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DNP FINAL REPORT: BUILDING A COMPREHENSIVE GUIDELINE TO IMPROVE THE TREATMENT OF INFANTS WITH NEONATAL ABSTINENCE SYNDROME: AN EVIDENCE-BASED INNOVATION PROJECT

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by

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A DNP Final Report submitted in partial fulfillment
of the requirements for the degree of
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Ellen Fineout-Overholt, PhD., RN, FNAP, FAAN, Committee Chair

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This is to certify that the DNP Final Report of

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Dedication

I would like to dedicate this DNP project to the women and infants impacted by the opioid crisis and Neonatal Abstinence Syndrome. Thank you for teaching us the value of compassion in all situations. May this be the beginning of many projects aimed on improving your total wellbeing and keeping your families together.

Acknowledgements

I would like to acknowledge the following people who were instrumental in supporting my achievements over the years:

- My family and friends who listened and inspired me, talked me through the difficult times, and celebrated each victory beside me. Thank you, Jacob, Brannon, Mom, Paul, Brian, and Heather. I could not have done this without you.
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Abstract

DNP FINAL REPORT: BUILDING A COMPREHENSIVE GUIDELINE TO IMPROVE THE TREATMENT OF INFANTS WITH NEONATAL ABSTINENCE SYNDROME: ADDING NON-PHARMACOLOGICAL INTERVENTIONS TO A MORPHINE PROTOCOL

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Background: The incidence of Neonatal Abstinence Syndrome (NAS) has increased nationally; however, only 55% of NICUs indicated having a written NAS treatment plan as recommended by the American Association of Pediatrics. Current practice included symptom management via morphine only; however, non-pharmacological interventions were not routinely delivered.

Purpose: The purpose of this project was to standardize and improve the care provided to patients with NAS.

Methods: A systematic search was conducted using keywords and subject headings from the PICOT question. Retrieved synthesized evidence suggested that adding breastfeeding and rooming-in as first line treatment options reduced the length of hospital stay and medication treatment. An interprofessional council developed and implemented a comprehensive treatment guideline featuring education on addiction, trauma informed care, evidence-based NAS treatment options, and Finnegan scoring.

Results: Post-education knowledge assessment scores were 100 percent. Hospital length of stay was reduced from 27 (2017) to 17 days (2019) and length of morphine treatment was reduced from 34 (2017) to 20 days (2019). Associated hospital all NAS cases costs dropped from

$499,709 pre-intervention to $192,573 post-intervention. The guideline is now the standard plan of care to ensure that all NAS patients receive best practice.

Chapter 1: Development of the Leadership Question and Problem Identification (EBP Process Steps, 0, 1, & 2)

Background and Significance

In December 2016, a young couple welcomed their newborn daughter to the world. She was a beautiful baby with dark hair and a stunning smile. Unfortunately, Gracelynn tested positive for opiates because of her mother's heroin use during pregnancy. Within forty hours of birth, Gracelynn experienced blood sugar instability, intermittent high pitch cry, tremors, nasal congestion, and increased muscle tone. During this time, Gracelynn received controlled opioid doses to manage painful withdrawal symptoms; she was experiencing a condition called Neonatal Abstinence Syndrome (NAS). When they learned of Gracelyn's condition, Child Protective Services (CPS) removed custody of Gracelynn from her mother and father and restricted parental visitation to supervised visits, only in the presence of a CPS caseworker. Gracelynn's grandmother could visit without restrictions. Gracelynn spent many days alone in her hospital room. The lack of interactions, including holding, eye contact, talking, and touch, increased her irritability, leading to delays in weaning or escalations in medication dosage. Ultimately, Gracelynn's hospitalization lasted a total of 63 days, well beyond the average 16-day length of stay (LOS) for NAS (Patrick et al., 2012).

The Center for Behavioral Health Statistics and Quality's 2014 national survey on drug use and health (2015) indicated 44.5% of females, 12 years old or older, reported illicit drug use in their lifetime. The incidence of non-medical use of opioid pain relievers is highest in women 18 to 25 years old. The current opioid crisis raises significant concerns in that as substance use issues in women of childbearing age continue to multiply, the number of NAS cases will follow.

Drug overdoses come in second to car accidents as the number two cause of injury/death in the US (Leonard, 2016; Chopra & Marasa, 2017). 21.5 million Americans suffer from substance use disorders, including 1.9 million using prescribed opioids and nearly 600,000 using heroin (Centers for Disease Control and Prevention, 2016; Chopra & Marasa, 2017). Heroin-related deaths tripled between 2010 and 2013, while opioid-related deaths among women increased by 400% between 1999 and 2010 (Chopra & Marasa, 2017). Over the past decade, the use of opiates during pregnancy has significantly increased and has become a compelling public health concern (Stover & Davis, 2015). Prescription opioid use in pregnancy positively correlates with neonatal complications; opiate use can lead to intrauterine growth restriction, placental abruption, preterm birth, oligohydramnios, stillbirth, and maternal death. Adverse infant neurodevelopmental outcomes also have been shown to result from maternal drug use during pregnancy (Stover & Davis, 2015).

NAS is a constellation of behavioral and physiological signs and symptoms resulting from exposure in utero to maternal drug use of opioids, stimulants, depressants, cigarettes, serotonin reuptake inhibitors (SSRI), or any combination thereof (MacMullen, Dulski, & Blobaum, 2014: Chopra & Marasa, 2017). Fifty-five to 94% of infants exposed to drugs in utero will develop NAS (Minnesota Hospital Association, 2013). Most NAS symptoms manifest in the central and autonomic nervous systems as well as the gastrointestinal tract (Jensen, 2014). Symptoms can include, but are not limited to, hyperirritability, tachypnea, poor sleep or feeding patterns, and tremors (MacMullen, Dulski, & Blobaum, 2014). The onset of symptoms and intensity vary between babies; symptom onset ranges from three to seventy-two hours. Duration

for opioid withdrawal symptoms can last from 10-30 days; duration is dependent on the type of drug, dosage, and frequency the infant is exposed to in utero.

Symptoms are managed medically with medications including morphine, methadone, and Buprenorphine. To determine if the infant requires pharmacological intervention, healthcare providers use scoring tools such as Lipsitz, the Finnegan Neonatal Scoring Tool (FNAST), and the newest option, Eat, Sleep, and Console. The FNAST tool quantifies the most common symptoms presented by the infant. The FNAST contains 21 clinically significant items in three categories; each FNAST category is weighted differently in the total score. The categories include central nervous system disturbances, metabolic, vasomotor, and respiratory disturbances, and gastrointestinal disturbances. The pharmacologic treatment starts following three scores at or above eight or two scores at or above 12 on consecutive assessments. Once symptom control has been achieved (as indicated by the FNAST scores), the weaning process starts.

External Evidence

Between 2009 and 2012, the incidence of NAS increased nationally from 3.4 to 5.8 per 1,000 hospital births, totaling 21,732 infants with the diagnosis in the U.S with $316 billion spent annually. The incidence rate for Texas increased by 60%, reaching 2.6 per 1000 births leading to $29 million in costs (Texas Department of State Health Services, 2017). While not the highest national statistic, it is a rapidly growing concern across the state (Patrick, Davis, Lehman, & Cooper, 2015). Bexar, Dallas, Harris, Tarrant, and Nueces counties had the highest number of NAS cases in 2015 (Texas Department of State Health Services, 2017). Dallas County saw two in every 1000 births results in the development of NAS and spent millions annually on hospitalization of this patient population. In 2006, 55% of Neonatal Intensive Care Units

(NICU) indicated having a written plan for NAS treatment (Patrick et al., 2016). The American Academy of Pediatrics (AAP) published a clinical report recommending, "…each nursery should develop and adhere to a standardized policy for the evaluation and comprehensive treatment of infants at risk for or showing signs of withdrawal" (Hudak & Tan, 2012, pp. e554). Patrick et al. (2016) indicated standardization of patient care and hospital policies would improve overall patient outcomes. Despite this revelation, there is no nationally established standardized treatment guideline available to date for the care of this patient population.

Internal Evidence

Much like the growing national and state incidence rates, in 2017, Texas Health Presbyterian Hospital of Dallas (THD) experienced a 55% increase in infants with NAS. Currently, NAS patient treatment at THD includes symptom management via morphine. A morphine protocol has been in place since 2014, yet not consistently prescribed or followed by all physicians. The lack of a standardized adherence to the current protocol has led to morphine dosage weaning and escalation fluctuations, thereby increasing the length of time for the infant's treatment. Additionally, the FNAST tool is inconsistently used due to isolated staff training and an overall lack of knowledge pertaining to the 21 clinical definitions, leading to a great deal of subjectivity. Staff ensure babies with NAS receive minimal stimulation (decreased lighting and noise and clustered care), which results in a reduction in parental participation. Like other NICU's across the county, THD does not have a comprehensive guideline for the treatment of patients with NAS.

Development of the Clinical Question and Problem

Considering the increase in the NAS patient population, lack of a comprehensive

guideline, extended length of stay and treatment, increased costs, and recommendations from professional associations, a comprehensive NAS treatment guideline is warranted. A guideline inclusive of nonpharmacologic interventions and pharmacological treatment, used consistently, could improve patient outcomes. Therefore, the question arises, in neonates with Neonatal Abstinence Syndrome (P), how does adding non-pharmacologic therapies to the current medication protocol (I) compared to current medication protocol alone (C) affect the length of stay (O) and duration of treatment (O) within one quarter (T)?

Chapter 2: Systematic Search, Evidence Synthesis & Project Models (EBP Process Steps 1, 2, 3, & 4)

Systematic Search

A systematic search of three online databases was completed using the PICOT question as a guide, including, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Cochrane Library, and PubMed. Keywords or subject headings searched included, *neonatal abstinence syndrome, length of stay, length of treatment, alternative therapies, non-pharmacological treatment, pharmacological treatment,* and *medication management*. Since many versions of the terms *pharmacological* and *therapies* exist, the truncated search terms *pharm* treatment, non-pharm* treatment,* and *alternative therap** also were used across all databases.

The initial yield from CINAHL was 149, 266 potential articles. Terms were combined using Boolean operators to narrow the yield to 13,760 articles. The inclusion criteria of *English language*, *full text*, *all infant sample*, *academic journals*, and *peer-reviewed* were then added and resulted in a reduced total yield of 123 relevant articles. Evaluation for relevancy resulted in a final total of 33 relevant articles (Appendix A, Figure A1).

The Cochrane Library database was searched using key terms as listed above (and truncation symbol asterisk). The search resulted in a yield of 335,763. Combining key terms with the Boolean operator *AND* (to combine like terms) and *OR* (to consolidate like terms) resulted in a yield of 44,200 The inclusion criteria included *review only*, to isolate systematic review articles, while studies were included for non-relevance and duplicate reviews. The final yield was zero (Appendix A, Figure A1), indicating there were no Cochrane systematic reviews.

The final database searched was PubMed using the same key terms as mentioned above. The initial yield was 4,635,907. Pairing the keywords with Boolean operators *OR* and *AND* resulted in a yield of 407,628. Further narrowing the results, the inclusion criteria of *full text*; *humans*; *English language*; *Newborn: birth-1 month* was applied to bring the final yield to 97 (Appendix A, Figure A1).

A final hand search was performed of the 97 retained articles, yielding an additional 16 articles, for a final yield of 113 potential articles to put forward for critical appraisal. After review of title and abstract, a total of 8 articles were retained for the critical appraisal.

Critical Appraisal

Melnyk, Fineout-Overholt, Stillwell, and Williamson (2010) indicated, "Step 3: Critically appraise the evidence" follows the systematic search. When comparing the research against the hierarchy of evidence as indicated by Melnyk, Fineout-Overholt, Stillwell, and Williamson (2010), the eight articles were 2-Level I, 5-Level IV, and 1-Level V.

Rapid Critical Appraisal

Eight articles were evaluated utilizing a rapid critical appraisal (RCA), which is the process of systematically assessing the quality, outcomes, and applicability of the evidence. For identifying keeper studies, specific study design rapid critical checklists (RCAC) helped evaluate the literature. For example, an RCAC of descriptive studies is different from the RCAC for qualitative evidence. Additionally, a General Appraisal Overview (GAO) enabled a proper assessment of each study's purpose, subjects, sampling techniques, and major variables, among other aspects of the studies. The result of rapid critical appraisal with GAO & RCA yielded six keeper studies (Appendix B, Table B1).

Evaluation

For ease of comparison study data, an evaluation table was developed (Appendix B, Table B2). Aspects of the study were compared for differences and commonalities. Across studies, independent variables included one or more of the following: breastfeeding, rooming-in, specialized bed, positioning, and non-insertion acupuncture. Dependent variables included hospital length of stay and length of medication treatment, but not all variables were evaluated for their impact on the dependent variables (Appendix B, Table B3). Two studies were systematic reviews (Bagley et al., 2014; Edwards et al., 2016), three were retrospective cohort studies based in a single facility (McKnight et al., 2014; Short et al., 2016; Well-Strand et al., 2013), and the final article was a meta synthesis (Boucher, 2017).

Studies in Bagley et al. (2014) and Edwards et al. (2014) reviews supported that BF had an impact on LOS and LOT (Appendix B, Tables B4 & B5). Edwards and Brown (2016) found that breastfed infants increased symptom management, reduced need for medication treatment, delayed onset of symptoms, and a reduced length of treatment. Additionally, breastfed infants had a shorter period of stay requiring only 12.5 days compared to 18.5 days, a profound difference from the current LOS within the SCN and justification for considering breastfeeding as supportive therapy. The supportive nature of breastfeeding is further corroborated by Short, Gannon, and Abatemarco (2016) who conducted a retrospective cohort study appraising breastfeeding and its impact on the length of stay. The median length of stay for non-breastfeeding infants was twelve days, two days longer than breastfed infants. Breastfeeding and length of stay have an inverse relationship, supporting previous results from other studies.

Like Bagley, Wachman, Holland, and Brogly (2014), findings by Edwards and Brown (2016) indicate infants who roomed-in had less severe symptoms of NAS, required less pharmacologic treatment, and a shorter length of stay. Rooming-in enabled the mother and infant to be together, improving bonding, and decreased the admissions to the NICU; fewer admissions to the NICU ultimately reduces the hospital's financial burden. Furthermore, rooming-in was shown to aid in the reduction of length of stay and duration of treatment and was also statistically significant, according to Hunseler (2013) and Abrahams (2007). Boucher (2017) reviewed the literature to evaluate rooming-in as a nonpharmacological therapy in the treatment of NAS symptoms and the impact on the length of stay. The research examined led the author to believe that rooming-in may lead to a reduction in the length of the hospital. The duration of treatment dropped by five days in the infants who roomed in with their mother. The researchers suggest the developmental benefits of rooming-in outweigh the risks.

Bagley, Wachman, Holland, and Brogly (2014) suggest a potential supportive and synergistic relationship between rooming-in and breastfeeding, who also evaluated the impact of rooming-in on NAS management. This relationship is supported by McKnight, Coo, Davies, Holmes, Newman, Newton, and Dow (2015), who analyzed rooming-in and its impact on NAS symptom management. Results indicate infants who roomed in required fewer days of pharmacologic treatment and reduced hospitalization. While there was a higher proportion of breastfeeding infants in the rooming-in group, it was not a significant difference. Rooming-in supported symptom management, independent of breastfeeding. Rooming-in and breastfeeding may significantly improve outcomes if used in conjunction. Edwards and Brown (2016) rooming-in

exploration included many infants who breastfed, combining two non-pharmacological interventions.

Bagley, Wachman, Holland, and Brogly (2014) evaluated the use of a specialized bed in the management of NAS symptoms. Using a rocking bed (with replicated intrauterine sounds) did not show a significant difference in withdrawal scores and led to sleep disturbance issues due to the constant noise; continuous noise can overstimulate an infant with NAS. Non-oscillating water beds used with this patient population led to less medication for treating symptoms, although more research is required. Specialized beds lack a determination to reduce the length of hospital stay. Edwards and Brown (2016) found the use of waterbeds with breastfeeding infants supported less severe NAS symptoms and were less likely to require treatment with opiates resulting in a reduced LOT. In comparison, a study examining the use of rocking beds found this intervention to be too stimulating to this patient population and therefore not a recommended treatment.

Bagley, Wachman, Holland, and Brogly (2014) found in conjunction with the beds, placing the patient in a prone position positively supported symptom management. While the results are positive for the use of positioning as an intervention, more studies are required to support the ongoing use and addition of this tactic. Edwards and Brown (2016) suggest the use of positioning in the NAS population is a new concept, but one which requires consideration. Prone positioning appears to alleviate NAS symptoms and the infants placed in the prone position experienced lower withdrawal scores.

Boucher (2017) reviewed the literature to evaluate acupuncture, noted as non-insertive acupuncture (NIA), as a potential treatment for NAS symptoms as well as NIA's impact on

length of stay. The authors suggest infants had better feeding sessions and their caloric intake was improved following NIA. Sleep in this patient population was also improved just after NIA treatment was performed. Agitated or infants who were hard to console appeared to have the most improved outcomes with the use of NIA treatment. Edwards and Brown (2016) found acupuncture to be a supportive therapy for infants with NAS. Infants appeared to have improved sleep and feeding following treatment with NIA, but the researchers did not link NIA with LOS or LOT. Acupuncture is a controversial area and one that requires more research to support its acceptance.

Synthesis

From the evaluation table, interventions were extrapolated from each article and compared for their impact on LOS and LOT (Appendix B, Table B3). Synthesis of the body of evidence revealed that the inclusion of breastfeeding, as a non-pharmacologic intervention, resulted in a statistically significant reduction in length of treatment and length of stay for NAS patients; specifically, hospitalizations were 3-19 days shorter in infants who breastfed. From the 10 studies reviewed by Bagley et al. (2014); Edwards et al. (2016) six supported that BF reduced infant LOS and LOT (Appendix B, Tables B4 & B5).

Rooming-in was shown to enable the mother and infant to be together, improve bonding, and decrease the admissions to the NICU. Rooming-in was shown to aid in reducing the length of hospitalization and medication treatment. There were not enough studies to support that specialized beds, prone positioning or acupuncture had a reliable impact on length of hospital stay or symptom management.

Recommendations

Based on the evidence, non-pharmacological interventions of breastfeeding and rooming-in should be routine care for infants suffering with NAS symptoms. These non-pharmacological interventions should be included into the care of the baby through the initial phase of withdrawal. When the infant's symptoms can no longer be managed with non-pharmacological interventions alone, the Morphine protocol should then be added. Given this contrasts with current practice, the recommendation for implementing these interventions is to develop and implement a comprehensive treatment guideline for the care of infants with NAS indicating initial treatment with non-pharmacological interventions of breastfeeding and rooming in and followed by the established morphine protocol.

Evidence-Based Practice Model

To simplify the process of implementing a new evidence-based practice into the hospital setting, the Johns Hopkins Nursing Evidence-Based Practice Model (JHMEBP) (Appendix C, Figure C2) was adopted into this project. The "PET" process includes the development of a *practice* or clinical question, the systematic search of the *evidence*, and then *translation* of the evidence into practice (Brooks-Staub, 2005). According to the Daemen Library (2018), the goal of the model is to "ensure that the latest research findings and best practices are quickly and appropriately incorporated into patient care" (pp. 1). Once the clinical question was established, a standardized search strategy was developed and used to search the most current and applicable evidence. The evidence is thoroughly evaluated and synthesized to answer the clinical question for intervention development. Once the intervention is developed, the project plan is initiated, and a change model is selected to begin the process of translating the science into practice.

Lewin's Change Theory

Change is an inevitable part of healthcare. To facilitate change related to this project, Kurt Lewin's Change Model (Appendix C, Figure C3) will set the foundation for careful consideration of how this project would lead to practice change. Lewin's Change Model outlines three steps to change including unfreezing, changing, and refreezing. During "unfreezing", it is important to find ways to help others let go of old habits. This can be done by increasing driving forces away from current patterns, decreasing the restraining forces causing negative movement from neutral, or a combination of the two (Nursing Theory, 2016). Movement during the "change" stage includes process changes in thoughts, feelings, behaviors, or a change in all three that leads to a new sense of liberation. "Refreezing" is when the change is now the new status quo. Using this model, change would be planned, systematic, and thoughtful resulting in outcome success.

In the first stage, staff and physicians would be made aware of the need for change through case studies, internal data, and current evidentiary recommendations (unfreezing). During this time, a new comprehensive and evidence-based guideline would be developed in partnership with staff and physicians who volunteers to participate in the project. Moving into the change stage, those impacted by the new guideline would receive education and training on the use of the guideline prior to implementation. Practice expectations would be established and then the guideline would be implemented. The refreezing stage would include data collection, celebration of successes, and review of outliers.

Chapter 3: Project Design and Methodology (EBP Process Steps 3-4)

Project Design & Methodology

To bring the evidence-based recommendation to fruition required planning included the development of a logic model, a timeline, and a Gantt chart all grounded in the evidence-based practice model and the change model previously mentioned. Before the EBP project was launched, to ensure the full support of the project, an executive summary (Appendix D) was submitted to the interim Chief Nursing Officer (CNO) who then provided approval for implementing the project within the facility (Appendix E, Form E1). Furthermore, two industry mentors signed on in support (Appendix E, Form E2 & E3). Lastly, due to organizational requirements, I worked with the entity nurse scientist in preparation of Institutional Review Board (IRB) approval. A Quality Improvement Evidence-Based Practice Assessment form was completed and submitted to the IRB for project determination (Appendix F, Ethics Review Form F1 & F2), and IRB support was secured (Appendix F, Ethics Review Form F3).

Operationalization Plan

During the beginning of this project, it was important for every unit to have input, therefore an interdisciplinary team was created, called the NAS Council. This council was comprised of one individual from each of the women and infant units who would interact or provide care for the target patient populations (women with substance use issues and their newborn baby). From this team, the logic model, timeline, and Gantt chart were completed including the required milestones, tasks to achieve each milestone, responsible parties, and all deadlines associated.

Timeline and Gantt chart

A timeline was created using the goals established from the logic model (Appendix G, Table G1). Milestones were fixed as checkpoints on the timeline. In evaluating the milestone, tasks were laid out for each checkpoint. The timeline enabled the project to stay on track with forward momentum. To further visualize the timeline and associated milestones/tasks, a Gantt chart was developed (Appendix G, Figure G2). A Gantt chart is a visual tool and schedule representing the milestones of the project with assigned dates. Under those milestones, the individual associated tasks were highlighted, each with a date of completion assigned.

Logic model

A Logic Model was created to define the inputs (resources, contributions, and people), outputs (activities, services, and events), and outcomes (results or changes related to the projects interventions) (Appendix G, Figure G1). The logic model helped to create an overview of this project by identifying the short- and long-term goals, including that the NAS guideline was finalized and approved by medical director, and the expected outcomes of reduced length of hospital stay and length of medication treatment. From these goals, we evaluated "inputs", which are the things that will be invested in this project such as finances, staffing, technology, and equipment. Additionally, we investigated the outputs to identify the activities currently being practiced and pertaining to the project as well as the people those activities are aimed. The logic model helped to isolate the information known about the project and identify uncontrollable external factors may impact the project. Through this model, we were able to pinpoint what is readily available and what is missing so the gaps can be filled. As the project developed, the logic model was adjusted to include new information and details.

Project Progress

Following several initial meetings with the NAS Council, the first and most important task identified by the council members was to draft, edit, and finalize a comprehensive treatment guideline that includes the current morphine protocol and the evidence-based non-pharmacological interventions as outlined in the body of evidence. The team met with the medical director and began the first draft of the guideline. The guideline was shared with one of the industry mentors for additional input as he was the content expert. This process took approximately 6 months to complete. The final draft of the NAS guideline was submitted through the policy committee for approval and upload to the internal policy database (Appendix H).

Through the many meetings regarding the guideline, the NAS council representatives expressed concerns of staff and physician's lack of baseline knowledge as evidenced by the lack of consistency in following the weaning and escalation steps outlined in the current morphine protocol. An additional moment of concerned sparked from an obstetric department meeting in which opiates during pregnancy was a topic of discussion. During the meeting, NAS was mentioned. One physician asked, "What is NAS?" This situation was discussed during an NAS Council meeting. The Council recommended developing an education module to prepare staff and physicians for the implementation of the guideline. Further discussion led to an additional recommendation of developing and adding education on the topics of addiction, trauma-informed care, NAS interventions, Finnegan scoring, in addition to the new treatment guideline. This would establish a solid foundation to elevate the staff and physician's knowledge and understanding of these topics. The timeline and Gantt chart was updated with the new milestone

and tasks including the following: the council developed sub-committees and each group would take a topic and develop an evidence-based module for consideration. The NAS Council met an additional four times to edit and finalize the modules of which they submitted to the following for approval:

- Neonatology Department – medical director and content expert
- Pediatric Department – medical director and one additional physician representative
- Women and Infant's Leadership Team – managers of impacted departments and director
- Education Department –women's and infant's educators

EBP Model

From my experience with Gracelynn, I use the Johns Hopkins Nursing Process Model for evidence-based implementation to guide this project from start to finish. I first formulated a background question. I used the question to extract key terms to search online the online databases of CINAHL, PubMed, and Cochrane library for the most current and applicable evidence. I synthesized the evidence to answer the clinical question and then translate the evidence into practice.

Change Model

To facilitate a planned change, I used Lewin's Change Theory, to break down the project into three stages including "unfreezing" old habits, implementing the "change" we want to see, and "refreezing" the new habit as the best practice. In the "unfreeze" phase, we educated all stakeholders through case studies and an education package. When the "change" was planned

for rollout, we implemented the guideline, monitored for compliance, redirected those who fell out of compliance back to the guideline and reminded them of why we were making this change. As we entered the "refreeze" phase, we collected data and reported out our project in several different settings. We celebrated our successes and planned growth and development of the project.

Final budget

The estimated data from the logic model enabled me to draft an email, to the director and interim CNO, that would highlight the financial impact of the project would make on the organization. Initial estimates included costs associated with items such as projectors and computers and since the unit already owns these items, they become budget neutral. The final budget consisted of time spent for staff and physicians to complete the education ($4000) prior to the implementation of the guideline as well as the time spent by the project's members to develop the education modules and the guideline ($5500). With the understanding the only financial requirement would come in the form of time spent reviewing the education modules, the director, and interim CNO gave the greenlight to move forward with the project's implementation.

Data Collection Plan

The following were deemed as process indicators and outcome measures to be collected in relation to this project:

Process indicators

- Percent of providers education/completed modules

- Pre and post-test reliability scores

Outcome measures

- Length of hospital stay
- Number of days of pharmaceutical treatment outcome
- Pre and post intervention total hospital cost by NAS diagnosis by year

Pre - Post knowledge transfer assessment surveys evaluate the effectiveness of staff and physician's education about providing care to infants with NAS. It was also important to track the number of staff and physicians who completed the education modules to ensure the message reached as close to 100% of the target audience as possible. These data points would be collected direct from the SharePoint platform in which the education modules were housed and by the assigned project members only. No identifying information was collected from the staff or physicians other than job role.

Outcome measures would determine the efficacy of the intervention and included the length of hospital stay, length of morphine treatment and will demonstrate the project's success or failure. The outcomes data collection plan consisted of two parts: (1) Pre project and post project data obtained by submitting a request to finance for a list of infants (account number, medical record number, date of birth, date of discharge, ICD9/10 diagnosis code, total cost of hospital stay) with a diagnosis related to drug withdraw and their total LOS, and (2) Pre project and post project data obtained by submitting a report request to pharmacy (including the above report) detailing the patients from the list who were treated with morphine (date morphine initiated, date morphine discontinued, and the total duration of morphine treatment). Data stewardship was implemented to ensure all private patient information was kept secure,

including all data collected were deidentified, assessed and aggregated prior to dissemination. Ownership of the data remained secure on a password locked spreadsheet with limited access to those involved in the data collection process. Access of data was limited to NAS council members in charge of data collection.

Data Analysis Plan

The final dataset was evaluated for any missing data and cases were removed with any missing data points. Absolute differences for knowledge transfer scores, LOS, LOT were calculated by case for the various time periods within the project. Mean differences were reported for by case outcomes to demonstrate success or failure of the education or intervention in this setting. Absolute differences for number of providers educated and total costs by diagnosis were calculated for the various time periods within the project.

Chapter 4: Project Implementation, Outcomes, Impact, and Results (EBP Process Steps 4 & 5)

Process Indicators/Milestones

The first milestone included developing, reviewing, finalizing, and submitting the evidence-based treatment guideline through the policy committee (Appendix H). Once this process was complete, the guideline was uploaded into the hospital system's online policy database. The second milestone was the completion and launching of the evidence-based education modules including the accompanying pre and posttests. The education module would be open to participants for 6 weeks. Unit leaders were asked to add information about participation to daily huddles, weekly emails, and individual communications, which kept the project fresh on the participant's minds. Once the 6 week period was complete, data was collected from the SharePoint platform, requested from finance, and requested from pharmacy.

Lessons Learned

One of the most important lessons learned was the process for requesting a specific platform that would meet the needs of the project. In the implementing hospital system, there are limited number of available platforms. During this project, I learned there is an established method of requesting platforms. The project lead is required to submit a request to a centralized network of hospital system educators. That request is then taken to the education council to review and investigate options. If a platform is available, the council will notify the requestor and obtain the appropriate access for use.

Barriers

One barrier to achieving outcomes for the project was the platform used to house the education intervention modules. The SharePoint platform enabled the staff and physicians to complete a pre-test (three questions), review the education material, and a post-test (same three questions). Several staff reported an inability to log onto the SharePoint. Additionally, navigation of the education material was not ideal for staff, who had to use the back button to take them to the home page to continue to the next phase of the education package versus a smooth logical transition to the next module. SharePoint was chosen because of its ability to provide the pre/post-testing of staff completing the educational modules. Furthermore, since physicians are not internal employees of the organization with a hospital email address, they could not be added as users on the SharePoint site, which hindered the educational intervention delivery

Because of the platform challenges, 52% of available staff and physicians were not able to log on and successfully complete the education package. Additionally, only one physician completed all the modules, with one other partially completing. Due to the lack of physician participation, inconsistency in practice is still an issue in need of resolution.

Solutions

As we ended this project, I met with leaders within the entity and discussed the desire to relaunch the education module in order to reach the participants we missed during our first run. It was decided a new platform would be necessary. I worked with the education department to find a platform that will meet the needs of the project so that physicians can participate in the education and evaluation. The aim was to have 100% completion by all audience members by

December 2020. A request was submitted, and the education council reviewed the request several times. Unfortunately, there is not a platform that will be easy for staff and physicians to access that will allow us to collect pre and post knowledge transfer assessments. This put the NAS council in a position where we had to decide to either reuse the SharePoint site or go out of the system and find a platform unsupported by the hospital system. To date, this is still being investigated by the education council members in hopes of finding a platform to meet our needs.

Project Results

As mentioned previously, the following were process indicators for this project: percent of provider's education/completed modules and pre and post-test reliability scores. The module was launched and given a six-week deadline. Following the deployment of the education module, of the 120 available staff and physicians who were able to access the platform where the modules were housed, 48% were able to complete the entire education package (Appendix I, Table I6). Pretest results included the following: trauma-informed care (94%), addiction (90%), Finnegan Scoring (57%), NAS interventions (72%), and the new NAS treatment guideline (93%). For each of the five education components, participating staff and physicians achieved a 100% score on the posttest after reviewing the education presentation, which indicates the education provided was successful (Appendix I, Figure I3).

Once the education module deadline was met, the NAS guideline was officially implemented into practice. Outcome measures collected included the length of hospital stay, length of pharmaceutical treatment (morphine), and total hospital costs NAS diagnosis code and by year. Data was collected for years 2014, 2015, and 2016 to establish baseline data. In 2017, there were 23 cases of NAS who stayed an average 31 in the hospital and received an average of

34 days of morphine treatment. In 2019, there were 19 cases of NAS who stayed an average of 17 days and received an average of 20 days of morphine treatment (Appendix I, Figure I4). These results indicate the implementation of an evidence-based treatment guideline paired with a comprehensive education package were successful in reducing the length of stay by 14 days and the length of morphine treatment by 14 days. This resulted in a savings of $307,136 in hospital costs (Appendix I, Figure I5).

Data Collection

Outcome measures collected from a requested finance report included the number of NAS cases, length of hospital stay, and the total cost of hospitalization by diagnosis and year. Baseline data was collected for the years of 2014 through 2017 and post-intervention data was collected for years 2018, and 2019. The finance report also included individual patient medical record number of which a pharmacy representative could use to extrapolate the start and end date of morphine treatment. Raw data was collected from the SharePoint site including total number of staff completing the entire education module, total number of staff partially completing the education module, pretest scores by job role for each education section, and posttest scores by job role for each education section.

Data Analysis

Using the finance report, the number of NAS cases were totaled and reported by year. The total length of stay was collected from each NAS case and then averaged and reported by year. Associated hospital costs for each NAS case were totaled and reported by year. The finance report was submitted to the NAS council pharmacy representative. She used the account numbers to conduct a manual extraction of data including the date of morphine initiation and the

date of morphine discontinuation. From this, each case had a total length of stay. The average length of hospital stay was calculated and reported by year.

Outcome Measures

Of the 120 available staff and physicians who were noted as potential participants, 118 completed at least one of the 16 components of the education module. Fifty-eight completed the entire module, which translates to 48% of staff completed 100% of the module. We looked at the pre-test scores and knew the Finnegan scoring module would be tough as the scoring tool has a great deal of subjectivity. The goal was to reduce the subjectivity with the education module by providing clear definitions of each of the 21 components of the scoring tool. Following the completion of the education modules, each of the 58 participants achieved 100%, which means the education module was effective.

To evaluate our outcome measures, finance pull ICD9 and ICD10 diagnosis codes associated with NAS and the patient's LOS. In 2017, there were 23 cases of babies with NAS who stayed an average of 31 days and were treated for an average of 34 days. After the implementation of the guideline and the completion of the education modules, the same finance reports were pulled. In 2019, there were 19 cases who stayed and average of 17 days and were treated for an average of 20 days. Overall, while the number of NAS cases remains steady, the interventions had an important impact on the average length of stay and the length of treatment.

Outcome Analysis

While the number of NAS cases remained steady, differences in absolute numbers for LOS, LOT, and the cost of hospitalization showed a downward trend (Appendix I, Figure I4), which was an expected finding based on the synthesized body evidence.

Financial Impact

The organization began considering the NAS patient population in 2014 due to its exorbitant cost of care. Project implementation occurred in late 2018. Impact outcomes were evaluated pre-project implementation in 2017, when the hospital had 23 patients with NAS who stayed an average of 34 days, accumulating a total of $499,709 in hospital charges. In 2018, during project implementation, there were 28 cases who stayed 13 fewer days than the year before, resulting in a total cost of $313,799. In 2019, post project implementation, there were 19 cases of NAS who stayed an average of 17 days at a cost of $192,573. The total savings from 2017 to 2019 was $307,136, which supported the findings in the body of evidence (Appendix I, Figure I5).

Chapter 5: Project Sustainability Discussion, Conclusions, and Recommendations (EBP Process Step 5 & 6)

Implications of Project Results

By providing foundational education and implementing a standardized treatment guideline for the care of infants with NAS, the healthcare team practices consistently resulting in a reduction in hospitalization and costs. There has been a noted shift in culture within the units involved in this project. I have seen staff identify external educational material still using old terminology such as "addicted" in relation to the babies impacted with NAS. Babies are not "addicted" but rather harbor a physical dependence on the medication they were exposed to.

This same shift in staff and physician perception has also been impacted the relationship between staff and the mothers of these patients. Through the trauma-informed care education, the staff now understand the mother's history and past trauma(s) may contribute to her use of drugs. Additionally, staff and physicians now know addiction is a medical condition rather than a choice. Shifting staff perceptions and attitudes towards the mother has led to staff empowering the mother to take an active and engaged role in her baby's treatment.

There has been a marked improvement in the relationship between staff, physicians, and Child Protective Services (CPS) following the implementation of this project's interventions. The improved partnership with CPS enabled staff to advocate on behalf of the mother and baby and develop safety plans with CPS that not only meet case worker expectations but enabled on-going incorporation of non-pharm interventions into patient's care by the mother.

Project Sustainability Plans

Two quarterly reports will be generated: 1) a quarterly report for the number of NAS cases, the total length of hospital stay, and associated hospital costs will be requested by appointed NAS Council member(s) and submitted to a finance representative. 2) The finance report will be shared with the NAS Council pharmacy representative in which they will collect the total duration of morphine treatment on each NAS case identified in the finance report. To facilitate this, I added quarterly report appointments to the calendar of each of the NAS Council members involved in data management. Assigned data collectors will keep a secure spreadsheet of all data for ongoing monitoring for trends. Discussion of quarterly data will occur at specified NAS Council meetings and action plans developed to address negative trends. To ensure the NAS treatment guideline is based on the latest evidence, the guideline will enter the 2-year policy review cycle, in which the evidence will be explored for any new recommendations to update the guideline. Quarterly reports and updates to the guideline will be communicated via daily huddles, email, and weekly newsletters.

Implications of Results to the Community/Organization

While Gracelynn was not able to benefit from this project, other babies like her will benefit from the consistent evidence-based care at a significantly reduced cost. Dissemination of this project via poster fairs (Appendix J, Figure J1), podium presentations, and publication will benefit other healthcare facilities seeking to improve the care they deliver their own patients with NAS. Through our improved partnership with CPS case workers, we expect CPS caseworkers will share their experiences with other organizations, highlighting our work as the benchmark for successful outcomes with the NAS population. One of the most powerful implications of this

project is the mothers will feel a sense of connection and ownership because we have incorporated them into the treatment team and educated them on the vital role they play in their baby's treatment journey.

Key Lessons Learned

The first key lesson learned through this process is that evidence-based practice is effective in addressing clinical issues. In this case, as the evidence suggests, the implementation of a comprehensive treatment guideline for the care of infants with NAS reduced the length of hospital stay, the duration of morphine/medication treatment, and can save the hospital thousands of dollars for our organization. Second key lesson is that consistent utilization of the guideline is key to ongoing success. Toward that end, the sustainability plan will ensure data points are regularly evaluated and negative trends are investigated using quality improvement process, such as root cause analysis.

The third key lesson learned is that barriers to success must be anticipated and plans developed to address those barriers. When faced with unplanned obstacles, it is important to evaluate all options and make the best decision based on those available options. The options may not include the perfect solution, but project leaders should move forward, learn from the situation, and adjust later as the project fully develops. The final key lesson for this project was the despite best laid plans, unforeseen flaws in the plan are bound to happen, such as the inadequacies of the educational module platform and inaccessibility to physicians. Key lessons learned in this project will facilitate better project process and outcome success with the next one.

Project Recommendations

The best evidence-based treatment for patients with NAS is consistency in guideline implementation, which guarantees a standard of care across patients, providers, and time. When this project began, adherence to the new guideline was varied. Continuing to offer the NAS educational modules will be of utmost importance – in orientation of new nurses as well as annual competency blitz. This will ensure that babies are treated appropriately and are discharged in the appropriate time period.

With the success with NAS patients in our organization, there is the potential for implementing the new NAS guideline system-wide. One challenge to system-wide implementation is that two different neonatology groups care for these patients. The practice approach varies between these two provider groups. The key to system-wide implementation will be the project leader cultivating relationships with these provider groups, helping them understand the evidence underpinnings of the guideline, the success of this project and how appointed NAS Council member can help them implement the guideline in their organization, including ongoing updates to ensure its evidence-based foundations.

Chapter 6: DNP Practice-Scholar Role Actualization

Role Impact

I define my leadership style as a combination of transformational, situational, and servant leadership (Appendix K, Figure K1). During this project, I drew on components of each of these leadership styles to motivate and stimulate those involved in the project's development, implementation, and completion. As a servant leader I ensured staff impacted by this project had a voice and encouraged their participation, which fostered their professional growth through a trusting give and take relationship. When issues developed, I called upon my situational leadership skills and reassessed the situation with my team. We examined participants and their readiness to receive change. From this, I adjusted my methods to meet their needs and improve their commitment to the project.

As a DNP clinical expert, my impact on the organization is broad and stretches from finance, through policy development, patient outcomes, and beyond. I plan to draw on my DNP program experience to lead my organization to improved healthcare delivery through translation of the best and most current evidence into practice. I hope to implement this guideline into practice system wide to each of our entities may delivery high-quality evidence-based care. I have recently started hosting talks with visiting nursing students about my experience in the DNP program in hopes of inspiring them to continue their education and contribute to the ongoing success of the nursing profession.

When evaluating my career trajectory, I plan to continue to increase my engagement within my organization by taking on additional leadership roles. Should an opportunity to advance present itself, I am now more confident in my abilities to move to the next level. I will

continue to push myself beyond my comfort level to foster growth both personally and professionally. I believe this project has provided an opportunity for others (within the organization) to see my potential and therefore seek me out for important projects and tasks. I'm open to any and all opportunities that come my way and I contribute that directly to my experience in this program.

Summary

Through a keen awareness of my individual strengths and emotional intelligence, as they have been woven through this program, I have found success. With the regular use of self-reflection, I have focused energy on improving my areas of opportunity, which will benefit my future career momentum. This program has not only helped me improve as a leader and a DNP clinical expert but empowered me to seize each opportunity as a monumental event to explore things I would not normally have tried.

References

Bagley, S., Wachman, E. M., Holland, E., & Brogly, S. B. (2014). Review of the assessment and management of neonatal abstinence syndrome. *Addiction Science & Clinical Practice*, *9*(1), 19. doi:10.1186/1940-0640-9-19

Benson, T. (2015). *The history of Opium in the United States*. Retrieved from https://www.attn.com/stories/1934/why-is-opium-illegal

Billings, J. R. (2007). Bonding theory-tying mothers in knots? A critical review of the application of a theory to nursing. *Journal of Clinical Nursing*, *4*(4), 207-211. doi:10.1111/j.1365-2702.1995.tb00208.x

Boucher, A. (2017). Nonopioid management of neonatal abstinence syndrome. *Advances in Neonatal Care*, *17*(2), 84-90. doi:10.1097/anc.0000000000000371

Brooks-Staub, K. (2005). *The evidence is in*. Retrieved from https://magazine.nursing.jhu.edu/2005/12/the-evidence-is-in/

Center for Behavioral Health Statistics and Quality. (2015). *2014 National survey on drug use and health: Detailed tables* (29). Retrieved from Substance Abuse and Mental Health Services Administration website: https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs2014/NSDUH-DetTabs2014.pdf

Centers for Disease Control and Prevention. (2016). *Drug overdose death data*. Retrieved from https://www.cdc.gov/drugoverdose/data/statedeaths.html

Chopra, N., & Marasa, L. H. (2017). The opioid epidemic. *The International Journal of Psychiatry in Medicine*, *52*(2), 196-201. doi:10.1177/0091217417720900

Corr, T. E., & Hollenbeak, C. S. (2017). The economic burden of neonatal abstinence syndrome in the United States. *Addiction, 112*(9), 1590-1599. doi:10.1111/add.13842

Daemen Library. (2018). *Evidence-Based Practice: Johns Hopkins Nursing EBP*. Retrieved from https://libguides.daemen.edu/c.php?g=704212&p=4999155

DeAtley, H. N., Burton, A., Fraley, M. D., & Haltom, J. (2017). Evaluation of the effectiveness of two morphine protocols to treat neonatal abstinence syndrome in a level II nursery in a community hospital. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, *37*(7), 856-860. doi:10.1002/phar.1966

Devlin, L. A., Lau, T., & Radmacher, P. G. (2017). Decreasing total medication exposure and length of stay while completing withdrawal for neonatal abstinence syndrome during the neonatal hospital stay. *Frontiers in Pediatrics, 5*. doi:10.3389/fped.2017.00216

Edwards, L., & Brown, L. F. (2016). Nonpharmacologic management of Neonatal Abstinence Syndrome: An integrative review. *Neonatal Network*, *35*(5), 305-313. doi:10.1891/0730-0832.35.5.305.

Felter, C. & Council on Foreign Relations. (2017). *The U.S. Opioid Epidemic*. Retrieved from https://www.cfr.org/backgrounder/us-opioid-epidemic#chapter-title-0-4

Grossman, M., Seashore, C., & Holmes, A. (2017). Neonatal abstinence syndrome management: A review of recent evidence. *Reviews on Recent Clinical Trials, 12*, 1-7. doi:10.2174/1574887112666170816144818

Hahn, J., Lengerich, A., Byrd, R., Stoltz, R., Hench, J., Byrd, S., & Ford, C. (2016). Neonatal abstinence syndrome: The experience of infant massage. *Creative Nursing*, *22*(1), 45-50. doi:10.1891/1078-4535.22.1.45

Hudak, M. L., Tan, R. C., The Committee on Drugs, & The Committee on Fetus and Newborn. (2012). Clinical report: Neonatal drug withdrawal. *Pediatrics, 129,* e540-e560. doi:10.1542/peds.2011-3212

Jensen, C. L. (2014). Improving outcomes for infants with NAS. *The Clinical Advisor*, *17*(6), 85-92. Retrieved from http://www.clinicaladvisor.com/cmece-features/improving-outcomes-for-infants-with-nas/article/349884/

Jones, H. E., & Fielder, A. (2015). Neonatal abstinence syndrome: Historical perspective, current focus, future directions. *Preventive Medicine, 80,* 12-17. doi:10.1016/j.ypmed.2015.07.017

Leonard, K. (2016). America's opioid epidemic is increasingly harming babies. Retrieved from https://www.usnews.com/news/articles/2016-08-11/americas-opioid-epidemic-is-increasingly-harming-babies-cdc-report-shows

Lind, J. N., Petersen, E. E., Lederer, P. A., Phillips-Bell, G. S., Perrine, C. G., Li, R., … Anjohrin, S. (2015). Infant and maternal characteristics in Neonatal Abstinence Syndrome — Selected hospitals in Florida, 2010–2011. *Morbidity and Mortality Weekly Report (MMWR)*, *64*(08), 213-216

Ludington-Hoe, S. M., & Abouelfettoh, A. M. (2015). Can kangaroo care help newborns with neonatal abstinence syndrome? Case report. *Clinical Nursing Studies*, *3*(4). doi:10.5430/cns.v3n4p44

MacMullen, N. J., Dulski, L. A., & Blobaum, P. (2014). Evidence-based interventions for neonatal abstinence syndrome. *Pediatric Nursing*, *40*(4), 165-203. Retrieved from https://www.pediatricnursing.net/ce/2016/article40051.pdf

Maguire, D. (2014). Care of the infant with neonatal abstinence syndrome. *The Journal of Perinatal & Neonatal Nursing*, *28*(3), 204-211. doi:10.1097/jpn.0000000000000042

McKnight, S., Coo, H., Davies, G., Holmes, B., Newman, A., Newton, L., & Dow, K. (2015). Rooming-in for infants at risk of neonatal abstinence syndrome. *American Journal of Perinatology*, *33*(05), 495-501. doi:10.1055/s-0035-1566295

Melnyk, B. M., Fineout-Overholt, E., Stillwell, S. B., & Williamson, K. M. (2010). Evidence-based practice: Step by step: The seven steps of evidence-based Practice. *AJN, American Journal of Nursing*, *110*(1), 51-53. doi:10.1097/01.naj.0000366056.06605.d2

Minnesota Hospital Association. (2013). *Neonatal Abstinence Syndrome (NAS) Toolkit*. Retrieved from http://www.mnhospitals.org/Portals/0/Documents/patientsafety/Perinatal/Neonatal%20Abstinence%20Syndrome%20Toolkit.pdf

Murphy-Oikonen, J., Brownlee, K., Montelpare, W., & Gerlach, K. (2010). The experiences of NICU nurses in caring for infants with Neonatal Abstinence Syndrome. *Neonatal Network: The Journal of Neonatal Nursing*, *29*(5), 307-313. doi:10.1891/0730-0832.29.5.307

Nursing Theory. (2016). *Lewin's Change Theory*. Retrieved from https://nursing-theory.org/theories-and-models/lewin-change-theory.php

Osborn, D. A., Jeffery, H. E., & Cole, M. J. (2005). Opiate treatment for opiate withdrawal in newborn infants. *Cochrane Database of Systematic Reviews*, (10). doi:10.1002/14651858.cd002059.pub2

Patrick, S. W., Davis, M. M., Lehman, C. U., & Cooper, W. O. (2015). Increasing incidence and geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *Journal of Perinatology, 35*(8), 667-667. doi:10.1038/jp.2015.63

Patrick, S. W., Dudley, J., Martin, P. R., Harrell, F. E., Warren, M. D., Hartmann, K. E., & Cooper, W. O. (2015). Prescription opioid epidemic and infant outcomes. *Pediatrics*, *135*(5), X6-X6. doi:10.1542/peds.2014-3299d

Patrick, S. W., Schumacher, R. E., Benneyworth, B. D., Krans, E. E., McAllister, J. M., & Davis, M. M. (2012). Neonatal Abstinence Syndrome and associated health care expenditures. *JAMA*, *307*(18), 1934-40. doi:10.1001/jama.2012.3951

Patrick, S. W., Schumacher, R. E., Horbar, J. D., Buus-Frank, M. E., Edwards, E. M., Morrow, K. A., & Soll, R. F. (2016). Improving care for neonatal abstinence syndrome. *Pediatrics*, *137*(5), 1-8. doi:10.1542/peds.2015-3835

Raeside, L. (2003). Attitudes of staff towards mothers affected by substance abuse. *British Journal of Nursing*, *12*(5), 302-310. doi:10.12968/bjon.2003.12.5.11176

Rudd, R. A., Seth, P., David, F., & Scholl, L. (2016). Increases in drug and opioid-involved overdose deaths — United States, 2010–2015. *MMWR. Morbidity and Mortality Weekly Report*, *65*(5051), 1445-1452. doi:10.15585/mmwr.mm655051e1

Short, V. L., Gannon, M., & Abatemarco, D. J. (2016). The association between breastfeeding and length of hospital stay among infants diagnosed with neonatal abstinence syndrome: A population-based study of in-hospital births. *Breastfeeding Medicine, 11*(7), 343-349. doi:10.1089/bfm.2016.0084

Siu, A., & Robinson, C. A. (2014). Neonatal abstinence syndrome: Essentials for the practitioner. *Journal of Pediatric Pharmacology and Therapeutics, 19*(3), 147-155. doi:10.5863/1551-6776-19.3.147

Stover, M. W., & Davis, J. M. (2015). Opioids in pregnancy and neonatal abstinence syndrome. *Seminars in Perinatology, 39*(7), 561-565. doi:10.1053/j.semperi.2015.08.013

Sublett, J. (2013). Neonatal abstinence syndrome: Therapeutic interventions. *The American Journal of Maternal/Child Nursing, 38*(2), 102-107. doi:10.1097/nmc.0b013e31826e978e

Sylvia, M. L., & Terhaar, M. F. (2018). *Clinical analytics and data management for the DNP* (2nd ed.). New York, NY: Springer Publishing Company

Texas Department of Family and Protective Services. (2016). *Child Protective Services (CPS) Conservatorship: Removals*. Retrieved from https://www.dfps.state.tx.us/About_DFPS/Data_Book/Child_Protective_Services/Conservatorship/Removals.asp

Texas Department of State Health Services (TDSHS). (2017*). Neonatal Abstinence Syndrome (NAS).* Retrieved from http://www.dshs.texas.gov/sa/nas/

Texas Department of State Health Services (TDSHS). (2017). Texas health data – opioid-related deaths. Retrieved from http://healthdata.dshs.texas.gov/Opioids/Deaths

The Annie E. Casey Foundation. (2017). *KIDS COUNT Data Center*. Retrieved from http://datacenter.kidscount.org/data/tables/6269-children-entering-foster-care?loc=1&loct=2#detailed/2/2-52/false/573,869,36,868,867/any/13036

The Treatment Center. (2018). *Texas reports struggle with drug and alcohol use throughout the state*. Retrieved from https://www.thetreatmentcenter.com/blog/addiction-texas-substance-abuse-trends-statistics-2017/

Vogel, L. (2018). Newborns exposed to opioids need mothers more than NICU, say pediatricians. *CMAJ : Canadian Medical Association Journal*, *190*(4), E123–E124. http://doi.org/10.1503/cmaj.109-5550

Welle-Strand, G. K., Skurtveit, S., Jansson, L. M., Bakstad, B., Bjarkø, L., & Ravndal, E. (2013). Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatrica*, n/a-n/a. doi:10.1111/apa.12378

Zahorodny, W., Rom, C., Whitney, W., Giddens, S., Samuel, M., Maichuk, G., & Marshall, R. (1998). The Neonatal Withdrawal Inventory. *Journal of Developmental & Behavioral Pediatrics*, *19*(2), 89-93. doi:10.1097/00004703-199804000-00005

Appendix A. Systematic Search

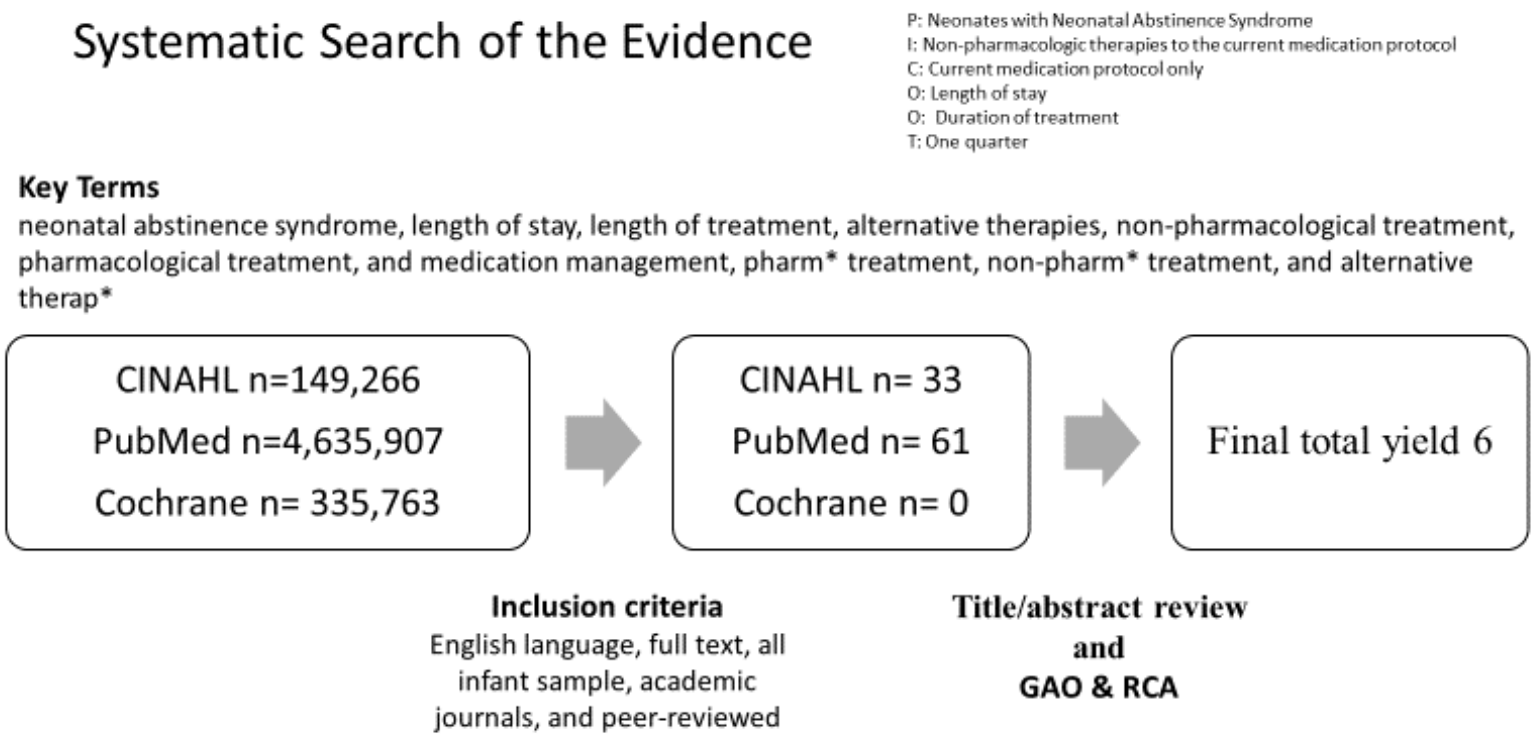

Figure A1 Systematic Search Strategy Flowchart

Appendix B. Critical Appraisal

Table B1: Levels and Type of Evidence

	1	2	3	4	5	6
Level I: Systematic review or meta-analysis	X	X	--	--	--	--
Level II: Randomized controlled trials	--	--	--	--	--	--
Level III: Controlled trials without randomization	--	--	--	--	--	--
Level IV: Case-control or cohort study	--	--	X	X	X	--
Level V: Systematic review of qualitative or descriptive studies	--	--	--	--	--	X
Level VI: Qualitative or descriptive study (includes evidence implementation projects)	--	--	--	--	--	--
Level VII: Expert opinion or consensus	--	--	--	--	--	--

1 = Bagley, et al., (2014); 2 = Edwards, et al., (2016); 3 = McKnight, et al., (2016); 4 = Short, et al., (2016); 5= Welle-Strand (2013); 6 = Boucher et al., (2017)

Appendix B. Critical Appraisal & Synthesis

Table B2: Evaluation Table

CLINICAL QUESTION: In neonates with Neonatal Abstinence Syndrome (P), how does adding non-pharmacologic therapies to the current medication protocol (I) compared to current medication protocol alone (C) affect the length of stay and length of treatment (O) within one quarter (T)?

Citation: author(s), date of publication& title	Purpose of Study	Conceptual Framework	Design/ Method	Sample Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
1. Bagley, S. et al. (***2014***). Review of the assessment and management of neonatal abstinence syndrome. *Addiction Science & Clinical Practice*, *9*(1), 19.	Summarize the evidence of NAS interventions	N/A	**Design**: SR **Searched**: PM, CO, hand search **Nonpharm**: TY: 879, Y: 13 **Pharm**: TY: 940, Y: 7	**Nonpharm:** BF: n=452 RI: n=183 Bed: n=44, Position: n=48,	IV 1 - BF IV 2 – RI IV 3 - Beds IV 4 – Position IV 5 - NIA	DV 1 - LOS DV 2 - LOT	-OR -CI -SD	• BF - ↓LOS (mean LOS 14.7 [SD 14.9], ↓ LOT (OR=0.36 95% CI 0.18-0.71; p<0.05), • RI= ↓LOS (mean LOS 11.8; p<0.05), ↓LOT (mean LOT 5.9; p<0.05) • Beds: ↓LOT • Position (prone)=↓peak & mean scores; ↓mean kcal intake • NIA - ↑ sleep, ↓restlessness, ↑feeding	**LOE=1** **Weaknesses** limited evidence, ↓sample sizes **Strengths** BF-↑sample size (incl RCT), ↑CI, ↓p-value **Conclusion** BF, RI, & position ↓LOS, scores, LOT, req kcal, & restlessness, ↑sleep & feeding **Recommendations** Beds, BF, & RI
2. Edwards, et al., (2016). Nonpharmacologic management of Neonatal Abstinence Syndrome: An integrative review.	Summarize evidence of nonpharm interventions for tx of NAS	N/A	**Design**: SR **Searched**: CL, PM, ML, & PI	**BF**: n= 6 trials (n=565 AG) **Position**: n=1 trial (n=48)	IV 1 - BF IV 2 - Position IV 3 - RI IV 4 - Acupun/Acupre	DV 1 - LOS DV 2 - LOT	-CI -RR	• **BF**: ↓LOS & LOT • **Position**: Prone =↓severity of NAS • **RI**: ↓LOT (-12.7	**LOE=1** **Weaknesses** Overall - ↓ability to generalize findings, ↓sample size, ↓subjects of varying

Legend: Adm-Admission, AG-Aggregate, Asmt-Assessment, BF-Breastfeeding, Bupren-Buprenorphine, CF – Conceptual Framework, CI-Confidence Interval, CL, CINAHL, Clin-Clinical, CO-Cochrane Database, DTO-Diluted, Tincture Opium, DV-Dependent Variable, EB – Embase Database, Eval-Evaluate, Exp-Experimental, Finnegan-Neonatal Narcotic Abstinence Scoring System, F/U-Follow Up, IB-Infant Behaviors, ICC- Intraclass correlation coefficient, IM-Infant Massage, IRR-Inter-rater reliability, IQR-Interquartile Range, IV-Independent Variable, KC-Kangaroo Care, Kcal-Kilocalories, Lipsitz-Neonatal Withdrawal Inventory, LOS-Length of Stay, LOT-Length of Treatment, MA-Meta Analysis, MD-Mean Difference, MIR, Maternal Infant Relationship, Med Req-Medication Required, Mgt-Management, ML – Medline, Modified Finnegan-MOTHER NAS Scale, MSO4-Morphine, NAS-Neonatal Abstinence Syndrome, N/D – Not Determined, NIA-Non-insertion Acupuncture, NNWI-Neonatal Narcotic Withdrawal Index, Nonpharm-Nonpharmacologic treatment, NOS-Neonatal Opium Solution, NWI-Neonatal Withdrawal Inventory, OR-Odds Ratio, Pharm-Pharmacologic treatment, Phenobarb-Phenobarbitone, PI – PsychInfo, PM-PubMed, Position-Positioning (Prone vs. Supine), PT-Patient, RCT-Randomized Controlled Trial, RD-Risk Difference, Rec'd- Received, RI-Rooming-in, RR-Risk Ration, RX-Treatment, SC-Supportive Care, SD-Standard Deviation, Sen/Spec-Sensitivity/Specificity, SX-Symptoms, SZ-Seizures, TO-Tincture of Opium, TX-Treatment, TY-Total Yield, WKS-Weeks, WMD-Weighted Mean Difference.

Citation: author(s), date of publication& title	Purpose of Study	Conceptual Framework	Design/ Method	Sample Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
Neonatal Network, *35*(5), 305-313.			TY: 112, Y: 14	**RI**: n=3 studies (n=1353 AG) **Acupun** **Acupre**: n=2 studies (n=130 AG) **Bed**: n=2 studies (n=44 AG)	IV 5 - Bed			days. p<0.003), ↓LOS (-11.7 days, p<0.001) **Acupun/Acupre**: ↑sleep & feeding, ↓agitation; potential for TX - not stat sig **Bed**: ↑sensitivity with rocking beds - not effective; ↓incidence of NAS w/ waterbed, ↓LOT	cultures, ethnicities, socioeconomic status **Strengths** -13/14 studies found nonpharm has positive effect RI findings stat sig BF findings stat sig **Conclusion** BF, RI, Position found supportive TX for NAS **Recommendations** BF, RI, and position
3. McKnight et al., (2015) Rooming-in for infants at risk of Neonatal Abstinence Syndrome. *American Journal of Perinatology*, *33*(05), 495-501.	Examine RI program for infants with NAS	N/A	**Design**: CC/Cohort Single-center, retro cohort	n=44 Infants born between 2012 and 2014, ≥36 wks w/ NAS 2 groups: RI (n=24) RI: (n=20)	IV 1 – RI	DV 1 – LOS DV 2 – LOT	-IQR -p-value	• ↓LOS: NICU (IQR 24, 3-56; 24) vs RI (IQR 5, 3-34; 3) (p<0.001) • No stat sig: LOT 1st line med: NICU (IQR 29.5, 8-73; 23 vs RI (IQR 24, 23-29, IQR not calculated) (p=0.83)	**LOE=4** **Weaknesses** Small sample size ↓ ability to test BF hypothesis Non-randomization uncontrolled design Drugs of exposure not compared **Strengths** Stat sig results for LOS **Conclusion** RI may be supportive for SX mgt **Recommendations** RI
4. Short et al., (2016). The association between breastfeeding and length of hospital stay among	Evaluate the relationship between BF and LOS in	N/A	**Design**: CC/Cohort	n=3,725	IV 1 – BF	DV 1 - LOS	-IQR -p-value	• ↓LOS in BF babies – median LOS 10 days	**LOE=4** **Weaknesses**

Legend: Adm-Admission, AG-Aggregate, Asmt-Assessment, BF-Breastfeeding, Bupren-Buprenorphine, CF – Conceptual Framework, CI-Confidence Interval, CL, CINAHL, Clin-Clinical, CO-Cochrane Database, DTO-Diluted, Tincture Opium, DV-Dependent Variable, EB – Embase Database, Eval-Evaluate, Exp-Experimental, Finnegan-Neonatal Narcotic Abstinence Scoring System, F/U-Follow Up, IB-Infant Behaviors, ICC- Intraclass correlation coefficient, IM-Infant Massage, IRR-Inter-rater reliability, IQR-Interquartile Range, IV-Independent Variable, KC-Kangaroo Care, Kcal-Kilocalories, Lipsitz-Neonatal Withdrawal Inventory, LOS-Length of Stay, LOT-Length of Treatment, MA-Meta Analysis, MD-Mean Difference, MIR, Maternal Infant Relationship, Med Req-Medication Required, Mgt-Management, ML – Medline, Modified Finnegan-MOTHER NAS Scale, MSO4-Morphine, NAS-Neonatal Abstinence Syndrome, N/D – Not Determined, NIA-Non-insertion Acupuncture, NNWI-Neonatal Narcotic Withdrawal Index, Nonpharm-Nonpharmacologic treatment, NOS-Neonatal Opium Solution, NWI-Neonatal Withdrawal Inventory, OR-Odds Ratio, Pharm-Pharmacologic treatment, Phenobarb-Phenobarbitone, PI – PsychInfo, PM-PubMed, Position-Positioning (Prone vs. Supine), PT-Patient, RCT-Randomized Controlled Trial, RD-Risk Difference, Rec'd- Received, RI-Rooming-in, RR-Risk Ration, RX-Treatment, SC-Supportive Care, SD-Standard Deviation, Sen/Spec-Sensitivity/Specificity, SX-Symptoms, SZ-Seizures, TO-Tincture of Opium, TX-Treatment, TY-Total Yield, WKS-Weeks, WMD-Weighted Mean Difference.

Citation: author(s), date of publication& title	Purpose of Study	Conceptual Framework	Design/ Method	Sample Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
infants diagnosed with Neonatal Abstinence Syndrome: A population-based study of in-hospital births. *Breastfeeding Medicine, 11*(7), 343-349	infants w/ NAS.		Pennsylvania-retro cohort Retrospective chart review	Hospital d/c data used to collect subjects born between 2012 and 2014 w/ NAS using ICD-9				(IQR 5-19) • Stat sig inverse relationship between BF and LOS (p=0.008) (Adjusted p=0.05) Adjusted LOS ↓9.4%	Using ICD-9 has been problematic in the past due to potential incorrect coding Limited info on maternal drugs used Limited info on maternal TX Illicit vs RX? Limited data on BF practices (initiation, duration, continuation etc) **Strengths** Large sample size Stat sig results Adjusted results stat sig **Conclusion** BF beneficial to infants w/NAS **Recommendations** BF
5. Welle-Strand, et al., (2013). Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatrica*, n/a-n/a.	Examine BF impact on incidence and duration of NAS TX.	N/A	**Design**: Cohort Part I: retrospective questionnaire Part II: prospective data collection Part III: retrospective phone interview	(n=139 women; n=161 babies) Part I: (n=36) Part II: (n=36) Part III:(n=52)	IV 1: BF	DV 1: LOT	-p-value	↓LOS (p=0.02) in BF babies whose mother is receiving MMT	**LOE=4** **Weaknesses** Retrospective design (incomplete data) Varied experience with assessment of NAS Limitations of questionnaire Small subject size **Strengths** National study Compared mothers in both MMT and BMT treatment plans Study population = subjects on OMT >1 year

Legend: Adm-Admission, AG-Aggregate, Asmt-Assessment, BF-Breastfeeding, Bupren-Buprenorphine, CF – Conceptual Framework, CI-Confidence Interval, CL, CINAHL, Clin-Clinical, CO-Cochrane Database, DTO-Diluted, Tincture Opium, DV-Dependent Variable, EB – Embase Database, Eval-Evaluate, Exp-Experimental, Finnegan-Neonatal Narcotic Abstinence Scoring System, F/U-Follow Up, IB-Infant Behaviors, ICC- Intraclass correlation coefficient, IM-Infant Massage, IRR-Inter-rater reliability, IQR-Interquartile Range, IV-Independent Variable, KC-Kangaroo Care, Kcal-Kilocalories, Lipsitz-Neonatal Withdrawal Inventory, LOS-Length of Stay, LOT-Length of Treatment, MA-Meta Analysis, MD-Mean Difference, MIR, Maternal Infant Relationship, Med Req-Medication Required, Mgt-Management, ML – Medline, Modified Finnegan-MOTHER NAS Scale, MSO4-Morphine, NAS-Neonatal Abstinence Syndrome, N/D – Not Determined, NIA-Non-insertion Acupuncture, NNWI-Neonatal Narcotic Withdrawal Index, Nonpharm-Nonpharmacologic treatment, NOS-Neonatal Opium Solution, NWI-Neonatal Withdrawal Inventory, OR-Odds Ratio, Pharm-Pharmacologic treatment, Phenobarb-Phenobarbitone, PI – PsychInfo, PM-PubMed, Position-Positioning (Prone vs. Supine), PT-Patient, RCT-Randomized Controlled Trial, RD-Risk Difference, Rec'd- Received, RI-Rooming-in, RR-Risk Ration, RX-Treatment, SC-Supportive Care, SD-Standard Deviation, Sen/Spec-Sensitivity/Specificity, SX-Symptoms, SZ-Seizures, TO-Tincture of Opium, TX-Treatment, TY-Total Yield, WKS-Weeks, WMD-Weighted Mean Difference.

Citation: author(s), date of publication& title	Purpose of Study	Conceptual Framework	Design/ Method	Sample Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses]) RECOMMENDATIONS
									High proportion of BF women **Conclusion** BF beneficial to ↓LOS in babies born to mothers on MMT **Recommendations** BF
6. Boucher, A. (2017). Nonopioid management of neonatal abstinence syndrome. *Advances in Neonatal Care, 17*(2), 84-90.	Review the efficacy of RI and Acupuncture on LOS	N/A	**Design:** Level V Meta-Synthesis **Searched**: PM, ML, CL, & EB	n=8 studies **RI:** n=5 studies (n=122) **Acupuncture:** n=158 (n=3)	IV 1: RI IV 2: Acupuncture	DV 1: LOS	--	**RI:** ↓LOS **Acupuncture:** inconclusive	**LOE=5** **Weaknesses** Small study size (sample methods not indicated) **Strengths** RI stat sig ↓LOS RCTs included in analysis **Conclusion** RI supportive to symptom management and can ↓LOS **Recommendations** RI

Legend: Adm-Admission, AG-Aggregate, Asmt-Assessment, BF-Breastfeeding, Bupren-Buprenorphine, CF – Conceptual Framework, CI-Confidence Interval, CL, CINAHL, Clin-Clinical, CO-Cochrane Database, DTO-Diluted, Tincture Opium, DV-Dependent Variable, EB – Embase Database, Eval-Evaluate, Exp-Experimental, Finnegan-Neonatal Narcotic Abstinence Scoring System, F/U-Follow Up, IB-Infant Behaviors, ICC- Intraclass correlation coefficient, IM-Infant Massage, IRR-Inter-rater reliability, IQR-Interquartile Range, IV-Independent Variable, KC-Kangaroo Care, Kcal-Kilocalories, Lipsitz-Neonatal Withdrawal Inventory, LOS-Length of Stay, LOT-Length of Treatment, MA-Meta Analysis, MD-Mean Difference, MIR, Maternal Infant Relationship, Med Req-Medication Required, Mgt-Management, ML – Medline, Modified Finnegan-MOTHER NAS Scale, MSO4-Morphine, NAS-Neonatal Abstinence Syndrome, N/D – Not Determined, NIA-Non-insertion Acupuncture, NNWI-Neonatal Narcotic Withdrawal Index, Nonpharm-Nonpharmacologic treatment, NOS-Neonatal Opium Solution, NWI-Neonatal Withdrawal Inventory, OR-Odds Ratio, Pharm-Pharmacologic treatment, Phenobarb-Phenobarbitone, PI – PsychInfo, PM-PubMed, Position-Positioning (Prone vs. Supine), PT-Patient, RCT-Randomized Controlled Trial, RD-Risk Difference, Rec'd- Received, RI-Rooming-in, RR-Risk Ration, RX-Treatment, SC-Supportive Care, SD-Standard Deviation, Sen/Spec-Sensitivity/Specificity, SX-Symptoms, SZ-Seizures, TO-Tincture of Opium, TX-Treatment, TY-Total Yield, WKS-Weeks, WMD-Weighted Mean Difference.

Appendix B. Critical Appraisal & Synthesis

Table B3: Nonpharmacologic Interventions and Impact on LOS/LOT

	Breastfeeding	**Rooming-in**	**Beds**	**Position**	**Acupuncture Acupressure**
1	LOS↓*	LOS↓* LOT↓*	LOS n/m LOT↓	LOS n/m LOT n/m	LOS n/m LOT n/m
2	LOS↓ LOT↓	LOS↓ LOT↓	LOS↓ LOT n/m	LOS n/m LOT n/m	LOS n/m LOT n/m
3	--	LOS ↓ LOT n/m	--	--	--
4	LOS ↓ LOT n/m	--	--	--	--
5	LOS n/m LOT↓*	--	--	--	--
6	--	LOS↓* LOT n/m	--	--	LOS incon LOT n/m
Synthesis	3 of 3 reduced LOS 2 of 2 reduced LOT	4 of 4 reduced LOS 2 of 2 reduced LOT	1 of 2 reduced LOS 1 of 2 reduced LOT	None evaluated	1 incon

1 = Bagley, et al., (2014); 2 = Edwards, et al., (2016); 3 = McKnight, et al., (2016); 4 = Short, et al., (2016); 5= Welle-Strand (2013); 6 = Boucher et al., (2017)

LOS – length of stay, LOT – length of treatment, n/m – not measured, ↓ - decreased, * - statistical significance, incon - inconclusive

Appendix B. Critical Appraisal & Synthesis

Table B4: Systematic Review by Bagley et al.

	LOS	LOT
Abdel-Latif (2006)	BF = ↓*	n/m
Dryden (2009)	n/m	n/m
McQueen (2011)	n/m	n/m
Pritham (2012)	BF = ↓	n/m
O-Connor (2013)	n/m	n/m
Wachman (2013)	BF = ↓*	n/m
Welle-Strand (2013)	n/m	BF = ↓*
Hunseler (2013)	RI = ↓	RI = ↓
Abrahams (2007)	RI = ↓*	RI = ↓*
D'Apolito (1999)	n/m	n/m
Oro (1988)	Bed = ↓	n/m
Maichuk (1999)	n/m	n/m
Filippelli (2012)	n/m	n/m
Recommendation	BF & RI reduce LOS	RI reduce LOT

LOS – length of stay, LOT – length of treatment, n/m – not measured, ↓ - decreased, * - statistical significance, RI – Rooming-in, BF - Breastfeeding

Appendix B. Critical Appraisal & Synthesis

Table B5: Systematic Review of Non-Pharmacological Interventions by Edwards et al.

	LOS	LOT
Addel-Latif et al. (2006)	n/d	n/d
Abrahams et al. (2007)	RI↓*	RI↓*
Abrahams et al. (2010)	RI↓*	n/d
Ballard (2002)	BF↓	BF↓
D'Apolito (1999)	n/d	n/d
Filippelli et al. (2012)	n/d	n/d
Hodgson & Abrahams (2012)	n/d	n/d
Isemann et al. (2011)	BF↓	BF↓
Maichuk et al (1999)	n/d	n/d
McQueen et al. (2011)	n/d	n/d
O'Connor et al. (2013)	n/d	n/d
Oro & Dixon (1988)	n/d	n/d
Schwartz et al (2011)	n/d	n/d
Welle-Strand et al. (2013)	n/d	BF↓
Recommendation	BF & RI reduced LOS	BF reduced LOT

LOS – length of stay, LOT – length of treatment, n/m – not measured, ↓ - decreased, * - statistical significance, RI – Rooming-in, BF - Breastfeeding

Appendix C. EBP and Change Models

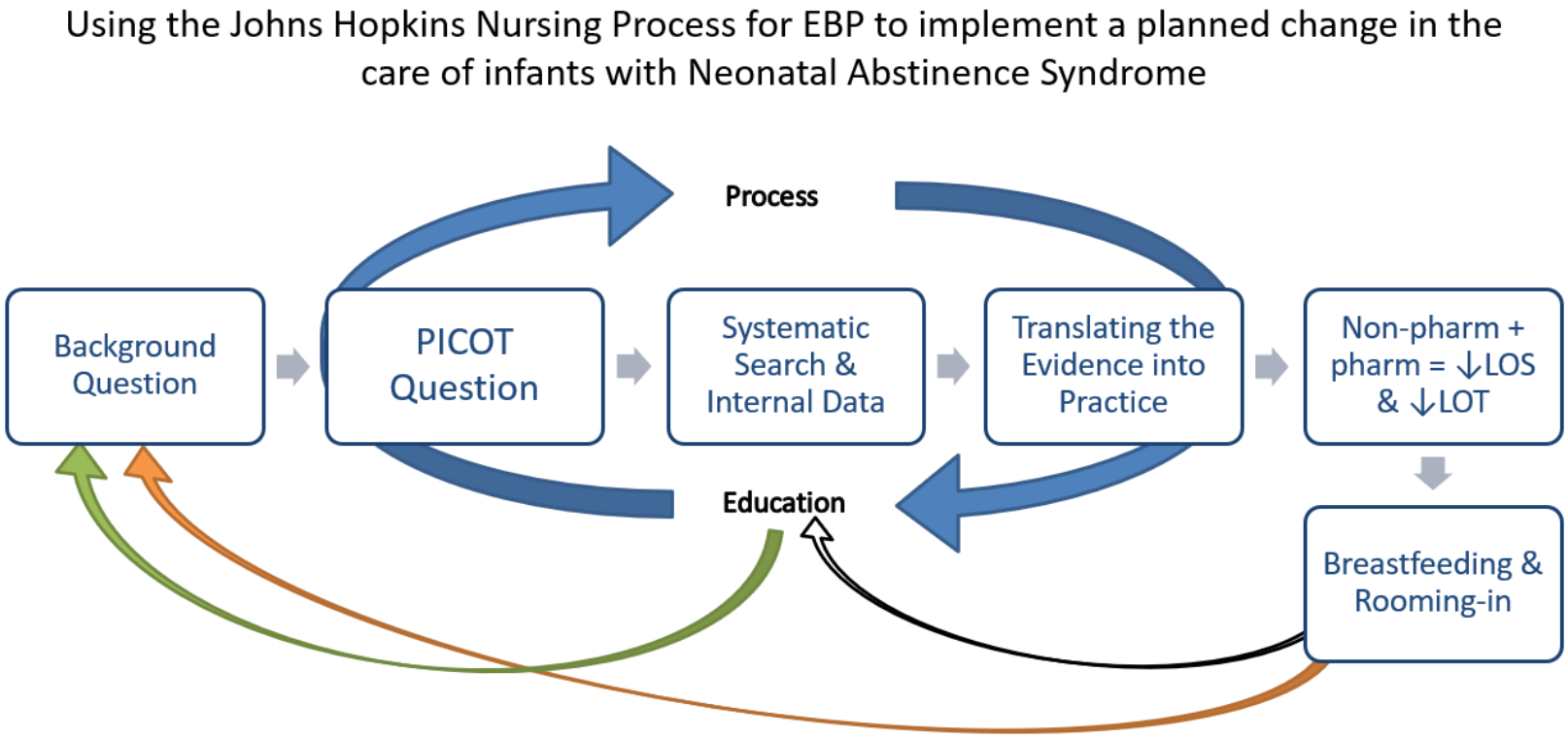

Figure C1 Johns Hopkins Nursing Evidence-Based Practice Model (JHMEBP)

Appendix C. EBP and Change Models

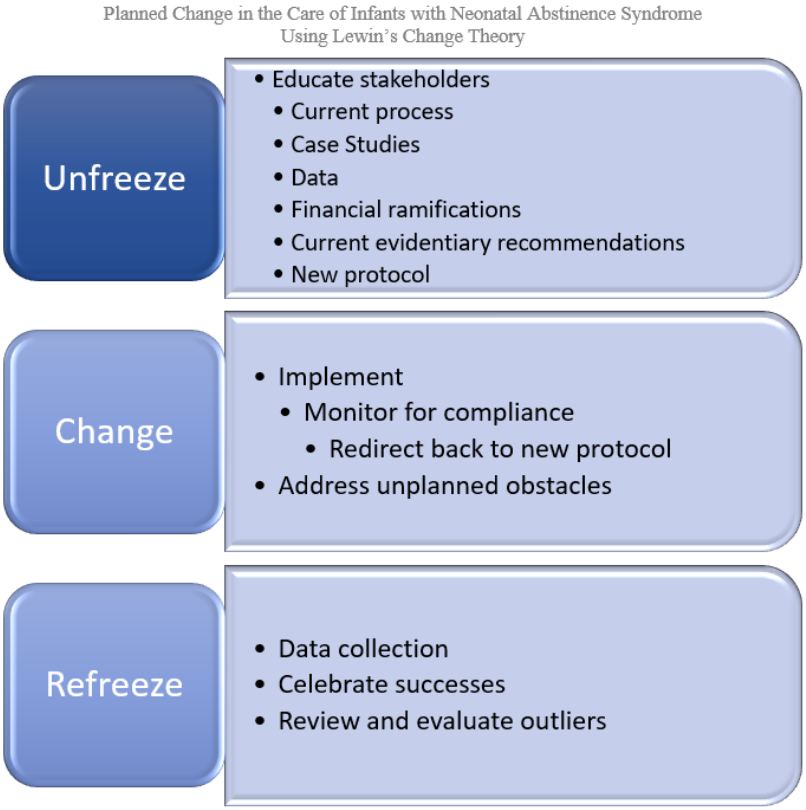

Figure C2 Lewin's Change Model

Appendix D. Executive Summary

Executive Summary

We are in the middle of an opioid crisis. Over the past decade, the use of opiates during pregnancy has significantly increased and has become a compelling public health concern[1]. Opioid use in pregnancy positively correlates with neonatal complications; opiate use can lead to intrauterine growth restriction, placental abruption, preterm birth, oligohydramnios, stillbirth, and maternal death. Neonatal Abstinence Syndrome (NAS) is a constellation of behavioral and physiological signs and symptoms resulting from exposure in utero to maternal drug use of opioids, stimulants, depressants, cigarettes, serotonin reuptake inhibitors (SSRI), or any combination thereof [2, 3].

Current treatment for this patient population consists of the use of morphine. According to the body of evidence, treatment of infants with NAS should include both pharmacological and non-pharmacological intervention, particularly rooming-in and breastfeeding to reduce the length of medication treatment and hospital stay [7, 8, 9, 10, 11, 12] Therefore, it is my recommendation that a comprehensive treatment guideline for the care of infants with NAS be developed to reduce the length of treatment and hospital stay.

Following approval from the compliance officer, data will need to be collected from patient charts admitted to with a diagnosis of NAS. This data will be deidentified and aggregated prior to dissemination. Chart audits will be conducted by select NAS Council members and remain the property of Texas Health Resources. Privacy and security of this information will be utmost priority. Data collected will include the following:

- Demographic details (based on report from finance): Infant name, account number, medical record number, medical diagnosis, admit unit, discharge unit, costs associated with hospital stay.
- Outcomes data: NICU admissions, max NAS scores, # patients needing medication treatment, feeding method, caregiver engagement/activity, length of hospital stay, duration of medication treatment

Costs associated in human resources, supplies, and equipment totals approximately $9,500, which includes 100 hours of committee member engagement for planning, development, chart audits, and sustainability and a total of one hour for participating staff and physicians to complete pre survey, education modules, and post survey. From the 2017 data, the average length of stay was 42 days at $33,000-$42,000 per patient in associated costs. If we treat the same number of patients during the implementation period and reduce the length of stay by 12 days, the cost savings could fall between $192,000-$240,000.

Appendix E. Letters of Support & Agreement

Form E 1 Letter of Support CNO

The University of Texas at TYLER
School of Nursing

March 26, 2019

On Behalf of: Cyndi B. Kelley, MSN, RNC-LRN
The University of Texas at Tyler - College of Nursing & Health Sciences
Doctor of Nursing Practice Program
3900 University Blvd.
Tyler, TX 75799
Ph: 903.566.7320
SONGrad@uttyler.edu

Texas Health Presbyterian Hospital of Dallas

RE: Letter of Support for Educational Endeavors

This letter is to confirm our organization's support for Cyndi Kelley's educational endeavors in the Doctor of Nursing Practice program at The University of Texas at Tyler over the next three years.

This support will include on-campus visits by the student as well as the implementation of an evidence-based practice project in our organization during Year 2 & 3 of the student's doctoral work.

Sincerely,

Julie Balluck MSN, RN, CPAN, NEA-BC
Texas Health Dallas
Interim Chief Nursing Officer
Julieballuck@texashealth.org
214.345.7178 (o)

DNP Form 102 Revised November 4, 2018

Appendix E. Letters of Support & Agreement

Form E 2 Industry Mentor Agreement – Chan

UTTYLER DNP INDUSTRY MENTOR MEMORANDUM OF UNDERSTANDING

THE UNIVERSITY OF TEXAS AT TYLER

COLLEGE OF NURSING AND HEALTH SCIENCES

SCHOOL OF NURSING – DOCTOR OF NURSING PRACTICE PROGRAM.

DNP INDUSTRY MENTOR AGREEMENT

I have reviewed the industry mentor guidelines. I can provide the student with advanced experiences that meet the DNP Scholarly Project (EPIP) goals as agreed upon by the student, the faculty mentor, and me. I understand that there will be no remuneration for this service. I will facilitate and review the student's learning activities and will submit the required evaluations to the DNP Program.

I, Christina Chan, agree to serve as an Industry mentor for the DNP student, Cyndi Kelley.
(name of industry mentor) (name of student)

from _____ to _____
(beginning date of mentorship) (anticipated end of mentorship)

OR

☑ For ALL Semesters

OR

For specifically indicated semesters: ____Fall _____Spring _____Summer

Please indicate if UTTYLER may disclose your contact information for future students seeking mentors?

☐ yes

☒ no

Industry Mentor Signature _____ Date 1/18/2019

For office use only:

Reviewed by _____Date _____

Approved as a DNP Industry mentor _____ yes _____ no

Appendix E. Letters of Support & Agreement

Form E2: Industry Mentor Agreement – Chan Page 2

UTTYLER DNP INDUSTRY MENTOR MEMORANDUM OF UNDERSTANDING

COLLEGE OF NURSING AND HEALTH SCIENCES

SCHOOL OF NURSING – DOCTOR OF NURSING PRACTICE PROGRAM

Industry Mentor Biographical Data

(**Please note** that an updated resume or curriculum vitae is also required in addition to this form)

Name: Christina Chan.

Current Agency UT Southwestern @ Presbyterian Dallas TAH Hospital

Position or Title: Medical Director / Assistant Professor.

Office Address: 8200 Walnut Hill Lane, NICU
(street)
Dallas, TX 75231
(city) (state) (zip)

Office phone with area code 214-345-8921

Fax number 214-648-2481

Email (personal or office) christina.chan@utsouthwestern.edu.

Alternate email _____

Preferred Method of Contact: _____ Phone X Email

Type of position you currently hold Medical Director.

Designated rural health site? _____ yes X no

Designated health professional shortage area? _____ yes X no

Designated medically underserved area? _____ yes X no

Student Signature: [signature]

Date submitted: 1/18/19

The UTTYLER School of Nursing complies with all federal and state laws related to the confidentiality of patient medical information including the Privacy Regulations issued pursuant to the Health Insurance Portability and Accountability Act of 1996. Students are required to comply with such laws and the medical record confidentiality policies and procedures of any health care facility where they are engaged in DNP Scholarly hour attainment. All DNP student mentors are tracked in a database for the purpose of ensuring and validating qualifications

*This document is designed to be used in conjunction with the UTTYLER Student Handbook.

Appendix E. Letters of Support & Agreement

Form E 3 Industry Mentor Agreement - Kakkilaya

UTTYLER DNP INDUSTRY MENTOR MEMORANDUM OF UNDERSTANDING

COLLEGE OF NURSING AND HEALTH SCIENCES

SCHOOL OF NURSING – DOCTOR OF NURSING PRACTICE PROGRAM

Industry Mentor Biographical Data

(**Please note** that an updated resume or curriculum vitae is also required in addition to this form)

Name: VENKATAKRISHNA KAKKILAYA, MD

Current Agency UT SOUTHWESTERN MEDICAL CENTER

Position or Title: Assistant Professor

Office Address: 5323 Harry Hines Blvd

(street) Dallas, Tx, 75390

(city) (state) (zip)

Office phone with area code 214-648-3903

Fax number 214-648-2481

Email (personal or office) VENKAT.KAKKILAYA@UTSouthwestern.edu

Alternate email VKakkilaya@Gmail.com

Preferred Method of Contact: ____ Phone ✓ Email

Type of position you currently hold Assistant Professor

Designated rural health site? ____yes ✓ no

Designated health professional shortage area? ____yes ✓ no

Designated medically underserved area? ____yes ✓ no

Student Signature: Cyndi B. Kelley, MSN, RNC-LRN

Date submitted: 2/2/2019

The UTTYLER School of Nursing complies with all federal and state laws related to the confidentiality of patient medical information including the Privacy Regulations issued pursuant to the Health Insurance Portability and Accountability Act of 1996. Students are required to comply with such laws and the medical record confidentiality policies and procedures of any health care facility where they are engaged in DNP Scholarly hour attainment. All DNP student mentors are tracked in a database for the purpose of ensuring and validating qualifications

*This document is designed to be used in conjunction with the UTTYLER Student Handbook.

Appendix F. Ethics Review

Ethics Review Form F1 Faculty Attestation of Compliance with the UTT DNP EPIP Ethics Form

I attest that I have reviewed the **UTTYLER DNP EPIP ETHICS FORM** that the DNP student has completed based on justification using the **UTTYLER DNP PROGRAM IRB DISCERNMENT FORM**.

I agree that the need for ethics review determination is correct and this DNP EPIP requires:

X FM Review Only

☐ -HIPAA ethics review by DNP Ethics Board
  ☐ HIPAA review form completed
☐ Organizational IRB review (based on policies of the organization in which the EPIP will be implemented)

_Ellen Fineout-Overholt__ _11-10-18_

Faculty Mentor Signature Date

Appendix F. Ethics Review

Ethics Review Form F 2 QIEBP Worksheet

Determination Worksheet for Quality Improvement (QI), Evidenced Based Practice (EBP) Projects and/or Human Subject Research

Investigators/Clinicians/Project Leads are encouraged to use this Worksheet to help determine whether a proposed activity can be considered Quality Improvement, Evidence-Based Practice, or Research.

Investigators/Clinicians/Project Leads may submit this Worksheet to the Texas Health Resources (THR) Institutional Review Board (IRB) with the Project Description review. Please know that should the IRB determine that a QI/EBP project contains an aspect of research then a full research application is required. For further instructions on how to use this document, see information below the tables of questions.

To continue with this Worksheet, circle below all the methods of review that are "**Applicable**" to your project.

1. Project purpose…..	**Applicable**
Quality Improvement (QI)	
Your project purpose is to evaluate a system process and use a PDSA for quality improvement.	
a. QI: Improve the process/delivery of care while decreasing inefficiencies?	Yes or No
b. QI: Measure variation from standard of practice?	Yes or No
c. QI: Improve adherence with standard practice?	Yes or No
d. QI: Measure ease of implementation?	Yes or No
e. QI: Measure feasibility?	Yes or No
f. QI: Measure rate of adoption?	Yes or No
g. QI: Measure cost reduction?	Yes or No
h. QI: Measure satisfaction with standard practice?	Yes or No
i. QI: Compare a program/process/system to an established set of standards?	Yes or No
If you answered "Applicable" to any of the items above, then most likely your project is QI. However, continue to complete this form to ensure your project does not require IRB review.	
Research	
Your project purpose is to develop or test the efficacy of a new intervention that has not been studied before, or test hypotheses about issues that are beyond the knowledge of current science, or to fill a gap in our knowledge ***Intervention*** includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Inventions can be non-clinical. Note: This is the HHS Human Subject Protections Regulation definition. There is no definition for intervention under the FDA human subject research regulations. Please refer to the QI/EBP/Case Study Instructional Sheet (attached to this document) for more information regarding FDA regulated research.	

Page **1** of **5**

Appendix F: Ethics Reviews

a. Research: Develop or test the efficacy of a new intervention that has not been studied before?	Yes or No
b. Research: Establish clinical practice standards/non-clinical standard procedures where none are already accepted?	Yes or No
c. Research: National or state registry/database from which a hypothesis will be tested?	Yes or No
If you answered "Yes" to any of the items above, then your project may involve research. However, continue to complete this form to ensure your project does not require IRB review.	

2. Project Involvement/Design.....	Applicable
Quality Improvement(QI)/Evidence Based Practice (EBP) **EBP is a change in practice that involves using the synthesized evidence already created and a model such as the IOWA model to determine the change in practice.** **In the implementation of your proposed project, are any of the following involved?**	
a. QI: Monitoring an existing process without any manipulation of the process	Yes or No
b. QI: Permitting physicians and caregivers to provide clinical standard of care and/or non-clinical standard procedure (without intervention) regardless of conduct of the project	Yes or No
c. QI: Involves collection of data to which the clinician/project lead and/or team routinely has access as part of his/her responsibilities within the institution associated with: 1) treatment; 2) billing; 3) performance monitoring; or 4) compliance	Yes or No
d. QI: Is the project flexible, including rapid and incremental changes such as in a plan-do-study-act (PDSA) cycle?	Yes or No
e. QI: Using established quality improvement methodology (for example Plan-Do-Study-Act)	Yes or No
f. EBP: Involves collection of data to which the clinician/project lead and/or team routinely has access as part of his/her responsibilities within the institution associated with: dashboard data	Yes or No
g. EBP: Does the project include the synthesis of evidence to implement a change in practice?	Yes or No
h. EBP: Using established evidence-based practice model such as the IOWA model	Yes or No
i. EBP: All patients/providers/units will receive the same intervention at the	Yes or No

Appendix F: Ethics Reviews

same time	
If you answered "Applicable" to any of the items above, then most likely your project is QI. However, continue to complete this form to ensure your project does not require IRB review.	
Research **In the implementation of your proposed project; are any of the following involved?**	
a. Prospective assignment of patients/providers into different procedures or therapies (such as randomization).	Yes or No
b. A control group for whom the procedure or therapy or study intervention is withheld to allow an assessment of its efficacy.	Yes or No
c. Blinding caregivers to any element of care	Yes or No
d. Prospective evaluation of drug, procedure or device not currently approved by FDA	Yes or No
e. Exploring a previously unknown phenomenon with a marketed or approved product (i.e. off label use of a drug/device)	Yes or No
f. Testing an intervention, care practices or treatments that are not standard (evidenced-based)	Yes or No
g. Is the project designed around a fixed protocol not allowing for frequent changes?	Yes or No
h. Will data be gathered about living individuals through intervention or interaction? -Physical procedures or manipulations of those individuals or their environment ("intervention"). -Communication or interpersonal contact with the individuals. ("interaction").	Yes or No
i. Will data be gathered (i.e., receiving, accessing) about living individuals that is private? The data are about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place (i.e. "Private information"). Individuals have provided the data for specific purposes in which the individuals can reasonably expect that it will **NOT** be made public, such as a medical record (i.e. "Private information").	Yes or No
j. Can the individuals' identities be readily ascertained or associated with the information by the investigator (i.e. "Identifiable information")?	Yes or No
If you answered "Applicable" to any of the items above, then your project may involve research. However, continue to complete this form to ensure your project does require IRB review.	

3. Recruitment.....	Applicable

Appendix F. Ethics Review

Quality Improvement(QI)/Evidence Based Practice(EBP)	
QI and EBP: Will the project involve a population (staff or patients) ordinarily seen in the institution where the project will take place?	Yes or No
Research	
or.... is there a formal process planned for recruitment for a target population?	Yes or No

4. Risks.....	Applicable
Research	
Will patients/personnel be exposed to additional physical, psychological, social or economic risks or burdens (i.e.,non-routine clinical care, confidentiality/privacy)?	Yes or No

5. Consent.....	Applicable
Quality Improvement/Evidence Based Practice	
QI and EBP: Are the interventions a part of standard clinical care or for non-clinical projects, standard procedure?	Yes or No
Research	
or.... will the activity require voluntary informed consent for interventions that are not part of standard clinical care or for non-clinical interventions, standard procedure?	Yes or No

6. Funding.....	Applicable
Quality Improvement(QI)/Evidence Based Practice/Research(EBP)	
Will your project require IRB review from your funding organization/agency?	Yes or No

7. Publication of Project.....	Applicable
Quality Improvement/Evidence Based Practice	
QI and EBP: Would this project still be done at your institution even if the results might not be applicable anywhere else?	Yes or No
Research	

or…. is the primary purpose of the project designed to develop or contribute to generalizable knowledge about a population?? Designed: evaluate whether the activities taking place will develop or contribute to knowledge. Develop: to elaborate or expand in detail. Contribute: to be an important factor in; help to cause. Generalizable: universally applicable. Knowledge: truths, facts, information.	Yes or No

When is it recommended to submit for IRB review?

The THR IRB cannot review a research project that has already been initiated. Retrospective approval can never be granted.

If you complete the above tables and none of the answers indicate the project may be research, but you are concerned you may be wrong, you may submit a Project Description to the Research Compliance Office for review. The Research Compliance Office designee will review the description and is likely to ask you a series of questions to help make a final determination. Contact the Research Compliance Office via phone at 682-236-6746 or via email at: **irb@TexasHealth.org**

If you complete the above tables and all of the answers indicate QI or EBP, then you should work with the appropriate THR associates/management team to proceed with and complete your project.

If you have deemed your project QI/EBP, and your improvement cycle consists of multiple tests of change, it's a good idea to review the checklist with each change. It's very easy to slip into something that might be considered research.

If you complete the above tables and answers indicate the project is research, go to the Texas Health Resources eIRB website and complete the research application at https://eirb.texashealth.org. Be sure to visit the THR IRB website as well for additional guidance and submission tools at www.texashealth.org/irb.

ADDITIONAL RESOURCE(S):

HHS.gov Quality Improvement Activities – FAQs: http://answers.hhs.gov/ohrp/categories/1569

Casarett D., Karlawish J., Sugarman J. (2000). Determining When Quality Improvement Initiatives Should Be Considered Research. *JAMA* ;283(17):2275-2280. doi:10.1001/jama.283.17.2275

Lynn J., Vaily M., Bottrell M., et. al. (2007) The Ethics of Using Quality Improvement Methods in Health Care. *Annals of Internal Medicine*; 146 (9): 666-673.

Ogrinc G., Mooney S.E., Estrada C., et. al. (2008). The SQUIRE (Standards for Quality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration. *Quality and Safety in Health Care*; 17:113-32.

Morris P., Dracup K. (2007). Quality Improvement or Research? The Ethics of hospital Project Oversight. *AJCC*; 16:424-426.

Appendix F. Ethics Review

Ethics Review Form F 3 Texas Health Resources IRB Approval Letter

Texas Health Resources

March 18, 2019

Name: Cyndi B. Kelley, MSN, RNC-LRN

Institution(s): Texas Health Dallas (THD)

RE: Non-Human Subject Research Determination

Title or Project: Building a Comprehensive Treatment Guideline to Improve the Treatment of Infants with NAS: Adding Non-pharmacological Interventions to an Established Morphine Protocol

Dear Ms. Kelley,

The Texas Health Resources (THR) Institutional Review Board (IRB) has determined that the above-mentioned project does not qualify as Human Subjects Research as defined by the Department of Health and Human Services (45 CFR 46) and the Food and Drug Administration (21 CFR 56) regulations and is therefore not under the oversight of the THR IRB. Please be advised that this review does not constitute a legal, editorial, or scientific review.

Thank you for your cooperation with the IRB in an effort to comply with the THR Human Research Protection Program. If you have any questions, please contact the THR IRB Office.

Regards,

David Chen
IRB Manager

THREI * 8440 Walnut Hill Lane Suite 220 * Dallas, Texas 75231 * (214) 345-6509 * Fax (214) 345-7016

Appendix G. Implementation Plan

Table G1: Logic Model

Program Name: Adding Non-Pharmacological Interventions to a Morphine Protocol to Improve the Treatment of Infants with Neonatal Abstinence Syndrome: An Evidence-Based Innovation Project
Program Goal: Improve the care and treatment of infants with NAS thereby reducing the treatment time and length of hospital stay

Resources/Inputs: (What resources are needed for the project to be successful… The human, financial, organizational, and community resources available to do the work.)

	Necessities List	Associated Costs	Wish List
Human Resources	• 12 - Neonatologists • 156 - Staff RN (FCC, SCN, NICU) • 5 - Nurse leaders (FCC, SCN, NICU) • 3 - OT/PT • 15 - PCTs • 10 - Administrators • 10 - Senior leaders • 12 NAS committee members for policy creation, review, and finalization	• 12 – Neonatologists: UTSW Salaried MDs • 65 - Staff RN (FCC, SCN, NICU): 45/hr • 5 - Nurse leaders (FCC, SCN, NICU): $60/hr • 3 - OT/PT: $35/hr • 15 – PCTs: $14/hr • 10 – Administrators: $80/hr • 10 - Senior leaders: $75/hr • 12 NAS committee members: $45/hr	• Support from all healthcare providers • Positive attitude and graceful adaptation from healthcare providers toward protocol changes • Support from senior leaders and administrators
Office Supplies	• Laptop • Projector	• Budget Neutral • Budget Neutral	• Already own these items
Organization Resources	• Access to patient charts/information • Access to NAS protocols, policies, and/or procedures • Staff breakroom for educational training	• Access to pt. information: No charge • Access to NAS protocols, policies, and/or procedures: No charge • Staff breakroom: No charge	• None

Resources/Inputs: (What resources are needed for the project to be successful… The human, financial, organizational, and community resources available to do the work.)			
	Necessities List	**Associated Costs**	**Wish List**

	• Food and drinks for each educational session
	• Breastmilk refrigerators
	• Breastmilk freezers
	• Breastmilk pumps
	• Disposable breast pump kits
	• Bottles
	• Nipples
	• Breast pump supply cleaning kits
	  ○ Palmolive dish soap
	  ○ Large pink basin
	  ○ Bottle brush
		•
		All items are budget neutral as they are included in the cost of admission:
		• Breastmilk refrigerators: $147 x 34
		• Breastmilk freezers: $350 x 2
		• Breastmilk pumps: $150 x 34
		• Disposable breast pump kits: $25/each
		• Bottles: $0.10/each
		• Nipples: $0.06/each
		• Breast pump supply cleaning kit: $1.50/each	

OUTPUTS		**OUTCOMES**		
Activities (What do project staff need to do?)	**Audience(s)** (What population needs to be engaged?)	**Short-Term** (At launch)	**Mid-Term** (1-month)	**Long-Term** (3-months)
Review current NAS treatment protocol. Revise protocol based on conclusive evidentiary support from systematic search to include non-pharm interventions: BF & RI	Active stakeholders	Protocol will be finalized & approved by medical director then placed as active in Policy Connect for launch		

OUTPUTS		OUTCOMES		
Activities (What do project staff need to do?)	**Audience(s)** (What population needs to be engaged?)	**Short-Term** (At launch)	**Mid-Term** (1-month)	**Long-Term** (3-months)
Educate passive stakeholders regarding updated NAS treatment protocol and implications to practice	Passive stakeholders required include: Neo MDs, Staff RNs in SCN, NICU, & FCC, PS, & NS:	100% passive stakeholders received education by launch date	100% infants admitted with dx of NAS will receive treatments as outlined in new protocol	Reduced LOS and LOT
Chart reviews	Cyndi & Catrina		100% of admitted infants with NAS will have chart reviews evaluating stakeholder compliance with new protocol	100% staff compliance with updated protocol
Ongoing data collection	Cyndi & Catrina		100% of patients with NAS will have data extracted and retained for review following project completion. Preliminary data comparison of pre and post data will be conducted to determine efficacy of new protocol	100% of patients with NAS will have data extracted and retained for review following project completion. Final data comparison will be completed and reviewed.

External Influencing Factors	
Environment/Setting	55555
Other Programs	Parkland: NAS Project Development and Mommies Program (Dr. Venkat Kakkilaya)

Influences	Dr. Venkat Kakkilaya (NAS project MD champion); Dr. Christina Chan (Neonatal Medical Director at THD)

Assumptions
• Staff believe mothers who use drugs do not care about their babies and do not want to stay with their baby in the hospital • Staff believe that it doesn't matter if the mother rooms in or not, the baby is best treated with pharmacological interventions • Staff believe all mothers with a history of drug use (but not currently using) should now be allowed to breastfeed

Appendix G. Implementation Plan

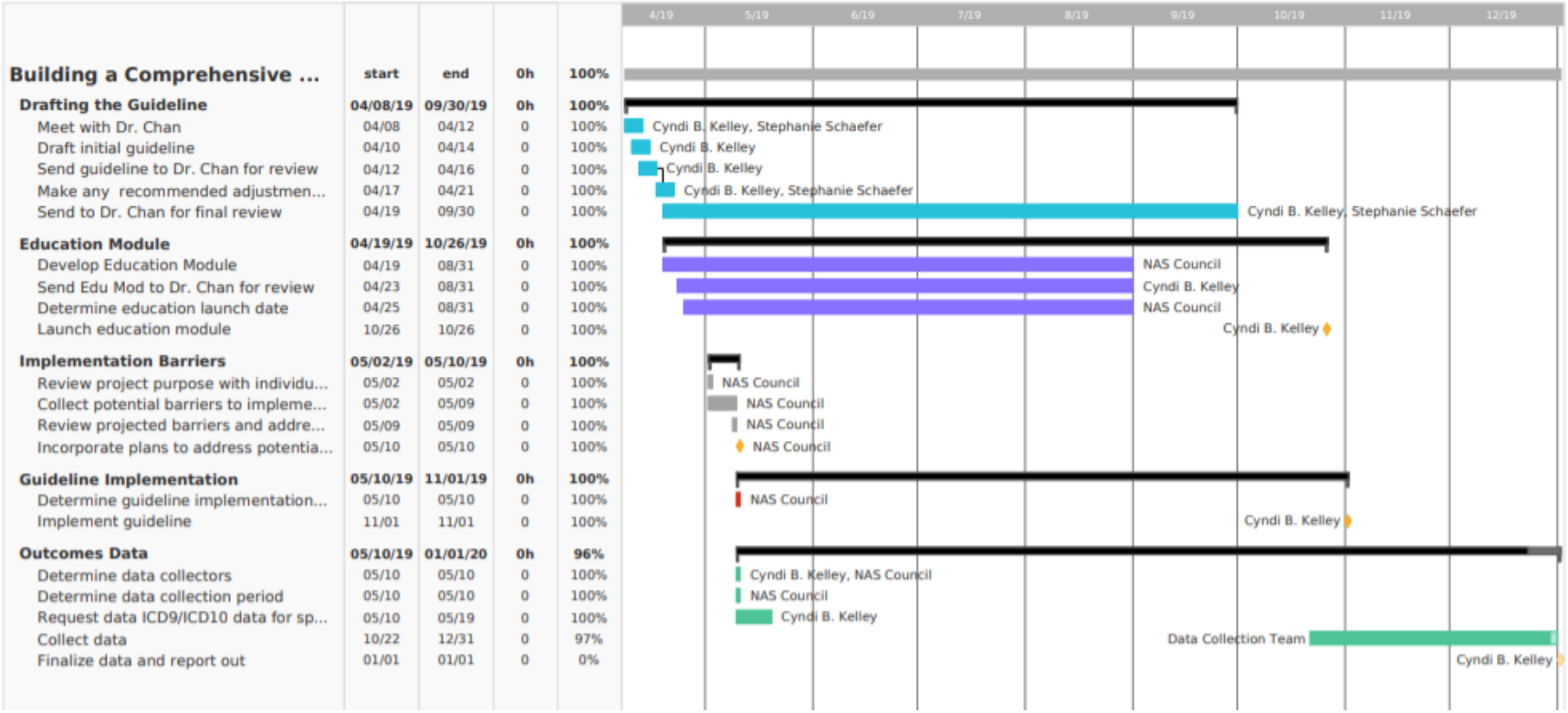

Figure G1 Gantt Chart

Appendix G. Implementation Plan

Table G2: Timeline for an EBP Change Project

PICOT Question: PICOT Question: In neonates with Neonatal Abstinence Syndrome (P), how does adding non-pharmacologic therapies to the current medication protocol (I) compared to current medication protocol alone (C) affect the length of stay (O) and length of treatment (O)within one quarter (T)?				
Team Leader: Cyndi Kelley				
Team Members: Catrina Mazzella, Beverly McMeans, Veronica Salvador, Suzanna Ice, Cecilia Amar, Racheal Daniel, Kellie Classen, Elaine Simon, Annie Ivy, Candace Haney, Yunlin Huang, Nuala Murphy, Sonya Manibusan, Stephanie Schaefer, Kimberly Williams.				
Agency Contact/Mentor Contact Info: Dr. Christina Chan (ChristinaChan@UTSouthwestern.edu and Dr. Venkat Kakkilaya (VenkatKakkilaya@UTSouthwestern.edu				
Preliminary Checkpoint A	○ Select the EBP model ○ Select the change model ○ How it will they guide the implementation project	Notes: John Hopkins Nursing Evidence-Based Practice Model This model was selected due to the problem-solving approach to clinical decision-making. This model is a three-step process: 1. Practice question, 2. Best evidence, 3. Translation into practice Lewin's Change Theory is the basis for this change model and breaks down the process of change into three steps, Unfreeze, Change, and Freeze.	OUTCOMES: Reduce the length of stay and length of treatment in infants with NAS.	JHNEBP EBP Model Lewin's Change Model
Preliminary Checkpoint B	○ Who are the stakeholders for your project? ○ Active (on the implementation team) & supportive (not on the team, but essential to success) ○ Identify project team roles & leadership ○ Begin acquisition of any necessary approvals for project implementation	**Active stakeholders:** Cyndi Kelley, Catrina Mazzella, Beverly McMeans, Veronica Salvador, Suzanna Ice, Cecilia Amar, Racheal Daniel, Kellie Classen, Elaine Simon, Annie Ivy,	All stakeholders aware of project Roles within project have been emailed Buy-in has been secured and letter of approval from CNO has been received. Met with nurse scientist. Must run project through	Stakeholder Power Grid  Kelley DNP EPIP Stakeholder-Register_

	and dissemination (e.g., system leadership, unit leadership, ethics board [IRB]) ○ ***Consult with Agency Contact/Mentor***	Candace Haney, Yunlin Huang **Passive stakeholders** Neonatologists, Staff RNs, Mother, Infant, CPS Faculty mentor: Dr. Ellen Fineout-Overholt Project Sponsors: Dr. Cole Edmonson, Suzanne Murphy Nurse Scientist: Dr. June Marshall Roles include: ○ Neonatologists: Use protocol to guide treatment of infant ○ Staff RN: Carry out actions of protocol as directed by Neonatologist ○ Mother – Received education from Staff RNs on role of rooming in and breastfeeding ○ Baby – received treatment as mandated by protocol ○ Faculty and Industry mentors – provide input and guidance during all project phases ○ Active stakeholders will carry out actions of project through each phase including education, implementation, data collection, and evaluation. ○ Passive stake holders will administer or receive treatment based on update protocol ○ Project sponsors will serve as mentors, support	IRB. Forms must be completed (Dr. Marshall altered the documents to remove research-based language to better support evidence-based implementation project)	

		measures to obtain any necessary approvals (financial, organizational) o CPS – provides social service interventions. As assigned to each case, CPS worker should receive education on protocol by staff RN to be considered when creating safety plan for mother/baby dyad. Approvals needed/date obtained/posted on BB HIPAA regs met?		
Checkpoint One	o Hone PICOT question & assure team is prepared o Build EBP knowledge & skills o ***Consult with Agency Contact/Mentor***	PICOT Question: In neonates with Neonatal Abstinence Syndrome (P), how does adding non-pharmacologic therapies to the current medication protocol (I) compared to current medication protocol alone (C) affect the length of stay (O) and length of treatment (O)within one quarter (T)?	Stakeholders have been notified via presentation including PICOT at leadership meeting.	
Checkpoint Two	o Conduct systematic search for evidence & retain studies that meet criteria for inclusion o Connect with librarian o **Meet with implementation group - TEAM BUILD** o ***Consult with Agency Contact/Mentor***	Search Results Synopsis	Stakeholders readily see how PICOT question drove systematic search Search results (see notes column) Met with medical librarian at THD and librarian at UTT Team meetings to discuss project status and systematic search.	Systematic Search: Evaluation Table:

Checkpoint Three	○ Critically appraise literature (including evaluation, synthesis & recommendation) ○ Meet with group to discuss how completely evidence answers question and drives the project plan; ○ If needed pose follow-up questions and re-review the literature as necessary ○ ***Consult with Agency Contact/Mentor***	Recommendation **from Evidence:** Synthesis tables lead to the addition of breastfeeding and rooming in as supportive measures in the treatment of infants with NAS (BF evidence #1, 2, 4, & 5 RI evidence #1, 2, 3, & 6)	Team met to discuss evidence conclusions. Discussed with agency mentors and all in agreement BR and RI added as non-pharm interventions to current protocol should be included. Costs associated with adding non-pharm interventions to the protocol: Time/Salary for education	Synthesis tables:
Checkpoint Four	○ Meet with group ○ Summarize evidence with focus on implications for practice & conduct interviews with content experts as necessary to benchmark ○ Begin formulating detailed plan for implementation of evidence ○ Include who must know about the project, when they will know, how they will know ○ ***Consult with Agency Contact/Mentor***	YOUR PLAN FOR IMPLEMENTATION: Provide Protocol Specifics, Dates & Progress Outcomes:		Updated NAS Protocol: Education Modules: 1 NAS Education Modules - Backgroun 2 NAS Education Modules - Trauma Inf 3 NAS Education Modules - Addiction.p 4 NAS Education Modules - Finnegan S 5 NAS Education Modules - Pharm and

				6 NAS Education Modules - NAS Treatr
Checkpoint Five	○ Define project purpose- connect the evidence & the project ○ Define baseline data collection source(s) (e.g., existing dataset, electronic health record), methods, & measures ○ Define post project outcome indicators of a successful project (process & completion) ○ Gather valid & reliable outcome measures ○ Write data collection protocol ○ Write the project protocol (data collection fits in this document) ○ Finalize any necessary approvals for project implementation & dissemination (e.g., system leadership, unit leadership, IRB) ○ ***Consult with Agency Contact/Mentor***	LAUNCH PLAN FOR IMPLEMENTATION: Provide what is to happen when you launch, when and how do you know it is successful (i.e., protocol specific, dates & progress outcomes):	Baseline data will be collected using details from 2017 through current (demographic information, maternal history, drugs of exposure, treatment history, onset of symptoms, all Finnegan scores, escalation/weaning, LOS, and LOT) Collect financial data and review with industry mentors Present to stakeholders and begin meetings with committee for education planning and implementation roll out time period.	Logic model:
Checkpoint Six (about mid-way)	○ Meet with implementation group ○ Discuss known barriers & facilitators of project ○ Discuss strategies for minimizing barriers & maximizing facilitators ○ Finalize protocol for implementation of evidence, include timeline ○ Identify resources (human, fiscal, & other) necessary to complete project ○ Supply Agency Mentor (& Faculty) with written IRB approval & managerial support ○ Begin work method of dissemination of initiation of project & progress to	• Identify project barriers • Identify project facilitators • Review your timeline – dates, measures, plans. • Communicate with key stakeholders about the plan – be creative – maybe a newsletter, flyer, -- yes, email will do, but will it be memorable? • Is your data collection plan complete?	Data collection plan complete. Schedule meetings to develop treatment guideline. Gather group and review other facility's guidelines to help shape the document. Initial drafts should be reviewed, and input sought by industry mentor.	Timeline:

	date to educate stakeholders about project – get help from support staff o Include specific plan for how evaluation will take place: who, what, when, where & how and communication mechanisms to stakeholders o ***Consult with Agency Contact/Mentor***			
Checkpoint Seven	o Meet with implementation group to review proposed stakeholder dissemination o Make final adjustment to dissemination plan with support staff o Inform stakeholders of start date of implementation o Address any concerns or questions of stakeholders (active & supportive) o ***Consult with Agency Contact/Mentor***	Review pertinent protocol specifics, dates & progress outcomes :	Collect data on progress outcomes to date and include in report	
Checkpoint Eight	o LAUNCH EBP implementation project o Follow project protocol rigorously o Collect Baseline Data o Deliver Evidence-based Intervention o Record process outcomes & lessons learned o ***Consult with Agency Contact/Mentor***	Progress Outcomes – are things working as you thought they would – why or why not (reflection)	Keep a journal of lessons learned and your responses to them	
Checkpoint Nine	o Mid-project: Schedule meeting with all key stakeholders to review progress outcomes and lessons learned (and associated adjustments to protocol) to date. o Don't forget to include any issues, successes, aha's, & triumphs of project to date. o ***Consult with Agency Contact/Mentor***	Progress Outcomes – are things working as you thought they would – why or why not (reflection)	Collect data on further progress outcomes to date and include in report Journal lessons learned and response.	

Checkpoint Ten	○ Complete final data collection for project evaluation ○ Analyze baseline compared to final data; create graphics for distribution of results ○ Present project progress and completion results via poster presentation to stakeholders ○ ***Consult with Agency Contact/Mentor & Agency Leadership***	Completion Outcomes data collection. Analyze the baseline to completion data change? Did your implementation work? Evaluate progress outcomes -report on success of project implementation process	Completion outcomes (analyze pre/post) Process outcomes (did project process go well/not)	
Checkpoint Eleven	○ Review project success, including progress & completion outcomes, lessons learned, and any new questions generated from process ○ ***Consult with Agency Contact/Mentor & consider new questions***	Provide Final Evaluation Report to Faculty & Agency contact, including Next Steps for sustainability:	• Dissemination includes making sure that everyone is aware of the implementation process successes, completion outcomes and any caveats (lessons learned) along the way. • Dissemination includes beyond the organization (poster)	Project Summary Poster

Appendix H. NAS Guideline

Texas Health Presbyterian Hospital DALLAS

Nursing – Women & Infants

Guideline Name: Care of the Infant with Neonatal Abstinence Syndrome	
Originating Officer (Title), Council, or Committee: Director of Nursing, Women's and Infant Services; NAS Committee	**Effective Date:**
Approved By: Director of Nursing; Women and Infant Services	**Last Reviewed Date:** 10/23/2019
Page 1 of 13	**Last Revised Date: 10/23/2019**

1.0 **Scope:**

1.1 Applicable Entities:
This guideline applies to Texas Health Dallas.

1.2 Applicable Departments:
This guideline applies to Labor and Delivery (L&D), Neonatal Intensive Care (NICU), Special Care Nursery (SCN), Family Centered Care (FCC), and Lactation departments.

2.0 **Purpose:**
To provide a guideline for nursing management of term infants with Neonatal Abstinence Syndrome (NAS).

3.0 **Guideline Statement(s):**

3.1 Neonatal abstinence syndrome (NAS) occurs following the discontinuation of fetal exposure to substances used or abused by the mother during pregnancy.

3.1.1 NAS is a generalized disorder characterized by central nervous system (CNS) hyperirritability, gastrointestinal (GI) dysfunction, respiratory distress, and autonomic nervous system (ANS) dysfunction.

a. CNS = increased tone, tremors, reduced quality/length of sleep,

b. GI = excessive sucking, poor feeding, loose stools,

c. Respiratory = sneezing, nasal flaring, increased respiratory rate,

d. ANS = sweating, yawning, mottling, fever.

3.2 Withdrawal symptoms or symptoms of neurotoxicity typically occur within the first 2-3 days of life but may appear as late as 5 days of life.

3.3 Licensed nursing personnel will use the Finnegan Neonatal Abstinence Scoring Tool (FNAST) to evaluate infants exposed to substances in utero.

3.3.1 The FNAST uses semi-objective criteria to assign a cumulative score based on the observation of 21 symptoms relating to neonatal withdrawal.

a. The FNAST assesses the onset, progression, and resolution of symptoms and monitors the clinical response to pharmacotherapy.

Appendix H. NAS Guideline

b. The FNAST scoring range is a minimum of 0 to a maximum score of 21, with three scores greater than or equal to 8 (≥8) or two scores greater than or equal to 12 (≥12) serving as the threshold for initiating or continuing pharmacotherapy.

3.4 The following are recommendations for nursing management and care for term (greater than or equal to 37 weeks) infants identified with NAS. Treatment for NAS includes: scoring, non-pharmacological interventions, and pharmacological interventions.

3.4.1 Complete a social services referral and initiate newborn drug screening for all infants with in utero exposure to substances and/or mothers presenting to L&D with none or limited prenatal care.

3.4.2 Medical indications for newborn drug testing include but are not limited to:

a. History of maternal drug use or agitated/altered mental status in the mother.

b. No prenatal care.

c. Unexplained CNS complications in the newborn (seizures, intracranial hemorrhage).

d. Symptoms of drug withdrawal in the newborn (See Attachments A & B).

e. Unexplained changes in behavioral state of the newborn (jittery, prolonged fussiness, lethargic).

3.4.3 Nurses caring for drug-exposed infants must be familiar with the signs and symptoms of withdrawal (See Attachment C).

a. Symptom onset varies. Polypharmacy may exacerbate or alter symptoms onset. See drug classifications and typical symptom onset in Appendix D.

3.5 *Using the Finnegan Neonatal Abstinence Scoring Tool*

3.5.1 Scoring does not require physician order.

Appendix H. NAS Guideline

3.5.2 Access the FNAST in the NICU Drug Withdrawal flowsheet in the electronic health record.

3.5.3 Perform an initial baseline score at approximately two hours of life for infants with known prenatal exposure.

a. Continue to score once per shift. Should scores reach 8 or greater, increase scoring to every 3-4 hours approximately one hour after feedings.

b. For all other infants, obtain FNAST score when infant shows 2-3 signs/symptoms of withdrawal (See Appendix A and Appendix B for symptom list and explanation).

3.5.4 Scoring should be completed 1 hour after feeding and include all symptoms exhibited during the scoring interval, not just those observed at a single point in time.

3.6 *Non-Pharmacological Interventions:*

3.6.1 Educate caregiver(s) on use of non-pharmacological interventions.

3.6.2 Utilize non-pharmacological interventions immediately following birth and continue for the duration of the hospital stay.

3.6.3 Discontinue if safety is a concern.

3.6.4 *Non-pharmacological interventions include:*

a. Rooming–in and frequent skin to skin care.

b. Breastfeeding - promotes maternal bonding and decreases severity of symptoms, need for pharmacologic agents, and length of stay.

1) Breast feeding is encouraged and should be evaluated on a case by case basis taking the drug(s) of exposure into consideration. A Lactation Consultant should review each case and provide a recommendation.

Appendix H. NAS Guideline

2) If the mother is positive for cocaine, she must pump and dispose her expressed breastmilk for 24-48 hours. Mother may breastfeed her baby 36 - 48 hours following her last use of cocaine at physician's discretion.

3) Mothers should be educated on the severe side effects of exposure to cocaine.

c. Formula: high-calorie, easily digestible, sensitive.

1) Infants with poor feeding may respond to more frequent feeds of smaller volumes.

2) Care should be taken to prevent overfeeding.

d. Minimal sensory or environmental stimulation.

1) Care to maintain temperature stability should be implemented.

2) Gentle, rhythmic rocking can promote bonding and decreased sensory stimulation.

e. Infant swaddling and rhythmic rocking.

1) Use containment of extremities when providing care to infants with tremors or hyperactive Moro reflex.

2) Use clear transparent dressings over reddened areas if extremities are showing excoriation.

f. Non-nutritive sucking - the use of a sucrose solution is not recommended due to the tendency to cause GI upset and irritation. Pain control should be managed via alternative non-pharmacological methods.

g. Frequent diaper changes - with protective ointment or creams to prevent diaper rash.

3.7 *Pharmacological interventions:*

Appendix H. NAS Guideline

3.7.1 Should be initiated when symptoms can no longer be managed with non-pharmacological interventions (as noted by three consecutive Finnegan scores greater than (>) 8 or two consecutive Finnegan scores ≥12). (Appendix E).

3.8 *Transfer to higher level of care*:

3.8.1 Should the infant receive two consecutive Finnegan scores ≥ 8 or one Finnegan score ≥12) transfer to NICU/SCN for evaluation and more intensive medical intervention.

4.0 **Definitions:**

4.1 Non-pharmacological – Withdrawal symptom management without medication interventions.

4.2 Pharmacological interventions – Withdrawal symptom management with medication.

4.3 Minimal sensory or environmental stimulation - Low lighting, low noise level, minimal touching, and low stimulation.

5.0 **Responsible Parties:**
Texas Health nursing policies are implemented and enforced at the entity level.

5.1 Registered Nurse
5.1.1 Provides direct care to patients.

5.2 Medical provider (Pediatrician or Neonatologist)
5.2.1 Provides care and medical direction of the patients

6.0 **External References:**

6.1 Bagley, S., Wachman, E. M., Holland, E., & Brogly, S. B. (2014). Review of the assessment and management of neonatal abstinence syndrome. *Addiction Science & Clinical Practice, 9*(1), 19. doi:10.1186/1940-0640-9-19

6.2 Boucher, A. (2017). Nonopioid management of neonatal abstinence syndrome. *Advances in Neonatal Care, 17*(2), 84-90. doi:10.1097/anc.0000000000000371

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6.3 Edwards, L., & Brown, L. F. (2016). Nonpharmacologic management of Neonatal Abstinence Syndrome: An integrative review. *Neonatal Network, 35*(5), 305-313. doi:10.1891/0730-0832.35.5.305

6.4 Farst, K. J., Valentine, J. L., & Hall, R. W. (2011). Drug testing for newborn exposure to illicit substances in pregnancy: pitfalls and pearls. *International Journal of Pediatrics, 2011,* 1-7. doi:10.1155/2011/951616

6.5 Juergens, J. (2019). Drug Classifications. Retrieved from https://www.addictioncenter.com/drugs/drug-classifications/

6.6 McMullin, N. J., Dulski, L. A., & Blobaum, P. (2014). Evidence-based interventions for neonatal abstinence syndrome. *Pediatric Nursing, 40*(4), 165-203. Retrieved from https://www.pediatricnursing.net/ce/2016/article40051.pdf

6.7 McKnight, S., Coo, H., Davies, G., Holmes, B., Newman, A., Newton, L., & Dow, K. (2015). Rooming-in for infants at risk of neonatal abstinence syndrome. *American Journal of Perinatology, 33*(05), 495-501. doi:10.1055/s-0035-1566295

6.8 Short, V. L., Gannon, M., & Abatemarco, D. J. (2016). The association between breastfeeding and length of hospital stay among infants diagnosed with neonatal abstinence syndrome: A population-based study of in-hospital births. *Breastfeeding Medicine*, *11*(7), 343-349. doi:10.1089/bfm.2016.0084

6.9 Welle-Strand, G. K., Skurtveit, S., Jansson, L. M., Bakstad, B., Bjarkø, L., & Ravndal, E. (2013). Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. *Acta Paediatrica*, n/a-n/a. doi:10.1111/apa.12378

Applicability of external clinical practice/procedure guidelines and other clinical resources may be dependent upon resources available at the hospital or a health care professional's licensure and/or certification.

Appendix H. NAS Guideline

Texas Health Presbyterian Hospital DALLAS

Nursing – Women & Infants

Guideline Name: Care of the Infant with Neonatal Abstinence Syndrome	
Originating Officer (Title), Council, or Committee: Director of Nursing, Women's and Infant Services; NAS Committee	**Effective Date:**
Approved By: Director of Nursing; Women and Infant Services	**Last Reviewed Date:** 10/23/2019
Page 7 of 13	**Last Revised Date:** 10/23/2019

7.0 **Related Documentation and/or Attachments:**

7.1 *Finnegan (FNAST) Clinical Descriptors of Withdrawal* - Attachment A

7.2 *FNAST Scorecard* - Attachment B

7.3 *Drug Classifications and Typical Symptom Onset* - Attachment C

7.4 *Pharmacotherapy Protocol* – Attachment D

8.0 **Required Statements:**

8.1 This guideline represents the collaborative effort of the appropriate Texas Health Dallas subject matter experts and the Texas Health Dallas Policy and Procedure Committee to determine and direct the recommended practice for the care anticipated under this policy and includes the input of clinical subject matter specialists.

As no policy or published procedure can anticipate every clinical and/or medical presentation, this policy is a guideline and is not intended as a substitute for the clinician's clinical judgment and/or experience.

8.2 The physicians on the medical staff of the hospital are practitioners independent of the hospital unless they are practitioners participating in the care of patients as part of a post-graduate medical education program. They are not agents, servants, or employees of the hospital unless they are part of a graduate medical education program of the hospital.

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Attachment A

Finnegan (FNAST) Clinical Descriptors of Withdrawal

Cry	• Score for prolonged crying even if it is not high pitched. • Score 2 if intermittently or continuously crying up to 5 minutes despite care giver consoling measures • Score 3 if infant is continuously crying for >5 min despite caregiver consoling measures
Sleeping	• Score based on the longest period of sleep within the scoring interval.
Hyperactive Moro reflex	• Assess infant when calm, after feeding when applicable. • Score 2 if there is pronounced jitteriness during or at the end of a Moro reflex or if there is an increased number of non-elicited Moro reflexes. • Score 3 if pronounced jitteriness and clonus (more than 8-10 beats) during or after initiation of reflex.
Tremors	• Score when infant is calm, after feeding when applicable. • Disturbed tremors occur while being handled, undisturbed tremors occur without being handled. • Mild tremors: Tremors of the *hands or feet* when asleep, awake, active, or alert. • Moderate-Severe tremors: Tremors of the *arms (one or both) or legs with or without tremors of the hands or feet* when asleep, awake, active, or alert.
Increased muscle tone	• Assess while infant is calm, after feeding when applicable. • Score for increased resistance to flexion or extension or absence of head lag on pull-to-sit maneuver
Excoriation	• Redness or skin breakdown resulting from rubbing of extremities against bed linen • Present at the nose, chin, cheeks, elbows, knees, or toes. • Does not include diaper rash
Myoclonic jerks	• Multiple jerks (not tremors) of the arms, legs, or facial muscles
Generalized convulsion	• Tonic seizures or subtle signs of eye staring, chewing, rowing motions, arching, fist clenching, bicycling
Sweating	• Score if sweating is spontaneous and is not due to excessive clothing, bundling, or high room temperature. • Evaluate for dampness to upper lip, forehead, and back of the neck
Respiratory rate and effort	• Assess while the infant is calm • Rule out other medical conditions
Excessive sucking	• Increased rooting (>3 times) with swiping movements of hand across mouth (more than that of an average hungry infant). • Score if attempts to suck on pacifier while moving head from side to side and is unable to adequately suck on pacifier.
Poor feeding	• Excessive sucking prior to feeding, but inadequate suck when fed or demonstrates an uncoordinated sucking reflex. • Score if continuously gulps while eating and stops frequently to breathe. • Premature infants may require tube feeding due to immaturity and should not be scored for poor feeding if tube feeding is expected at their gestation.
Vomiting	• Score 2: Frequent regurgitation (>2 times) not associated with burping. • Score 3: Forceful ejection of stomach contents from the mouth.
Loose/watery stool	• Loose stool: Curdy, mushy, or seedy stool that does not have a water ring around the stool on the diaper. • Watery stool: Any type of stool with a water ring around the stool on the diaper

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Attachment B

FNAST Scorecard

	Signs & Symptoms	Score
Central Nervous System Disturbances	Excessive high pitched cry	2
	Continuous high pitched cry	3
	Sleeps < 1 hour after feeding	3
	Sleeps <2 hours after feeding	2
	Sleeps <3 hours after feeding	1
	Hyperactive Moro reflex	2
	Markedly hyperactive Moro reflex	3
	Mild tremors: Disturbed	1
	Mod/severe tremors: Disturbed	2
	Mild tremors: Undisturbed	3
	Mod/severe tremors: Undisturbed	4
	Increased muscle tone	2
	Excoriation (Specific Area)	1
	Myoclonic jerk	3
	Generalized convulsions	5
Metabolic, Vasomotor, and Respiratory Disturbances	Sweating	1
	Fever 37.2°C-38.3°C	1
	Fever ≥38.4°C	2
	Frequent yawning (>3)	1
	Mottling	1
	Nasal stuffiness	1
	Sneezing (>3)	1
	Nasal flaring	2
	Respiratory rate >60/min	1
	Respiratory rate >60/min with retractions	2
Gastrointestinal Disturbances	Excessive sucking	1
	Poor feeding	2
	Regurgitation	2
	Projectile vomiting	3
	Loose stools	2
	Watery stools	3

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Attachment C

Drug Classifications and Typical Symptom Onset

Drug	Examples	Drug Information	Possible effects on the newborn	Approximate time to onset of withdrawal symptoms
Depressants				
Barbiturates	Amobarbital (Amytal) Pentobarbital (Nembutal) Phenobarbital Secobarbital (Seconal) Tuinal	Barbiturates were historically popular for the treatment of psychiatric and sleep disorders, and they are still used for anesthesia and treatment of several conditions such as epilepsy and headaches. Barbiturates are highly addictive, and they also present a very high overdose risk as they cause many body systems to shut down	*Prenatal:* Low birth weight, respiratory depression, hypotonia	4-7 days but can range from 1-14 days
Alcohol	Beer, wine, liquor	Alcohol creates feelings of euphoria and lowers inhibitions, but it also severely impairs judgment, perception, and reaction times. Alcohol is a central nervous system depressant	Fetal Alcohol Syndrome	3-12 hours
Opioids	Heroin Fentanyl Oxycodone Methadone Suboxone	Opioids work by interacting with neurotransmitters in the brain and blocking the signals that they are sending. This enables opioids to serve as powerful pain killers, but it also can cause feelings of intense pleasure, leading to addiction. Generally, heroin has the shortest and methadone has the longest time to onset of withdrawal.	*Prenatal:* Low birth weight, CNS irritability, autonomic dysfunction, respiratory symptoms, GI disturbances	24-72 hours but can be up to 5-7 days
Stimulants				

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Cocaine/Crack		Reacts with the body's central nervous system, producing energy and euphoria.	*Prenatal:* Low birth weight, CNS irritability/lability of state, neurodevelopmental alterations, necrotizing enterocolitis *Long term:* Modest but mesurable differences in growth, cognition, language, impaired behavioral self-regulation	Usually no withdrawal signs but sometimes neurobehavioral abnormalities (decreased arousal and physiologic stress) occur at 48-60 hours
Meth-amphetamines		Feelings of euphoria, alertness, and confidence that result from use have a powerful effect on the brain reward system.	*Prenatal:* Low birth weight, CNS irritability/lability of state, neurodevelopmental alterations, necrotizing enterocolitis	Usually no withdrwal signs but sometimes neurobehavioral abnormalities (decreased arousal, increased physiologic stress, and poor quality of movement) occur at 48-60 hours
CNS Stimulants (for ADHD)	Adderall, Ritalin, Vyvanse	Works by increasing dopamine and norepinephrine levels in the central nervous system. Norepinephrine affects how the brain responds to events, particularly how it pays attention and the speed at which it reacts to outside stimuli. Dopamine, the body's "feel good" chemical, creates a rewarding effect. Although dopamine		Usually no withdrwal signs but sometimes neurobehavioral abnormalities (decreased arousal, increased physiologic stress, and poor quality of movement) occur at 48-60 hours

Appendix H. NAS Guideline

		occurs naturally, drugs like Adderall produce unnaturally high levels of it. This can cause users to come back for more.		
Other				
Benzodiazepines	Ativan Valium Xanax	Functions by interacting with the neurotransmitter gamma-aminobutyric acid-A (GABA-A). Each Benzo interacts with GABA-A differently, which is why each Benzo impacts the body and mind differently. Benzos are prescribed to treat a wide variety of psychiatric and sleep conditions, but they are very commonly abused	*Prenatal:* Low birth weight, respiratory depression, hypotonia	1-3 days
Cannabinoids	Marijuana Hashish THC	Cannabinoids create feelings of elation, known as a high, but they also negatively impact mental and physical functioning	*Prenatal:* Low birth weight with heavy exposure, lability of state	Usually no clinical withdrawal signs
SSRIs (Antidepressants)	Celexa, Lexapro, Prozac, Paxil, Zoloft.	Block the reabsorption (reuptake) of serotonin in the brain, making more serotonin available		Usually 2nd day of life- ranges from 5-48 hours.

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Attachment D

Pharmacotherapy Protocol

Initiation of Pharmacotherapy - Oral Morphine

Begin pharmacotherapy for 3 scores ≥ 8 or 2 scores ≥ 12

Goals of therapy:
- Promptly achieve initial control of symptoms indicated by Finnegan score <8
- Maintain control of symptoms (all Finnegan scores <8) for 48 hours
- Wean infant from pharmacotherapy while maintaining Finnegan scores <8

Finnegan Score	Starting Dose Oral Morphine Sulfate every 3 hours with feedings
0 - 7	None - Continue to monitor
8 - 12	0.04 mg (0.1 mL)
13 - 16	0.08 mg (0.2 mL)
17 - 20	0.12 mg (0.3 mL)
21 - 24	0.16 mg (0.4 mL)
≥25	0.2 mg (0.5 mL)

Escalation Schedule

- If any Finnegan score is ≥8, then escalate dose according to the dose escalation schedule (below left)
- If any Finnegan score is <8, continue with current dose (no change)
- Goal is to achieve all Finnegan score <8 for 48 hours, and the proceed to weaning process

Dose Escalation (*initial capture*)	Finnegan Score	Dose Re-escalation (*weaning adjustment*)
None - continue current dose	0-7	None - Continue current dose
0.02 mg (0.05 mL)	8-12	0.012 mg (0.03 mL)
0.04 mg (0.1 mL)	13-16	0.02 mg (0.05 mL)
0.06 mg (0.15 mL)	17-20	0.028 mg (0.07 mL)
0.08 mg (0.2 mL)	21-24	0.04 mg (0.1 mL)
0.1 mg (0.25 mL)	≥25	0.048 mg (0.12 mL)

If 0.2 mg dose does not control symptoms, then consider alternate strategy:
1. Continue to increase morphine to gain control (preferred)
2. Add clonidine 1 mcg/kg Q3-6H, increasing as needed by 0.5 mcg/kg/dose up to 12 mcg/kg/day (monitor BP and HR)
3. Add phenobarbital 8 mg/kg Q4-6H x 2 doses then 2 mg/kg Q12H

If 2 weaning attempts fail, then add adjunctive pharmacotherapy: clonidine then phenobarbital

Weaning Process

- The first weaning should be started with first feeding after 0700 following 48 hours of symptom control (initial capture of symptoms may exceed 48 hours); subsequent weaning doses should be made with first feeding after 0700 following 24 hours symptom-control
- If three consecutive Finnegan scores are ≥8, then re-escalate according to dose escalation schedule
- If three or more non-consecutive Finnegan scores ≥8 in 24 hour period, then hold wean
- When morphine dose is maintained at 0.008 mg Q3H with ALL Finnegan scores <8, consider discontinuation or change to q6h interval x 24-48 hours. Discontinue when scores remain <8.
- Wean clonidine by 0.5 mcg/kg/dose q12-24 hours after morphine has been discontinued.
- Once an infant is weaned and the formula is changed to a regular diet, if problems reoccur, consider changing formula first before restarting morphine
- When morphine is discontinued, NAS scoring should be continued for at least 72 hours

Morphine dose	Weaning dose reduction (every 24 hours)
≤ 0.05 mg	0.004 mg (0.01 mL)
>0.05 and <0.16 mg	0.012 mg (0.03 mL)
≥0.16 mg	0.02 mg (0.05 mL)

Non-Narcotic Pharmacologic Therapies

- Acetaminophen 10-15 mg/kg Q6H PRN for low grade temperature or agitation
- Simethicone 0.3 mL PO Q6H PRN "gas"

Appendix I. Results

Table I6: Education Module Completion Summary by Role

Results and Analysis

Job Title	# Completing Partial Module	# Completing Entire Module
Occupational Therapist	2	0
Other	1	1
Patient Care Tech/Unit Secretary	3	1
Physician	3	1
Registered Nurse	107	55
Social Worker	2	0
TOTAL	**118**	**58**

48%

Appendix I. Results

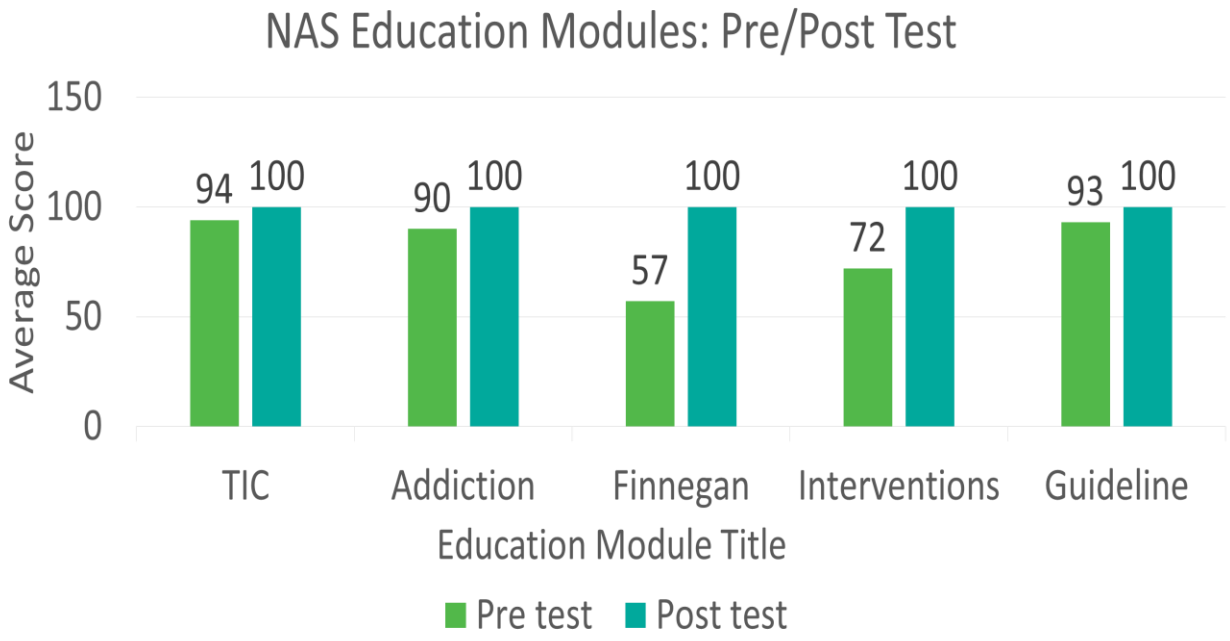

Figure I 1 Pre/Post Education Results by Title

Appendix I. Results

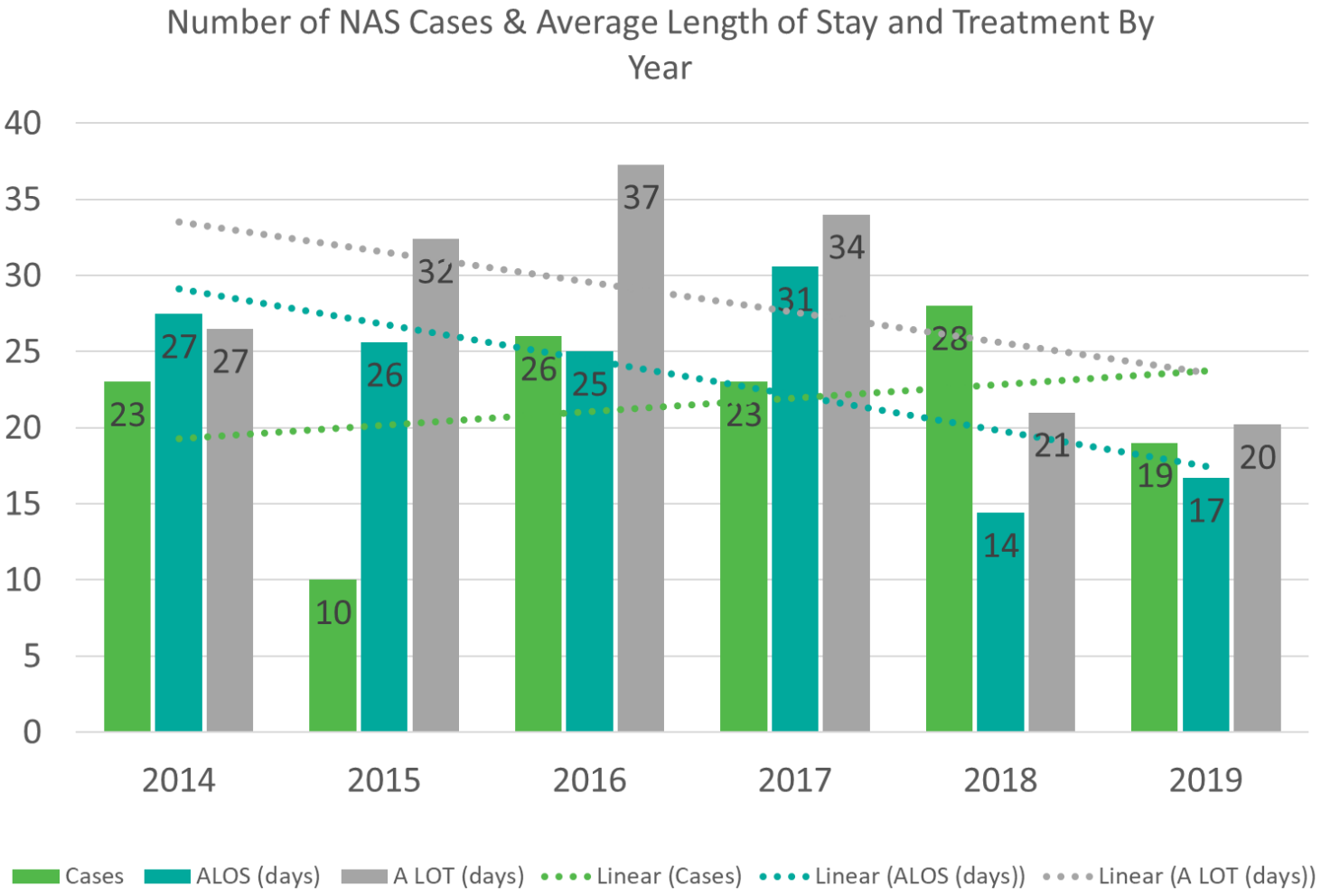

Figure I 2 Project Outcome Measure Results by Year – # Cases, ALOS, ALOT

Appendix I. Results

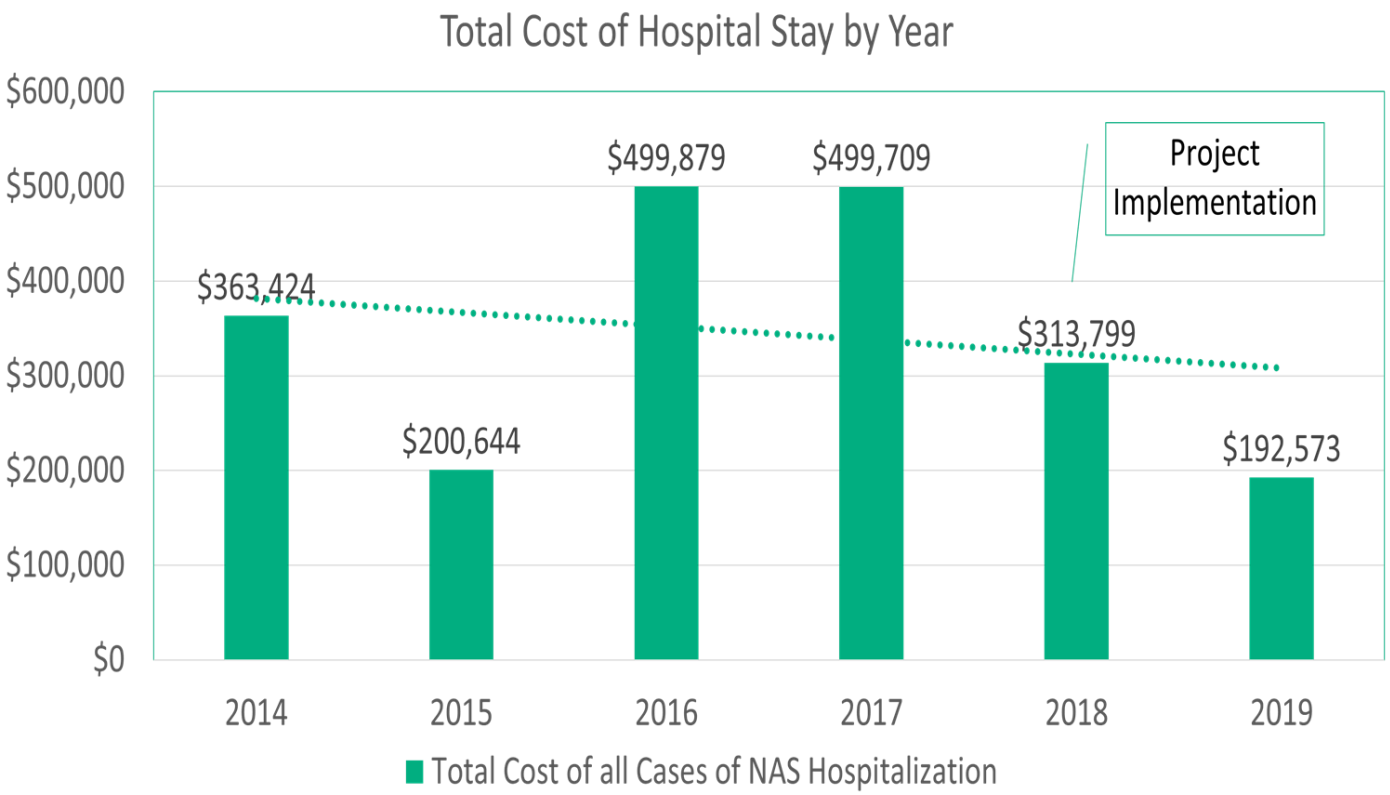

Figure I 3 Project Outcome Measure by Year – Total Hospital Costs

Appendix J. Project Poster

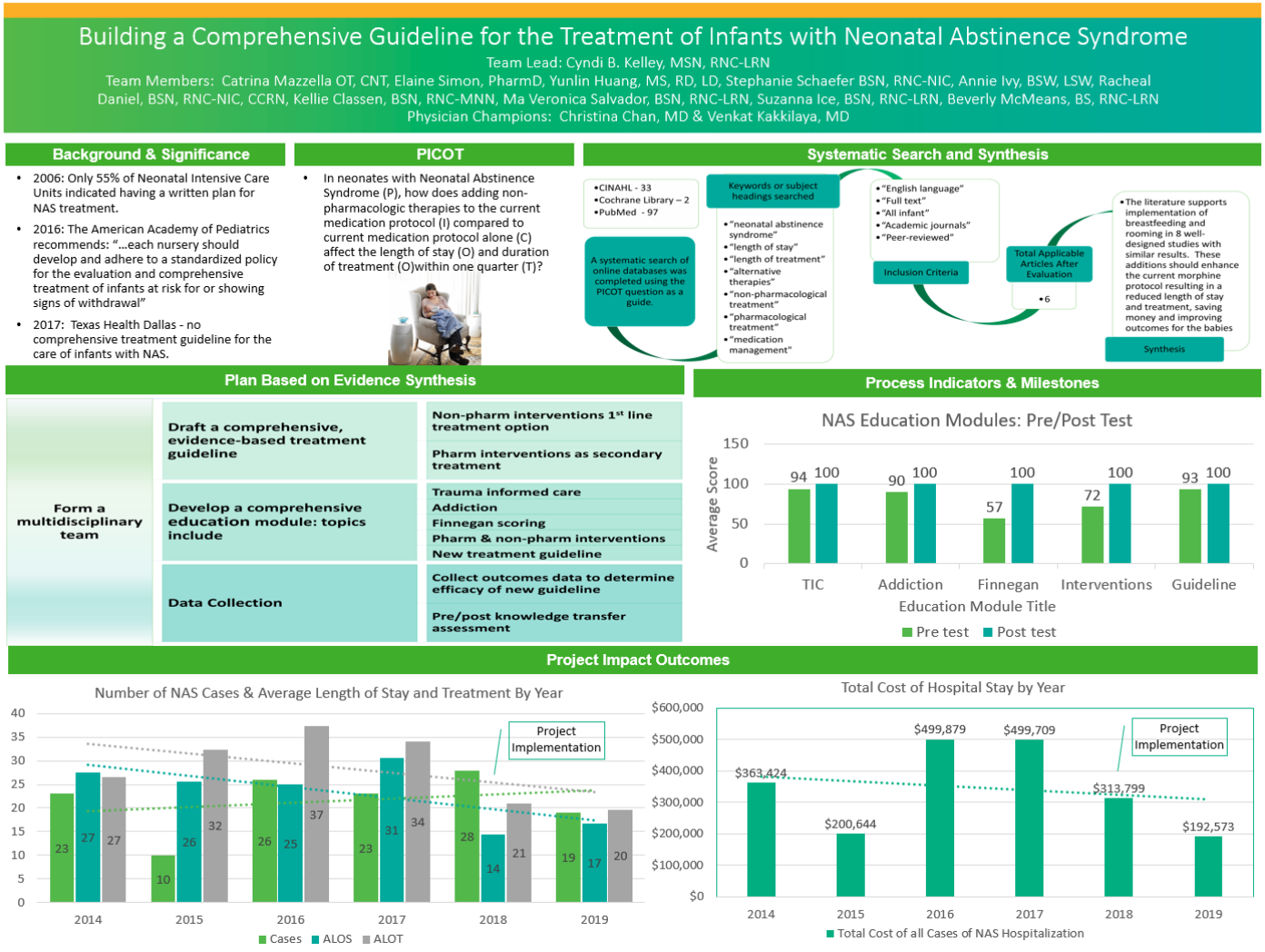

Figure J1 Project Poster

Appendix K. Leadership Model

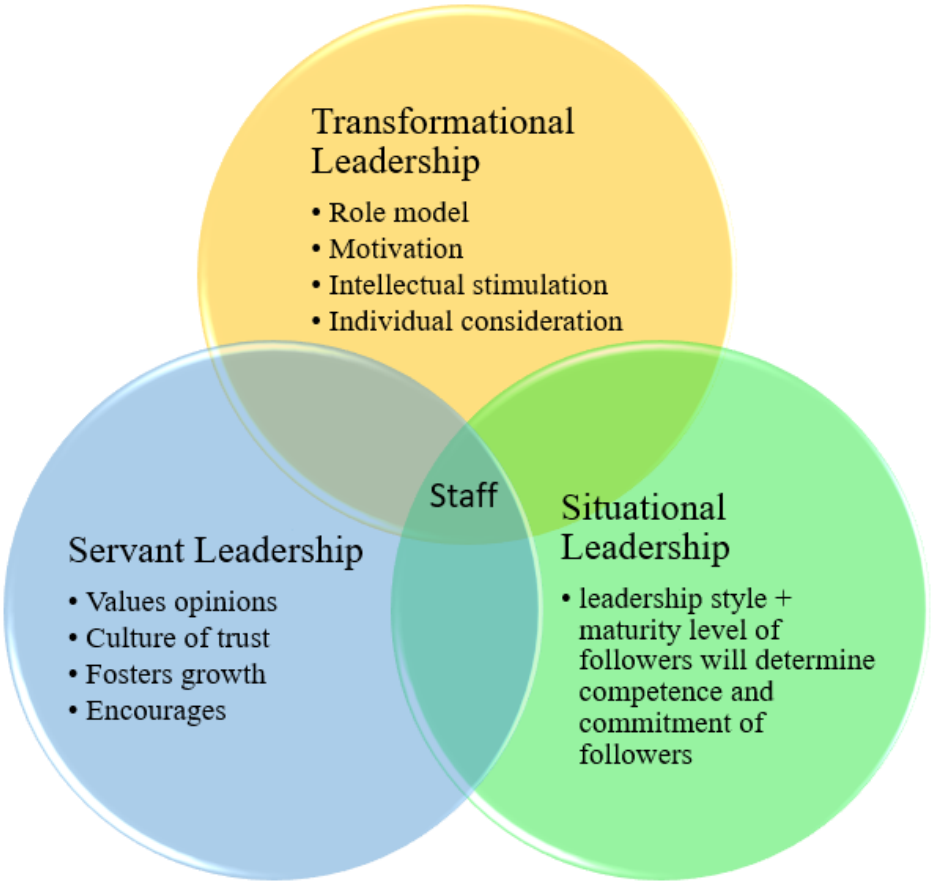

Figure K1 Leadership Model

Biosketch

Principal Investigator/Program Director (Last, First, Middle):

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Cyndi Briggs Kelley	Nurse Manager
eRA COMMONS USER NAME	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(If applicable)*	YEAR(s)	FIELD OF STUDY
Texas Women's University: Denton Texas	Bachelor of Science	2004	Dietetics & Institutional Administration
University of Texas at Arlington: Arlington, Texas	Bachelor of Science	2009	Nursing
University of Texas at Arlington: Arlington, Texas	Master of Science	2016	Nursing Administration

A. Positions and Honors.

a. Sigma Theta Tau, Delta Theta Chapter
b. TNA DNP Policy Fellowship: 2018 – 2019 Fellow

B. Selected peer-reviewed publications

- Kelley, C. B., & Huckaby, S. (2015). Modeling the practice of lifelong learning in the changing health care environment. *MedSurg Matters! 24*(6), 2-3.
- Kelley, C. B. (2017). Time management strategies: Purposeful rounding and clustering care. *MedSurg Matters! 26*(1), 1-3.
- Kelley, C. B. (2019). Connecting the Dots: What TNA's DNP Policy Fellowship Can Do for You. *Texas Nursing Magazine - Spring 2019*, 18-19. https://issuu.com/texasnurses/docs/tna-spring19-digital
- Grigsby, S., Chapman, B., Kelley, C. B., Shipley, R., Garrett, C., & Davis, C. (2018). DNP and PhD: Complementary Roles. *American Nurse Today*, *13*(7), 8-13. https://americannursetoday.com/Digital/EducationGuide18-19/#p=10
- Shipley, R., Chapman, B., Davis, C., Garrett, C., Grigsby, S., & Kelley, C. B. (2019). DNPs: Healthcare Change Agents. *American Nurse Today - Education Edition 2019-2020*, 16-18. https://americannursetoday.com/Digital/EducationGuide19-20/#page=18

PHS 398/2590 (Rev. 09/04) **Biographical Sketch Format Page**