational competencies of

all DNP graduates (American Association of Colleges of Nursing [AACN], 2006). The project addresses practice issues requiring the integration of scientific underpinnings and a literature review to develop an evidenced-based practice change (DNP essentials I and III). The development of a policy within an organization to make improvement is one of the three goals of the project, which is addressed in the DNP essentials II and V. Interprofessional collaboration to improve patient health outcomes (DNP essential VI) is essential for the success of this project (AACN, 2006).

Operational Definition of Terms

- Neonatal Abstinence Syndrome (NAS) - an infant born to an opioid addicted mother suffering from opioid withdrawal (Patrick et al., 2016)
- Neonate - an infant less than four weeks old, greater than 34 weeks gestation (Raffaeli et al., 2017)
- Critical Access Hospital (CAH) - hospital located in a rural community, more than 35 road miles from another hospital and has less than 15 inpatient beds (Montana Hospital Association [MHA], 2016)
- Opioid - class of drugs that activate mu-opioid receptors, including, but not limited to morphine, heroin, methadone, and fentanyl (National Institute on Drug Abuse [NIDA], n.d.)

Assumptions

The assumptions identified for this project include care team participation and improvement. The care team is expected to participate in the education program along

with completing pre and post surveys. The assumption is that the care team will exhibit improvement in knowledge and confidence of NAS as assessed by the surveys.

Organization of the Remainder of the Project

The following chapter is a literature review on the validity of the FNAST and other NAS scoring tools, management of a neonate with NAS, and nurse confidence levels for caring for neonates with NAS. Chapter three discusses project methodology including the design overview, setting, procedures and data analysis. The last two chapters (chapter four and chapter five) report findings, conclusions and recommendations.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

The purpose of this chapter is to first, discuss the search methods used to uncover the evidence and second, to review the pertinent literature. Specific areas of the literature related to the purpose of this project were searched including the following: NAS assessment based on FNAST and other scoring methods; the pharmacologic and nonpharmacologic management of NAS; and, confidence levels of the care team in providing care for neonates withdrawing from opioids. The section on nonpharmacological management of NAS is divided into environment and breastfeeding.

Search Methods/Results

The search methods used for this topic included three separate literature reviews. The databases used for all three literature reviews were: Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete, Medline and PubMed.

Neonatal Abstinence Scoring Tools

For literature on the FNAST and other NAS scoring tools, the following search terms were used in each database: ("Finnegan*" OR "FNAST") AND "valid.*" In CINAHL the articles were limited to peer-reviewed, which yielded 11 articles. Only six of the 11 articles reviewed the validity or compared the FNAST to another tool (Fox, Kavanagh & Fielder, 2016; Gomez-Pomer et al., 2016; Jones et al., 2016; Retskin &

Wright, 2014; Zimmermann-Baer, Notzli, Rentsch & Bucher, 2010). In Medline the articles were limited to the following MeSH headings: "Neonatal Abstinence Syndrome," "Infant Newborn," and "Opioids," which yielded 16 articles. Twelve of the articles were unrelated and the remaining four articles were duplicates. In PubMed the search terms yielded nine articles. After accounting for duplicates and unrelated articles, two related articles were added (Timpson et al., 2018; Newman, 2014). The seven articles yielded from the search are discussed below.

Treatment/Management

For literature on treatment and management of a neonate with NAS, the following search terms were used: "Neonatal Abstinence Syndrome" AND ("manag*" OR "treat*" OR "*pharm"). As mentioned above, CINAHL Complete, PubMed and Medline databases were used. Additional databases were PsychInfo, UpToDate, Cochrane Library and Joanna Briggs Institute Evidence Based Practice Database. Additional resources included were Centers for Disease Control & Prevention (CDC), World Health Organization (WHO) and the American Academy of Pediatrics (AAP).

Many of the databases had overlapping results, after duplicates and non-relevant studies were eliminated, seven primary research studies were included for environment, nine on breastfeeding, and five on pharmacological options. Multiple systematic reviews and clinical guidelines helped guide the literature review and are included below.

Confidence Levels of Care Team

With the assistance for the Montana State University librarians, a literature review was completed using CINAHL Complete, Medline and PubMed. The database Google

Scholar was added to increase the search results. Many varieties of the following search terms were used: “nurs,*” “confiden,*” “attitude,*” “knowledge,” AND “Neonatal Abstinence Syndrome.” The results were limited to academic journals, full text and English in each database. An overwhelming number of unrelated results returned and narrowing any further proved difficult therefore results were manually reviewed resulting in seven articles with some portion of the article related to the topic.

Literature Reviewed

The three topics discussed below include the neonatal abstinence scoring tools, treatment/management of NAS and confidence levels of the care team.

Neonatal Abstinence Scoring Tools

The FNAST was developed in 1975 by L.P. Finnegan for the assessment of a neonate from an opioid-addicted mother. The scoring tool consists of 21 of the most common signs of neonates with NAS. The tool has cut off points (three consecutive scores ≥ 8 or two consecutive scores ≥ 12) for the identification of the neonates that may require further treatment (Finnegan, Connaughton, Kron & Emich, 1975). Although there are many NAS tools, the FNAST and modified versions of FNAST are the most widely used for NAS scoring across the United States (Hudak & Tan, 2012). Multiple studies have compared alternate neonatal withdrawal scales to the FNAST and are discussed below.

Fox, Kavanagh & Fielder (2016) compared the Lipitz Withdrawal Scale (LWS) to a version of the FNAST. The retrospective study included 62 neonates diagnosed with

NAS. Statistically significant differences were seen in the time to treatment initiation and time to scoring commencement. Time to treatment initiation happened earlier in the FNAST group than the LWS group [$t(12) = 5.09$, $p < .001$, $d = 4.2$]. No statistically significant difference in the requirement to treat between the two groups (neonates assessed with LWS and neonates assessed with FNAST) was shown. The scales were found to be essentially the same in identifying and treating at risk neonates (Fox, Kavanagh & Fielder, 2006).

Another study compared FNAST to the Maternal Opioid Treatment: Human Experimental Research NAS Scale (MNS) (Jones et al., 2016). Secondary analysis of data was completed on 131 neonates. The neonates diagnosed with NAS were scored using the MNS and retroactively scored using the FNAST. Cronbach's alpha (0.62) was used for statistical measures of internal consistency. Jones et al. (2016) suggested that neither NAS tool had acceptable psychometric screening abilities. However, the limitations of the study included the secondary analysis of data from a separate study and the need to retroactively assign scores on the FNAST according to the scores indicated on the MNS.

Newman (2014) wrote an evidence-based practice brief answering the clinical question, "which tool is superior to guide identification, assessment, and treatment of NAS?" (p.181). The author reviewed the FNAST, LWS, Neonatal Withdrawal Inventory (NWI), Sophia Benzodiazepine and Opioid Withdrawal Checklist (SBOWC) and Withdrawal Assessment Tool (WAT-1). Ultimately, Newman's (2014) recommendations

aligned with the American Academy of Pediatrics (AAP) in the use of the FNAST or a modified version.

Though the FNAST appears to be the assessment tool of choice, there are multiple articles that have reviewed the factors influencing the consistency and validity. Zimmerman et al. (2010) completed a study evaluating the FNAST on non-opiate addicted neonates to verify healthy neonates would not score high enough for pharmacological treatment. The researchers scored healthy infants in the first three days of life and during weeks five and six. In this study 102 neonates were enrolled for the first three days of life and only 26 neonates were evaluated in weeks five and six of life. Results suggest the cutoff of three consecutive scores greater than or equal to eight is appropriate for initiation of pharmacological treatment of opioid affected infants. Additionally, the results from Zimmerman et al. (2010) suggested an increase of the baseline and day-night cycles at five to six weeks of life. Alternately, Gomez-Pomar et al. (2017) analyzed data from two institutions in 2014 compiling over 40,000 score observations from 367 neonates, a much larger sample size than Zimmerman et al. (2010). Analyses were completed to assess nursing experience, day of the week and time of day on the variation of scores. No statistically significant differences were seen in variation of scores using a linear mixed effects model analysis based on time of day ($p=0.78$) or weekday versus weekend ($p=0.46$) (Gomez-Pomar et al. 2017). The comparison of studies yields a discrepancy in results on day-night cycles (Zimmerman et al., 2010) though Gomez-Pomar at al. (2017) did not evaluate neonates at week five and six, which could account for the difference. Both studies supported FNAST as an

objective tool for identifying narcotic withdrawal in infants (Gomez-Pomar et al., 2017; Zimmerman et al., 2010).

The FNAST was evaluated for interobserver reliability in a cross-sectional study (Retskin & Wright, 2014). The median total score resulted in an interclass correlation coefficient (ICC) of 0.996 indicating excellent reliability between observers (Retskin & Wright, 2014). However, the individual scores on the 21-item FNAST had much less interobserver reliability [ICC of 0.694] (Retskin & Wright, 2014) indicating a concern about whether clinical decisions of pharmacological treatment are made based off the reliability of these scores. The implications of this research indicated a need for more education of the nurses assigning the scores surrounding the use of the FNAST. Timpson et al. (2018) completed a quality improvement project to increase scoring consistency and accuracy using the FNAST through education. Post-education scores were significantly closer to the target score indicating that education and training on the FNAST vastly improves accuracy of scoring. A follow-up analysis of consistency was completed and suggested the improvement did persist over time indicating a need for annual training on the FNAST (Timpson et al., 2018).

Recently, a new NAS scoring tool is gaining popularity called the ESC model. Grossman et al. (2017) developed a functional assessment as an alternative to the FNAST for infants diagnosed with NAS that considered three parameters: “the infant’s ability to eat, to sleep, and to be consoled” (p.e3). If the infant met these parameters, then no pharmacological intervention was initiated or increased. The results included a reduction of average length of stay for infants from 22.4 days to 5.9 days, a decrease in morphine

use in methadone-exposed infants from 98% to 14% and a $30,000 reduction in NICU costs. No adverse events occurred while using this functional assessment (Grossman et al., 2017). Grossman, Lipshaw, Osborn & Berkwitt (2018) published a follow-up research article of smaller scale indicating similar results: decrease in morphine use when using ESC versus FNAST.

Treatment/Management

The following section is divided into non-pharmacological and pharmacological interventions. Non-pharmacological interventions include environment and breastfeeding. Pharmacological interventions include medications that have been commonly used to treat NAS withdrawal symptoms, specifically methadone, morphine and buprenorphine.

Non-pharmacological interventions. The initial treatment of infants identified with NAS should be supportive and non-pharmacological. The following non-pharmacological interventions aid in avoiding or reducing the need for pharmacotherapy and decreasing length of inpatient stay (Hudak & Tan, 2012; Jansson, 2008; Grossman et al., 2017).

Environment. The research from two systematic reviews support a reduction in pharmacological treatment and shorter hospital stays for infants with NAS if a supportive environment is maintained (MacMillan et al., 2018; Wachman, Schiff & Silverstein, 2018). The supportive environment involves parental presence or rooming-in, the process in which the infant remains with the mother or family for the duration of the

inpatient stay. Several retrospective studies have examined the effects of rooming-in and/or parental presence as a treatment modality for infants affected by NAS (Abrahams et al., 2007; Abrahams et al., 2010; Holmes et al., 2016; Howard, et al. 2017; Hünseler, Brückle, Roth, & Kribs, 2013; Newman et al., 2015; Saiki, Lee, Hannam & Greenough, 2010; Grossman et al., 2017). The mean length of pharmacologic intervention is associated with a decrease (range, 20%-60% reduction) among those infants rooming-in with family (Abrahams et al., 2007; Holmes et al., 2016; Howard, et al. 2017; Hünseler et al., 2013; Grossman et al., 2017; Newman et al., 2015; Saiki et al., 2010) indicating that rooming-in with family can reduce pharmacological interventions. Additionally, researchers suggested that length of inpatient stay is reduced (mean, 3-7 day reduction) among those infants rooming-in or having parental presence (Abrahams et al., 2010; Grossman et al., 2017; Holmes et al., 2016; Newman et al., 2015; Saiki et al., 2010). Lastly, Abrahams et al. (2010) demonstrated a 2-fold increase in breastfeeding initiation among those infants rooming-in.

Breastfeeding. The systematic review completed by Wachman, Schiff & Silverstein (2018) evaluated feeding practices as well. The research showed a positive association between shorter length of inpatient stay and decreased need for pharmacological therapy in breastfed infants (Wachman, Schiff & Silverstein, 2018). Each primary study included in the systematic review is outlined below.

Any amount of breastfeeding was associated with a mean reduction of three to seven days in length of hospital stay (Crook & Brandon, 2017; O'Connor, Collett, Alto & O'Brien, 2013; Pritham, Paul & Hayes, 2012; Short, Gannon & Abatemarco, 2016;

Wachman et al., 2013). Breastfeeding was also linked to a range of 7% to 44% reduction in pharmacotherapy use (Crook & Brandon, 2017; Dryden, Young, Hepburn & Mactier, 2009; Isemann, Meinzen-Derr & Akinbi, 2011; O'Connor et al., 2013; Wachman et al., 2013; Welle-Strand et al., 2013). All the studies were limited by a lack of ability to control for rooming-in. As discussed above, rooming-in is associated with similar outcomes as studies of breastfeeding.

<u>Pharmacological interventions.</u> Although pharmacological intervention is not the first line of treatment for an infant exhibiting signs of withdrawal, it can be an important part of the short-term treatment plan to control symptoms. There have been several research studies comparing different medications in the treatment of NAS symptoms. The following literature review will be limited to the most commonly used medications: morphine, methadone, and buprenorphine.

Brown, Hayes & Thornton (2015) and Young, Hager & Spurlock (2015) compared morphine to methadone use. Brown et al. (2015) associated methadone with reduced number of pharmacological treatments days when compared to morphine (median 14 versus 21 days, $p=0.008$), whereas Young et al. (2015) discovered the opposite (mean 7 versus 38 days, $p=0.001$). Several studies have compared buprenorphine with methadone and morphine. Shorter hospital stays and a reduced number of days of pharmacological treatment were associated with buprenorphine (Hall et al., 2016; Hall, Rice, Folger & Wexelblatt, 2018; Kraft et al., 2017).

In addition to primary studies, multiple systematic reviews and clinical guidelines have supported use of all three of these medications. Wachman, Schiff & Silverstein

(2018) completed a systematic review and report, "methadone, morphine and buprenorphine are the most commonly studied first-line pharmacologic agents, with current available evidence not definitively favoring one agent over another" (p.1371). Jansson (2018) recommended first line pharmacological treatment to begin with morphine or methadone, but also have buprenorphine listed under the preferred opioid therapy options. The recommendation is consistent with the AAP recommendation, "limited available evidence from controlled trials of neonatal opioid withdrawal supports the use of oral morphine solution and methadone when pharmacologic treatment is indicated" (Hudak & Tan, 2012, p.e555).

Confidence Levels of Care Team

Limited studies have specifically addressed the confidence levels of the care team treating a neonate with NAS (Cook, Dahms & Meiers, 2017; Franza, 2016; Timpson et al., 2018), but several studies have addressed the nurses' experience, knowledge and attitudes while caring for this population (Fraser, Barnes, Biggs & Kain, 2007; Lucas & Knobel, 2012; Maguire, Webb, Passmore & Cline, 2012; Murphy-Oikonen, Brownlee, Montelpare & Gerlach, 2010; Romisher, Hill & Cong, 2018). Cook et al. (2017) completed a quality improvement project assessing the nurses' knowledge and confidence caring for neonates with NAS following implementation of a clinical practice guideline (CPG) on the unit. A Nurses' Knowledge and Confidence Survey (NKCS) was administered prior to and following implementation of the CPG. The results supported increased confidence levels of the care team, specifically in discharge education and NAS assessment (Cook et al., 2017). Similarly, Franza (2016) completed a quality

improvement project focused on education of NAS and using the FNAST. Increased confidence was reported by 93% of the RN/APRN's in their ability to care for infants with NAS and 90% reported increased confidence in effective communication with mothers of these infants (Franza, 2016). Timpson et al. (2018) also completed a quality improvement project, but this study was an initiative to improve the consistency and accuracy of FNAST scores. Although specific analysis was not completed on improved confidence levels, Timpson et al. (2018) discussed the nursing staff having increased confidence levels assigning NAS scores following education provided on the FNAST.

Multiple qualitative studies have been completed exploring nurses' experiences and attitudes surrounding the care of neonates with NAS (Fraser et al., 2006; Maguire et al., 2012; Murphy-Oikonen et al., 2010; Romisher et al., 2018). Although qualitative research represents a lower level of evidence, the frustration and stress in caring for the NAS infants along with negative interactions with the mothers were common themes expressed by the nurses is important to note (Fraser et al., 2006; Maguire et al., 2012; Murphy-Oikonen et al., 2010; Romisher et al., 2018). Education of the care team was a large discussion point highlighting the need to improve perceptions on drug addiction in adults and skills necessary to provide care to neonates diagnosed with NAS (Fraser et al., 2006; Maguire et al., 2012; Murphy-Oikonen et al., 2010). Gaps in education on nonpharmacological techniques and lack of a standardized plan of care on the unit adds to the frustration experienced by nurses (Romisher et al., 2018). Additionally, a quality improvement project focused on education and implementation of a CPG with a discussion that the program "equips caregivers with the necessary tools to consistently

and accurately assess an infant with NAS when using the FNAST" (Lucas & Knobel, 2012, p.40).

Conceptual Framework

Dr. Meleis' transitions theory was used to guide this project. Although there is no specific literature in relation to the direct application of transitions theory to health care providers and neonatal abstinence syndrome, there are two examples of transitions applied to becoming a mother and one of a mother's transition to infants in special circumstances.

The most relevant study of transitions involving infants in special circumstances was completed in 2007. Shin & White-Traut (2007) researched the transition to motherhood for mothers with infants in a neonatal intensive care unit. The outcomes of the study involved attributes of transition to motherhood, causes of these transitions and consequences. Mother-infant separation resulting from the infant's time in the neonatal intensive care unit caused a lack of opportunity to bond with the infant. The outcome of this study focused on nurses understanding of the transitions of mothers with infants having special needs and planning appropriate interventions for these families (Shin & White-Traut, 2007). The infant bonding and transitions emphasize the importance of maintaining maternal-infant rooming-in when possible for infants suffering from symptoms of NAS.

Another study completed in 2004 addressed the developmental transitions of mothers. Mercer (2004) reviewed the current research, identifying key aspects of motherhood. "Maternal identity continues to evolve as the mother acquires new skills to

regain her confidence in self as new challenges arise" (Mercer, 2004, p.226). The transitions theory applies to distinct transition from no children to motherhood. This project aims to provide the health care team with the knowledge necessary to educate mothers on new skills and build confidence in caring for their infant. Meleis' transition theory provided a structure for construction and implementation of this project.

CHAPTER THREE

METHODS

Introduction

The purpose of this project is to improve confidence in the team providing care for neonates suspected of substance withdrawal at a CAH in Montana by: (a) developing and implementing a policy on care and treatment of a drug dependent newborn; (b) educating the team providing care to these neonates on the use of NAS scoring tools; and (c) evaluation of the education and improved confidence levels of the health care team. This chapter will discuss the design overview, setting, population, protection of human subjects, procedures for implementation and data collection and how the data will be analyzed.

Design Overview

The project presented is a quality improvement project and is thus non-experimental. An evidenced-based policy and education program was implemented on the unit. A pretest/posttest design was used to evaluate change in nursing knowledge on NAS/scoring tools. A survey was administered prior to the education and following the education program to evaluate confidence in caring for neonates diagnosed with NAS.

Setting/Sample and Population

The setting for this quality improvement project was a CAH in rural Montana. The hospital had 25-inpatient beds with inpatient services covering medical, surgical and obstetrical patients. Within the inpatient obstetrical department, there was a labor & delivery unit, postpartum unit and nursery. The staff included ten nurses, two obstetricians and five pediatric providers. The hospital averaged 180 births per year. Although there were no exact figures on the number of NAS diagnoses per year, in a six-month timeframe in 2018, at least two were noted (A. Sorenson, personal communication, February 25, 2018). The obstetricians did not provide newborn care so for the sake of this study, the two obstetricians were omitted; the remaining 15 healthcare team (including providers and nurses) were invited to participate in this project. The incidence of NAS on this unit had not previously been established due to unclear diagnostic criteria with providers coding and discrepancy on NAS withdrawal symptoms relating to health care team education on the topic.

Protection of Human Subjects

The project was reviewed by the Institutional Review Board (IRB) at Montana State University (MSU) in Bozeman. The project underwent expedited review. The consent form (see Appendix C) was approved, and authorization was given to move forward with the project.

Procedures/Measures

The evidence-based policy was developed through careful review of the literature and guidance from other facilities policies regarding NAS. The policy described

symptoms of neonatal withdrawal, nonpharmacologic and pharmacologic treatment options, blood tests to consider, special considerations and patient teaching. The policy underwent thorough evaluation by the OB manager on the unit and pediatric providers. Pharmacological treatment options need to be cleared by hospital administration and pharmacy. The staff made the final decision on whether the FNAST or ESC method was to be used and included in the policy.

With permission, a test was adapted from a similar quality improvement project completed by Dr. Jeanne Franza, DNP, APRN, NNP-BC to evaluate the care team knowledge of NAS and FNAST before and after the education program was given (Appendix A). Franza (2016) completed the project at the MidState Medical Center in Meriden, Connecticut. “Content validity was verified by three experts” (Franza, 2016, p.e6). The pre and post tests were identical with 13 questions.

A confidence survey was administered before and after the education program to evaluate the confidence level of each health care team member on caring for infant diagnosed with NAS and the confidence in using NAS scoring tools. This confidence survey was adapted, with permission, from a similar quality improvement project performed by Dr. Christy Cook, DNP, Dr. Shannon Dahms, DNP and Dr. Sonja Meiers, PhD (See Appendix B). Cook, Dahms & Meiers (2017) implemented a quality improvement project at a rural Midwest hospital assessing nurses’ knowledge and confidence in caring for neonates with NAS. The pre and post surveys were identical with 15 survey questions. The participants rated their confidence on a scale from one to four (not confident to very confident).

The education program was adapted, with permission, from Dr. Franza, based on her DNP quality improvement project. Dr. Franza assisted in providing some valuable knowledge on changes to be made to the PowerPoint program. Although she used an educational DVD during implementation of her quality improvement project, she did not feel this portion of the educational program added to the overall knowledge of NAS and NAS scoring tools (J. Franza, personal communication, September 6, 2018).

Following administration of the consent, confidence survey and pre-test, the educational program was organized by this author on the unit. The educational program, a PowerPoint, was reviewed in detail with the health care professionals providing care to neonates suspected of substance withdrawal. The educational training was offered on two dates identified by the OB manager and was presented to the staff as a mandatory training. Immediately following the educational training, the post-test and confidence survey were administered.

Data Analysis

The statistical methods and survey scales were developed with the assistance of the Statistical Consulting and Research Services (SCRS) at Montana State University. The data was analyzed using a two-tailed paired samples t-test to compare the means represented at two different times, pretest versus posttest, for the confidence survey and knowledge test. The average mean difference in scores, standard deviation of the divergence, standard error of the difference, and confidence levels were calculated based on the t-test.

CHAPTER FOUR

RESULTS

Introduction

The rates of diagnosis of neonatal abstinence syndrome (NAS) have been steadily increasing in the United States (Patrick et al., 2012; Patrick, Davis, Lehmann & Cooper, 2015). Treatment for NAS primarily depends on the severity of withdrawal symptoms and often can be assessed and treated on the postpartum unit. Healthcare providers must have the skills, tools and confidence to identify and monitor withdrawal symptoms. Current evidence has recommended all nursery units develop a policy to address management of neonates at risk of NAS. The policy should include a scoring assessment tool and management protocols, supportive care measures, skin care, and breastfeeding recommendations (Jansson, 2018). Education on the guidelines for using the assessment tool provides the care team with consistent and accurate scores for diagnosing NAS and treatment management (Timpson et al., 2018). Therefore, the purpose of the project was to improve team member knowledge and confidence when providing care for neonates suspected of substance withdrawal at a critical access hospital (CAH) in Montana by: (a) developing and implementing a policy on care and treatment of a drug dependent newborn; (b) educating the team providing care to these neonates on the use of NAS scoring tools; and (c) evaluating the education and improved confidence levels of the health care team.

Characteristics of Population

The target population was health care providers caring for neonates suspected of drug withdrawal. The need for education surrounding infants affected by NAS was identified after working within the unit during a travel nurse contract. The inpatient obstetrical department at the project site, included labor & delivery, postpartum and nursery. The project site hospital averaged 180 births per year. Although exact figures on the number of NAS diagnoses per year were not available, in a six-month timeframe, at least two were identified (A. Sorenson, personal communication, February 25, 2018). The incidence of NAS on the unit was not established due to unclear diagnostic criteria with providers coding and discrepancy of NAS withdrawal symptoms relating to health care team education on the topic.

The staff included eight full-time nurses, one travel nurse, one part-time nurse and five pediatric providers. The 15 providers and nurses at the project site were invited to participate in this project. Attendance in the training was mandatory for all full-time nursing staff. Attendance was made optional for part-time nursing staff, travel nursing staff and providers by the unit manager. Three pediatric providers and one part-time nurse were unable to attend the educational sessions. Completing the surveys was not required for staff unable to attend.

Intervention

An educational PowerPoint was developed to provide knowledge on neonates suspected of drug withdrawal. Surveys were distributed prior to and following the education sessions to assess both confidence levels and knowledge of the health care team. Demographic information, including role (pediatric provider or registered nurse),

number of years in this role and number of years in this role at this facility, was collected. The knowledge survey assessed general knowledge specific to the assessment of neonates suspected of drug withdrawal using a multiple-choice format with 13-questions. The test was adapted from a quality improvement project by Franza (2016). Confidence was assessed by a 15-question survey with a four-point Likert scale designed to assess confidence: not confident (1), somewhat confident (2), quite confident (3), highly confident (4). The confidence survey was adapted from a quality improvement project by Cook et al. (2017) and distributed before and after the education session. The surveys administered on confidence and knowledge were identical before and after the education session. Secondarily, a NAS evidenced based policy was developed in conjunction with the staff.

Demographic Information

Demographic information was collected on all staff agreeing to participate in the project. Eleven total participants, including nine nurses (81.8%; eight full-time nursing staff and one travel nurse) and two pediatric providers (18.2%), attended and completed both surveys. All attendants were female, age was not assessed. The total average years' experience was 10 years (range 1.5-26 years, median 6 years) with a total average years' experience at this facility of 3.4 years (range 0.2-9 years, median 3.5 years). The physician specific total average experience was less than three years. Of the two physicians participating in the project, both provided pediatric care, however, only one physician with two years' experience trained specifically as a pediatrician, the other physician trained as a family practice physician.

Table 1. Demographic Data

Roles	Nurses	9	81.8%
	Pediatric Providers	2	18.2%
Sex	Female	11	100%
	Male	0	0%
Experience in Role	Mean/Median [Range]	10 / 6 [1.5-26]	
	Less than 5 years	5	45.5%
	5-10 years	1	9.1%
	10-15 years	2	18.2%
	Greater than 15 years	3	27.3%
Experience in Role on current unit	Mean/Median [Range]	3.4 / 3.5 [0.2-9]	
	Less than 5 years	8	72.7%
	5-10 years	3	27.3%
	10-15 years	0	0%
	Greater than 15 years	0	0%

Cleaning and Evaluation of Data

The participants attending the education session were required to bring the completed pre-education surveys to the educational session. Following the education session, participants completed the post-education surveys. The surveys were assessed for completion when handed in and participants were asked to complete any missing data. Data was entered into an Excel spreadsheet. The data was verified by an outside source to avoid data entry error.

Data Analysis

Pre-Intervention Knowledge Scores

Sample size for the project was eleven. Surveys completed pre-education had a mean knowledge score was 67.8%. The standard deviation was 18% with a range of

30.7%-100%. Results from the pre-intervention knowledge scores are presented in Table 2.

Table 2. Mean, Standard Deviation and Range of Scores for Pre-Intervention Knowledge Scores

Sample size (n)	11
Mean score (percentage correct)	67.8%
Standard Deviation	18%
Range of scores (percentage correct)	30.7%-100%

Post-Intervention Knowledge Scores

The knowledge survey was distributed immediately following the education session and participants returned the survey prior to leaving the conference room. Post education, participants answered 92.3% of the questions correctly. The standard deviation was 8.6% with a range of 76.9%-100%.

Table 3. Mean, Standard Deviation and Range of Scores for Post-Intervention Knowledge Scores

Sample size (n)	11
Mean score (percentage correct)	92.3%
Standard Deviation	8.6%
Range of scores (percentage correct)	76.9%-100%

Comparison of the Knowledge Scores

A paired samples t-test was conducted to assess the effect of the NAS education program and the implementation of a NAS evidenced-based policy on health care provider knowledge of neonates suspected of substance withdrawal as compared to no education/policy. There was a significant improvement in the scores for knowledge prior to the education session (M=0.68, SD=0.18) when compared to knowledge after the

education session (M=0.92, SD=0.09); t(12)=2.18, p=0.0001, an alpha of α = 0.05 was set a priori. The results suggest implementation of a NAS educational program including education regarding the implementation of a corresponding evidence-based policy, has a statistically significant effect on provider and nurse knowledge about NAS. Specifically, the results suggest NAS education improved provider/nurse knowledge. Results of the paired t-test examining the effect of NAS education on healthcare provider knowledge is presented below in Table 4.

Table 4. Paired Samples t-Test Examining Effect of NAS Education Program on Healthcare Provider Knowledge

	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference Lower**	**Upper**	**t**	**df**	**Sig. (2-tailed**
Pre-Intervention – Post-Intervention	0.25	0.16	0.04	0.15	0.34	2.18	12	0.0001

<u>Pre-Intervention Confidence Scores</u>

The confidence survey was completed prior to the education session. All eleven participants completed the 15-question confidence survey. Pre-intervention, the mean confidence score was 2.36 on a four-point scale indicating a result between somewhat confidence and quite confident. The standard deviation was 0.45 with a range of 1.47-3.27. The mean, standard deviation and range of pre-intervention confidence scores is presented below in Table 5.

Table 5. Mean, Standard Deviation and Range of Pre-Intervention Confidence Scores

Sample size (n)	11
Mean score	2.36
Standard Deviation	0.45
Range of scores	1.47-3.27

Post-Intervention Confidence Scores

The confidence survey was distributed with the knowledge survey immediately following the education session. Participants were required to complete the post-intervention confidence survey prior to leaving the conference room. Post-intervention, the mean confidence score was 3.01 on a four-point scale indicating a result between quite confident and highly confident. The standard deviation was 0.34 with a range in scores from 2 - 3.47. The mean, standard deviation and range of post-intervention confidence scores is presented below in Table 6.

Table 6. Mean, Standard Deviation and Range of Post-Intervention Confidence Score

Sample size (n)	11
Mean score	3.01
Standard Deviation	0.34
Range of scores	2-3.47

Comparison of the Confidence Scores

A paired samples t-test was conducted to assess whether the implementation of a NAS evidenced-based policy and a NAS education program improves health care provider confidence in caring for neonates suspected of substance withdrawal as compared to no education/policy. There was a statistically significant improvement in the scores for confidence prior to the education session (M=2.36, SD=0.45) when compared to confidence after the education session (M=3.01, SD=0.34); t(14)=2.14,

$p<0.0001$, $\alpha = 0.05$. The results of the comparison of confidence scores suggests implementation of the NAS education had a statistically significant effect on provider/nurse confidence, see Table 7.

Table 7. Paired Samples t-Test Examining Effect of NAS Education Program on Healthcare Provider Confidence

	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**		**t**	**df**	**Sig. (2-tailed**
				Lower	**Upper**			
Pre-Intervention – Post-Intervention	0.65	0.2	0.05	0.54	0.76	2.14	14	<0.0001

Summary of Findings

The purpose of the project was to determine the effect on healthcare provider knowledge and confidence after receiving education on care for neonates suspected of substance withdrawal at a CAH in Montana. Secondarily, a NAS evidenced-based policy was developed and implemented on the unit. The education was provided to all full-time nursing staff. Attendance was made optional for part-time nursing staff and providers by the OB manager. A total of eleven participants completed the education session and both surveys. The surveys were distributed prior to and following the education session to assess knowledge and confidence of staff when caring for neonates suspected of substance withdrawal. Improvement in knowledge and confidence scores was statistically significant following the implementation of a NAS education program and NAS evidenced-based policy. The results supported the hypothesis that education would

improve knowledge and confidence levels of the health care team. The next and final chapter will discuss findings of this project. The discussion will include insight as to how the results can be interpreted and applied to other setting as well as directions for further analysis.

CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

Summary

The opioid use among pregnant women has increased, which has led to a rise in the rate of NAS. Infants with NAS are delivered at rural and urban locations throughout the country. The rural CAH often lacks the resources (policy development and education updates) to prepare health care team members for safe care of infants that present with NAS. The goal of the project was to provide resources and education to better prepare health care team members to care for this population.

Literature from a variety of databases were reviewed including, CINAHL Complete, Medline, PubMed, UpToDate. The literature topics included NAS assessment tools, pharmacologic and nonpharmacologic management of NAS and confidence levels of the care team in providing care for neonates withdrawing from opioids.

The project was a quality improvement project and was thus non-experimental. The American Academy of Pediatrics (AAP) policy statement released in 2012 encouraged all hospitals to develop a policy to standardize care for neonates diagnosed with NAS (Hudak & Tan, 2012). In following the policy statement released by the AAP, an evidenced-based policy was developed for the unit. The implementation of the policy was completed within the conceptual framework identified in chapter one. Meleis' transitions theory emphasizes ways to promote well-being and education during transitional experiences. The policy directly addresses strategies to promote health in

neonates suspected of drug withdrawal. The evidenced-based policy on the unit provides parent education to meet the goal of preparing families for the health-illness transition of their neonate.

Romisher et al. (2018) suggested the need for NAS specific education programs in addition to the hospital policy. Education on the guidelines for using the assessment tool provides the care team with consistent and accurate scores for diagnosing NAS and treatment management (Timpson et al., 2018). An education program was implemented on NAS and evaluated using surveys. The results suggest implementation of a NAS educational program including education regarding the implementation of a corresponding evidence-based policy, has a statistically significant effect on provider and nurse knowledge and confidence about NAS. Specifically, the results suggest NAS education improved provider/nurse knowledge and confidence in caring for neonates affected by NAS. The results were consistent with previous research on confidence levels and knowledge surrounding neonates affected by NAS (Cook et al., 2017; Franza, 2016; Fraser et al., 2007; Lucas & Knobel, 2012; Maguire et al., 2012; Murphy-Oikonen et al., 2010; Romisher et al., 2018; Timpson et al., 2018). The education program was completed within the conceptual framework. Meleis' transitional theory focuses on the importance of education to assist with health transitions. Providing education to the staff on care for neonates suspected of drug withdrawal helps staff care for neonates during the health transition at the beginning of the neonate life.

Limitations and Implication for Practice and Future Research

There were several limitations in the project. Most of the correspondence with the facility was done from a distance. The OB manager changed between the initial discussion of the project and the implementation, which added some confusion and changes. Several of the providers, including the OB manager had the flu and were unable to attend the week the project was scheduled to be administered.

The implications for the project included the need for flexibility. The new OB manager wanted the different NAS scoring options discussed at the education session versus focusing on one method. The staff were asked to decide which method they preferred. Once the method was decided, the primary researcher was able to finish the policy which caused a delay in the policy being finalized. The delay may have altered the results of the surveys, specifically the confidence survey question on confidence in using the policy on the unit since the policy was not finalized prior to the staff taking the post-education survey.

Since the preparation for the project was completed from a distance, the project implementation date had to be decided in advance to make travel arrangements. Multiple staff members contracted the flu the week of implementation. All the education documents were provided to the staff who were unable to attend, but surveys were not collected, decreasing the population size for the project.

Ideally, future research would occur at a facility within a comfortable travel distance for increased flexibility with scheduling project implementation. Additionally, if the researcher was employed within the facility, they would have a better sense of employee movement within the unit to avoid last minute changes to the project.

Conclusion

The inquiry question for this project was ‘in providers caring for neonates suspected of drug withdrawal, does implementation of a NAS evidenced-based policy and a NAS education program improve health care provider knowledge, confidence and perceived ability to care for neonates suspected of substance withdrawal as compared to no policy/education?’ The results strongly suggest the answer to the original question was yes. The 6-month follow-up from the OB manager at the facility suggests a successful project. “We have implemented the NAS policy with the ESC model and have used it on two separate occasions. Both times that we used it, it was fantastic and so easy to use” (A. Davis, personal communication, August 20, 2019). The results along with the unit feedback indicate the project had statistical and clinical significance.

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APPENDICES

APPENDIX A

NAS KNOWLEDGE SURVEY

*test adapted with permission from Franza (2016)

Role at CHA (circle one): Pediatric Provider Registered Nurse
Years in this role (as a nurse/provider): __________
Years in the this role at CHA: ___________

Nursing Care of NAS Survey. Please circle the letter that corresponds to the correct answer.

1) Your newborn patient has a diagnosis of Neonatal Abstinence Syndrome (NAS), which is a result of sudden discontinuation of exposure to substances that were taken by the mother during pregnancy. The baby is exhibiting classic signs of tremors, irritability, excessive crying, and difficulty sleeping, Finnegan Neonatal Abstinence Scoring Tool scores are 6 to 7. Nursing measures for this baby include:
a. Place in a rocking bed when the infant exhibits excessive crying.
b. Holding and gentle rocking
c. Keep the infant undressed on the warmer to observe for seizures
d. all of the above

2) Newborn infants
a. can be born as drug addicts
b. have a proven high risk of becoming drug addicts as adults
c. are considered drug addicts until they are weaned off Morphine
d. are not capable of being drug addicts

3) When observing for undisturbed tremors in a newborn with NAS during Finnegan scoring, observe for
a. at least one full minute undisturbed
b. at least 5 minutes undisturbed
c. at least 2 one-minute undisturbed periods
d. at least 1 two- minute period undisturbed

4) Excoriation should be scored when using the Finnegan Neonatal Abstinence Scoring Test.
a. if the chin, the nose, or the diaper area is reddened
b. if the skin on the face or extremities becomes reddened due to rubbing
c. when new reddened areas appear in the diaper area when the infant has loose stools
d. if red blotchy areas with a white raised center appear on the face and chest

5) The pathophysiology of NAS includes
a. hyperirritability and anxiety due to Dopamine increase
b. sleep deprivation and sleep fragmentation due to Serotonin increase
c. sleep deprivation and sleep fragmentation due to Serotonin decrease
d. a and c

6) Non – pharmacologic care for infants with NAS
a. is best provided by active maternal participation and rooming- in
b. becomes less crucial once medication is started
c. can be provided at the discretion of the nurse if scores are low
d. is best provided by experienced nurses in the nursery

7) The relationship between the dose of the opioid that a mother has been taking and the severity of the NAS symptoms in the infant can be described as
a. the lower the dose the less severe the infant symptoms
b. the higher the dose, the less severe the infant symptoms
c. no clear relationship exists between maternal dose and infant symptoms
d. the varying doses produce the most withdrawal symptoms in the infant

8) Inter-Observer Reliability checks
a. should be done on a regular basis when using the FNAST
b. evaluate what the mother tells you and determine if it is reliable
c. should be limited in order to avoid overstimulation of the infant
d. all of the above

9) FNAST scoring should be
a. initiated within 4 hours of birth and done every 4 hours
b. initiated within 8 hours of birth and done every 3 hours with feedings
c. initiated within 2 hours of birth and done every 3 to 4 hours
d. initiated within 6 hours of birth and done every 3 to 4 hours

10) The preferred technique to check for muscle tone as part of the FNAST scoring is
a. Pull- to- Sit
b. Ventral suspension
c. Flexion and Extension
d. Upright Suspension

11) Oral Morphine is the most commonly used medication for NAS. A disadvantage could be
a. possible respiratory depression
b. possible hyperactivity
c. long half life
d. all of the above

12) Breastfeeding infants with NAS
a. does not affect the need for pharmacological treatment
b. is contraindicated if the mother is HIV positive
c. is contraindicated if the mother is Hepatitis C positive

d. b and c

13) The eat, sleep, console (ESC) method uses which of the following parameters
a. can the infant eat >1 ounce per feed or breastfeed well
b. can the infant sleep > 1 hour
c. can the infant be consoled within 10 minutes?
d. all of the above

NAS test answers and explanations adapted with permission from Franza (2016)

1. (B) A rocking bed may cause agitation in some babies. It is preferable to be

held and gently rocked by a caregiver. Swaddling and containment or skin – to- skin are preferable to being undressed on a radiant warmer. If the scores were much higher or the baby was having myoclonic jerks, a short period on the radiant warmer for assessment of possible seizure activity may be appropriate.

2. (D) Newborn infants are not capable of the drug seeking and other behavioral issues with risk and reward that are components of drug addiction. They experience physical withdrawal symptoms from chemicals that were received passively through the placenta. There is no known study that shows that infants with NAS have a higher risk of becoming drug addicts as adults.

3. (C) Newborns should be observed for tremors for at least 2 one- minute undisturbed periods.

4. (B) Excoriation is scored when skin breakdown or marked redness is seen on the face or extremities, and is clearly from excessive rubbing. The diaper area is not scored when excoriation occurs there as a result of loose stools. A score will be given for the loose stools instead. We do not want to double score for one finding. Do not score for normal newborn rash.

5. (C) Serotonin decrease is part of NAS and may cause sleep disturbances. Dopamine is decreased in NAS, causing hyperirritability and anxiety.

6. (A) Active participation and rooming in with the mother, when appropriate, are the best way to provide non- pharmacologic care.

7. (C) There is no conclusive evidence to show that there is a clear relationship between the maternal dose and the symptoms of the infant.

8. (A) Inter-observer reliability checks are done between professional caregivers, and should be done on a regular basis to insure accuracy. Ask a colleague to score the baby at the same time you are scoring to avoid overstimulation. Compare scores. Mothers should be included when assigning scores if appropriate, when they are providing much of the care for the baby. Inter- observer reliability, however, is done with another professional.

9. (C) Initiate Finnegan scores within 2 hours of birth, and the do every 3 to 4 hours when awake for feedings (after baby is calm and taken some of the feeding). Include all symptoms that were present during the interval.

10.(A) Pull-to-sit is preferred, but other methods may be used to verify.

11. (A) Morphine can cause respiratory depression. It has not been shown to cause hyperactivity. Morphine has a short half-life.

12. (B) Breast feeding may decrease the need for pharmacologic treatment, and is contraindicated in the U.S if the mother is HIV positive. Hepatitis C is not a contraindication for breastfeeding as long as the nipples are not cracked and bleeding.

13. (D) All of the above

APPENDIX B

NAS CONFIDENCE SURVEY

Assessment of Health Professionals Confidence
In the Care and Treatment of the NAS Neonate
Adapted with Permission from Cook, Dahms & Meiers (2017)

	Confidence Rating			
ITEM	Not Confident	Somewhat Confident	Quite Confident	Highly Confident
1. How confident are you in the current unit policies for NAS?				
2. How confident are you in knowing the drug interactions that may cause false positives? (UDS Reference)				
3. How confident are you knowing the toxicology screening guidelines?				
4. How confident are you in the pharmacological treatments recommended for newborns with NAS?				
5. How confident are you in providing discharge education to the family about NOT breastfeeding your baby if the mom chooses to use illicit drugs upon discharge?				
6. How confident are you in providing discharge education to the family about what to watch for in a neonate in mild withdrawal?				
7. How confident are you in providing discharge education to the family about when to call the doctor's office?				
8. How confident are you in your knowledge of non-pharmacological measures for the newborn with NAS?				
9. How confident are you in the weaning protocols for medications of the newborn with NAS?				
10. How confident are you with using the nursing standard orders for newborns with NAS?				
11. How confident are you in your knowledge about what multidisciplinary consult could be ordered and utilized?				
12. How confident do you feel with your ability to score the metabolic, vasomotor and respiratory disorders of the Finnegan tool?				
13. How confident do you feel in scoring the central nervous disturbances of the Finnegan tool?				

14. How confident do you feel in scoring the gastrointestinal disturbances of the Finnegan tool?				
15. How confident are you using the eat, sleep, console (ESC) approach?				

APPENDIX C

CONSENT

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY

Title of the Project: Implementation of an Evidenced-Based Policy and Educational Program on Caring for Neonates Withdrawing from Opioids: A Quality Improvement Project

You are being asked to participate in a research study on neonatal abstinence syndrome knowledge and confidence.

Rationale of research: This may help us obtain a better understanding of the role of education and policy implementation in improving health care team members confidence and knowledge when caring for neonates withdrawing from opioids.

You were identified to participate in this study because of your current employment at the Community Hospital of Anaconda.

Procedures involved: Participation is voluntary. If you agree to participate you will be asked to complete surveys before and after an educational program. Participation is voluntary and you can choose to not answer any questions you do not want to answer and/or you can stop at any time.

The surveys should take you less than 30 minutes and the educational program is one hour long.

The survey involves two parts (Neonatal Abstinence Syndrome knowledge survey and Neonatal Abstinence Syndrome confidence survey). The set of two surveys will be administered before and after the one-hour long educational program to evaluate change in knowledge and confidence.

Risks: There are no foreseen risks.

Benefits: The study will provide the benefit of education on neonatal abstinence syndrome.

Alternatives available: The education will be provided to the unit if you decline to participate in the surveys.

Funding: N/A

Cost to subject: None.

Confidentiality: The researcher will treat your identity with professional standards of confidentiality. The information obtained in this study may be published in medical journals, but your identify will not be revealed.

Contact the researcher: Participants are encouraged to ask questions about the research, they can contact Amy Olson, (608) 774-5933 [amy.jo.olson@gmail.com]. If you have additional questions about the rights of human subjects, you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [mquinn@montana.edu].

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, ______________________________ *(name of subject),* agree to participate in this research. I understand that I may later refuse to participate and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: ______________________________

Investigator: ___Amy Olson______________

Date: _______________________

APPENDIX D

EVIDENCE-BASED NAS POLICY

SUBJECT: NEONATAL ABSTINENCE SYNDROME GUIDELINE	POLICY #
	RELEVANT REFERENCES:
DEPARTMENT: OBSTETRICS	ORIGINATION DATE:
SCOPE: LABOR AND DELIVERY, NURSERY	

PURPOSE: To standardize evaluation and treatment of the newborn who is at risk for Neonatal Abstinence Syndrome (NAS). The optimal care of the mother-infant dyad is provided by a nonjudgmental, multidisciplinary team that is well versed in the management of maternal substance abuse and NAS.
POLICY: Information and guidance on the treatment of NAS
Definition of NAS: A group of problems that occur in a newborn who was exposed to addictive illegal or prescription drugs while in the mother's womb.

General: Chronic in utero exposure to a drug can lead to permanent developmental abnormalities. Signs and symptoms of withdrawal worsen as drug levels decrease, whereas signs and symptoms of acute toxicity lessen with drug elimination, with opioid exposure leading to the most clinically significant withdrawal.

Special Considerations: The clinical course in a neonate with NAS is difficult to predict and depends on the drug used, timing and amount of the drug last used by the mother, and maternal and neonatal metabolism and excretion. The prevalence of polysubstance abuse makes it even more difficult to diagnose and treat neonates experiencing withdrawal.

Nursery Provider (Physician or Nurse Practitioner) will be notified of maternal admission. If a consultation with the Nursery provider was not done prenatally, consider requesting one upon admission to L&D, if feasible due to maternal stage of labor.

Signs and Symptoms of Neonatal Withdrawal (Neonatal abstinence syndrome [NAS] refers to opiate withdrawal only):

Drug	Signs and Symptoms
Alcohol	Hyperactivity, crying, irritability, poor suck, tremors, seizures, poor sleeping patterns, hyperphagia, diaphoresis. (Onset of signs: 3-12 hours)
Barbiturates	Irritability, severe tremors, hyperacusis, excessive crying, vasomotor instability, diarrhea, restlessness, increased tone, hyperphagia, vomiting, disturbed sleep. (Onset of signs: 4-7 days)
SSRIs	Crying, irritability, tremors, poor suck, feeding difficulty, hypertonia, tachypnea, sleep disturbances, hypoglycemia, seizures. (Onset of signs: hours to days)

Opiates	Autonomic dysfunction, diarrhea, excessive sucking, excessive, high-pitched cries, GI dysfunction, hyperactive reflexes, hypertension, hypertonicity, ineffective feeding, irritability, jittery movements, mottling, respiratory distress, seizures, sleep disturbance, sweating, temperature instability, tremors, yawning. (Onset of signs: Short-acting opiates 24-36 hours, long-acting 5-7 days)
Cocaine	Abnormal sleep and feeding patterns, apnea, excessive sucking, excessive alertness, high-pitched cry, hypertonicity, irritability, tachycardia, tremors, hyperactivity. (Usually no signs of withdrawal, but may have behavioral abnormalities)
Marijuana	Fine tremors, hyperacusis, and prominent Moro reflex. (No clinical withdrawal)
Methamphetamine	Disorganized sucking and swallowing abilities, inconsolable frantic crying, increased metabolic rate, large insensible water loss, seizures, sleep regulation difficulties, tremors. (Onset of signs: 48-60 hours)
Diazepam	Apnea, hyperactivity, hyperreflexia, hypertonia, hypothermia, hypotonia, poor sucking ability, tachypnea, tremors, vomiting. (Onset of signs: 1-3 days)

PROCEDURE:

A. Assess the neonate using the eat, sleep, console (ESC) approach (see Fig. 1). Do not awaken the infant to perform withdrawal scoring. Score the infant after feeding and while being held by parent/family member/staff member, if possible.
    a. For known maternal risk factors, a baseline score should be recorded within 2 hours of birth.
    b. For unknown risk, begin scoring when symptoms are present, after discussion with the provider.
    c. Following the baseline score, infants should be scored every 3-4 hours if on the Postpartum unit.

B. Using the ESC approach:
    a. Assess if infant is able to eat ≥1 oz per feed or breastfeed well
    b. Assess if infant is able to sleep undisturbed ≥1 hour
    c. Assess if infant is able to be consoled, if crying, within 10 minutes.
        i. If the infant is eating <1 oz per feed or not breastfeeding well, sleeping <1 hour undisturbed, and/or is not consolable within 10 minutes, notify the medical team
        ii. The treatment can be increased either by augmenting nonpharmacologic interventions, if possible, or starting morphine at 0.05 mg/kg every 3 hours.
        iii. Morphine can be decreased by 0.04 mg per dose daily if the infant is considered well managed by the ESC standards (see Fig. 1).

iv. Patients can be cleared for discharge 4 to 7 days after birth if they are eating well, sleeping well, and easily consolable for 24 hours

d. If the infant does not require pharmacologic treatment by 72 hours of age, scoring by staff members may be discontinued, but parents/caregivers are to be encouraged to continue to observe the infant for signs and symptoms of NAS as they have been taught. Nursing support of this independent parental evaluation will continue as needed. The infant can be discharged after an additional 24 hours of observation, and again, the parents/caregivers should be encouraged to continue to observe the infant at home and report any symptoms or concerns.

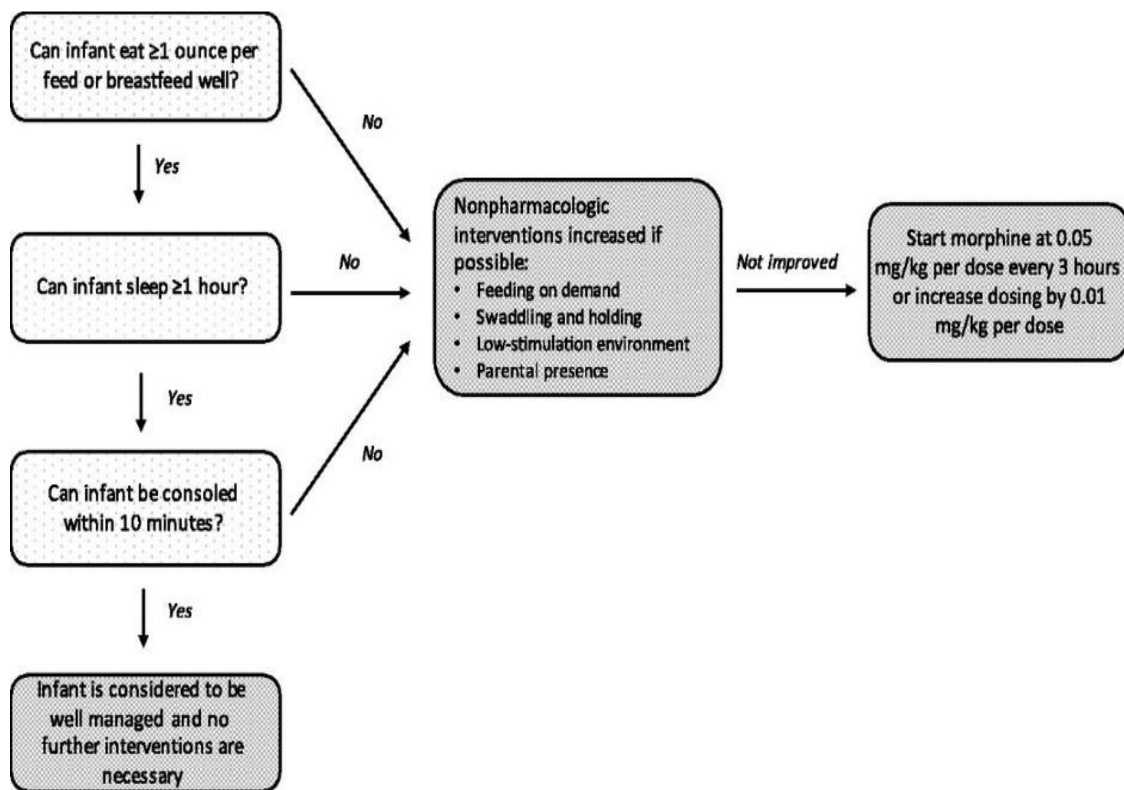

Figure 1: ESC approach (Grossman, Lipshaw, Osborn & Berkwitt, 2018)

C. Family involvement should be emphasized, ideally starting prenatally. After birth, separation of mother and infant should be avoided unless medically indicated. Engaging parent participation is the best treatment modality.

a. Postnatal rooming-in is effective in reducing the need for pharmacologic treatment of NAS and decreases the duration of treatment when it is needed. Maintaining maternal-infant contact in this high-risk population is crucial, both for the benefits of skin-to-skin care for physiologic stability and in the bonding needed for psychosocial stability.

i. In addition to education related to well-baby care, parents will be educated in the signs and symptoms of withdrawal, the infant's expected course both in the hospital and after discharge, as well as the importance of their role in the management of NAS.

D. Non-pharmacologic, supportive treatment is the foundation of management for NAS. Strategies for supporting the parents/caregivers in meeting the needs of their infant may include the following:

a. Provide comfort interventions to help the infant achieve and maintain a supported, calm, behavioral state.
b. Promote cuddling and skin-to-skin Kangaroo care, if appropriate.
c. Offer a pacifier.
d. Encourage swaying and rocking the infant as calming techniques.
e. Decrease simulation at the first signs of distress.
f. Calm the infant who is crying by holding the infant firmly to the body and gently rocking.
g. Tightly swaddle the infant to avoid auto-stimulation. Caution: Use a light blanket to reduce the risk of elevated temperature.
h. Maintain bed space as dark and quiet as possible to minimize environmental stimuli.
i. Feed the neonate on demand. Begin feeding the infant as soon as awake and manifesting hunger cues. Do not wait until the infant has become disorganized and reached an inconsolable behavioral state.
    i. Breast milk is the optimal source of nutrition for infants of opioid-dependent mothers. Breastfeeding enhances maternal/infant bonding, decreases neonatal abstinence severity, and improves mother's adherence to treatment and abstinence. These mothers should receive encouragement, as well as any education and assistance necessary to support breastfeeding, provided she is enrolled in a substance abuse treatment program (e.g., methadone), or under the care of a provider (e.g., long term pain management) and provided there are no other contraindications such as ongoing illicit drug use, HIV infection, or lack of prenatal care. Again, rooming-in is the best way to facilitate breastfeeding.
    ii. A lactation consultation should be ordered.
j. Frequently burp the infant and monitor during the feeding for increased stress.
k. While breastfeeding is encouraged, the infant's caloric needs may be high. Hyper-caloric supplementation may be required (22-24 kcal/ounce).

E. Transfer from postpartum unit.

a. Transfer to NICU should be reserved for medical indications as this will severely impede parental involvement. The sensory atmosphere of the NICU also poses the risk for escalation of symptoms in the newborn.

F. A social work consult/child protective services (CPS) case should be ordered on any mother presenting with known or suspected illicit drug use, or with a history

of chronic use of prescribed pain medications or medications provided through a treatment program. This should be ordered early in the mother's hospitalization to ensure adequate time to obtain information and resources that are available for her and her infant. This will also help ensure adequate time if a child protective investigation is indicated.

G. Infants at risk for withdrawal should remain hospitalized for 4-7 days depending on whether the opiate used in pregnancy was short or long acting. Frequent follow-up appointments should occur after discharge. Ongoing caregiver education related to NAS scoring of the infant should be occurring throughout hospitalization and should be reinforced at discharge. Ensure Office of Children's Services (OCS) follow-up and/or ongoing maternal treatment after discharge.

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