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Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project

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Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project

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Abstract

The purpose of this quality improvement project is to implement an educational program and bedside guide about the Finnegan Neonatal Abstinence Scoring Tool (FNAST) to increase accuracy, inter-rater reliability, and confidence when assessing infants with neonatal abstinence syndrome. The project is based on a Plan-To-Do-Study-Act framework involving a pre-assessment and post-assessment. It took place in a 70-bed neonatal intensive care unit in a hospital in South Florida that frequently cares for infants with neonatal abstinence syndrome but lacks an established training program within the organization. A convenience sample of 24 registered nurses from the neonatal intensive care unit participated in the project with varying degrees of experience. The participants watched a video of a newborn with neonatal abstinence syndrome while scoring the infant using the FNAST and rating their confidence level while scoring each item within the scoring tool. Afterwards, they participated in an educational session and were provided a bedside reference guide before completing a post-assessment where they watched the same video from the pre-assessment, scored the infant using the FNAST, and rated their confidence level after receiving the education. Participants improved their inter-rater reliability from 46% in pre-training to 71% in post-training. Average confidence levels while using the FNAST also increased from the pre-training session to the post-training session. Advanced training in neonatal abstinence syndrome scoring can result in improved health outcomes by decreasing length of hospital stay and time on pharmacological therapy.

Keywords: *Finnegan Neonatal Abstinence Scoring Tool, neonatal abstinence syndrome, nurses, neonatal intensive care, substance use disorder, withdrawal, inter-rater reliability*

Introduction/Problem Statement/Significance

Opioid use among pregnant women has increased significantly in the United States; 1.5 per 1000 live births to 6.5 per 1000 live births from 1999 to 2014 (Devlin et al., 2020). Babies are exposed to the drugs in utero through the umbilical cord and when the umbilical cord is severed at birth, it leads to the onset of withdrawal symptoms within the first few days of life. These withdrawal symptoms are associated with Neonatal Abstinence Syndrome, and there has been a 5-fold increase in the incidence of Neonatal Abstinence Syndrome from 2004 to 2014. Withdrawal symptoms can vary and can be behavioral or physiological including tremors, cardiorespiratory instability, poor feeding, diarrhea, vomiting, hyperthermia, excessive crying, disrupted sleep, and seizures. These babies are often admitted to the Neonatal Intensive Care Unit for observation and pharmacotherapy. The nurses caring for these infants use scoring tools to assess the severity of the withdrawal symptoms, with the Finnegan Neonatal Abstinence Scoring Tool (FNAST) being the most used. Accuracy of scoring is essential because it can affect the initiation or duration of pharmacotherapy and length of hospital stay.

Infants with Neonatal Abstinence Syndrome are usually treated with pharmacological therapy. Pharmacological treatments often include morphine, buprenorphine, phenobarbital, and clonidine. The dosage and frequency of the pharmacological interventions are dependent on the scores provided by the nurses using the appropriate scoring tools. The Finnegan Neonatal Abstinence Scoring Tool (FNAST) was developed in 1975 and consists of twenty-one items with two to four subcategories, and ratings within those categories that range from one to as many as five items (Devlin et al., 2020). It is complex, subjective, and lacks precise definitions which can lead to inaccuracy and questionable reliability. Infants are assessed using the scoring tool every three to four hours depending on their feeding schedule. Pharmacological therapy is initiated

after three consecutive scores equal to eight or above or two consecutive scores equal to twelve or above. Consistent scores greater than eight are used as a measure to determine a need for increase in pharmacological therapy dosage or frequency, and consistent scores lower than eight are used as a sign of readiness for weaning pharmacological therapy (Gomez-Pomar et al., 2017). Initiation and duration of pharmacological therapy, length of hospital stay, and health care utilization for infants with Neonatal Abstinence Syndrome are highly correlated with scoring accuracy and precision.

The hospital stay for infants with Neonatal Abstinence Syndrome can be lengthy and costly. The mean length of stay for infants with Neonatal Abstinence Syndrome in the hospital is around 23 days, with average hospital charges of $93,400, and Medicaid costs of up to $1.2 billion (Wachman et al., 2018). Inaccurate lower scores lead to faster weaning of pharmacological therapy before the infant is truly ready and can end up resulting in a setback for the infant, requiring an increase in pharmacological therapy back to the original dose and frequency. Inaccurate higher scores can lead to inappropriate increased dosage and frequency of pharmacological therapy which in turn, lengthens the weaning process and increases the length of stay in the hospital. Infants who are scored accurately can receive the appropriate pharmacological therapy allowing them to gain control of their withdrawal symptoms sooner, possibly resulting in earlier discharges and lower healthcare costs. Many components within the Finnegan scoring tool are vague and can be defined differently among different observers leading to scoring inaccuracy. The American Academy of Pediatrics described the scoring tool as being too complex to perform on a routine basis especially in a busy unit, however clinical experience demonstrated that nurses could perform the scoring assessment accurately within a

few minutes when the staff is properly trained and understand the item definitions (D'Apolito, 2014).

The Finnegan Neonatal Abstinence Scoring Tool (FNAST) is very complex and requires proper training and experience to score with accuracy. The tool includes parameters within subcategories but does not specify the appropriate time to score each item. Specific categories need to be scored at different times; before the feeding when the infant is quiet, during the feeding and hands-on care, and after the feeding is completed (Timpson et al., 2018). According to a study conducted by Clark (2019) that included 17 nurses in a southeastern medical center in the United States, experienced nurses reported feeling more confident using the Finnegan scoring tool then inexperienced nurses, but still scored inaccurately in their assessment. This study demonstrated that confidence does not always translate into competence. However, after being educated and trained those participants improved in their scoring accuracy from 64.7% to 94.1%.

The purpose of this project was to develop strategies to increase the scoring accuracy using the FNAST by developing a bedside guide as a reference for nurses to ensure each category is scored at appropriate times and to implement educational training for nurses that frequently care for infants with Neonatal Abstinence Syndrome. The bedside reference guide and training program can help decrease the subjectivity and increase the precision among nurses responsible for assessing infants with Neonatal Abstinence Syndrome. Reliable, accurate scoring can result in shorter length of hospital stay, decreased time on pharmacological therapy, and a reduction in hospital costs.

Literature Review

A literature review was conducted to analyze the challenges of using the FNAST and to demonstrate the benefits of having such training in place. The review was conducted using the

CINAHL database using the key words “Finnegan scoring tool” and “nursing”. The search was narrowed down to articles published in the years 2012 to 2022. Articles were eliminated that included secondary research or that did not include a research study. The six articles chosen for the review focused on methods to improve scoring accuracy and different approaches to addressing the inconsistencies with scoring.

The articles chosen from the literature review all discuss the current challenges nurses encounter while using the FNAST. Timpson et al. (2018) identified the complexity of the Finnegan scoring tool, 21 signs and symptoms that guide the use of pharmacotherapy. Despite the modifications made by various institutions, it remains a highly complex system and can be very complicated for nurses to use during routine care. The scoring tool’s reliability and validity are also not well established. Devlin et al. (2020) discussed the lengthy details of the FNAST which includes many subcategories and a weight for each subcategory. It requires extensive training, and the subjective components can influence the tool’s validity.

Timpson et al. (2018) conducted a survey with 20 nurses from NICU and newborn nursery identified the 5 areas that had the most ambiguous scoring patterns: Moro reflex, crying, sleep patterns, muscle tone, and tremors. Foo et al. (2021) conducted a study with 41 nurses from a mother-baby unit at the Women and Infants Hospital in Providence, Rhode Island were administered a survey about the Finnegan Neonatal Abstinence Scoring Tool (FNAST) and the items they found were the most subjective, were most difficult to score, and were most indicative of neonatal abstinence syndrome. The nurses reported that the Finnegan Neonatal Abstinence Scoring Tool (FNAST) was somewhat to very subjective and more than half of the nurses reported that it was somewhat to not accurate and a new scoring system was needed.

Clark (2019) used a Plan-Do-Study-Act project to study the impact of an educational training program on neonatal abstinence syndrome and the Finnegan Scoring Tool. The study involved 17 registered nurses from mother-baby, NICU, and pediatrics from a medical center in the southeastern region of the United States. The study demonstrated that advanced training in neonatal abstinence syndrome and the Finnegan Scoring Tool improved Interobserver reliability significantly from 64.7% in pretraining to 94.1% in post training. Another study conducted by Lucas and Knobel (2012) included 68 nurses from a NICU at a single medical facility that participated in an educational training in a classroom setting that included an interactive DVD component to assess and score an infant with neonatal abstinence syndrome, followed by a PowerPoint presentation focused on scoring for neonatal abstinence syndrome, and were provided a printed manual to assist with the scoring. They were given a posttest after the educational program and all the nurses showed improvement in scores from 2% to 44% improvement. These studies suggest that the Finnegan Neonatal Abstinence Scoring Tool (FNAST) lacks precise definitions and requires sufficient training and experience to improve the reliability and validity.

PICO

In the management of infants experiencing neonatal abstinence syndrome, does an educational competency and a bedside reference guide related to the Finnegan Neonatal Abstinence Scoring Tool (FNAST) increase nurses' consistency and accuracy of scoring? **Population:** NICU nurses at Broward Health Medical Center. **Intervention:** An educational competency and bedside reference guide. **Comparison:** Pre-assessment scores and confidence levels prior to the intervention. **Outcome:** Improved scoring consistency, accuracy, and confidence.

Definitions of Terms

Neonatal Abstinence Syndrome (NAS): A group of symptoms a neonate can experience when they withdraw from drugs from which they are exposed to while inside the womb.

Finnegan Neonatal Abstinence Scoring Tool (FNAST): A scoring tool used in the assessment of neonates with neonatal abstinence syndrome. It was developed by Loretta Finnegan and her colleagues in 1975 and contains 21 items with two to four subcategories with ratings within those subcategories ranging from one to as many as five.

Inter-rater Reliability: The degree of agreement among 2 or more raters while assessing the same phenomenon.

Conceptual Underpinning and Theoretical Framework of the Project

The Synergy Model for Patient Care was developed in 1996 by the American Association of Critical-Care Nurses (AACN) and it is a framework that aligns nursing competencies with patient needs (AACN, n.d.). The patient's needs encourage the nurse to achieve the competency to provide effective care. The synergy between the patient's needs and nursing competency results in optimal outcomes. For this project, the patient need is accurate scoring using the Finnegan Neonatal Abstinence Scoring Tool (FNAST) so that treatment can be appropriately provided. This can help decrease their length of stay in the hospital and time on pharmacotherapy. Nursing competency in using the Finnegan Neonatal Abstinence Scoring Tool (FNAST) can be obtained with an educational program to increase nurses' accuracy and confidence levels.

Methodology

The project was conducted in a 70-bed level three neonatal intensive care unit in a hospital located in South Florida. Institutional review board approval was received from both the hospital

and university. A total of 24 voluntary participants were recruited through hospital email. Participants each received an implied consent form explaining the purpose and intent of the project.

The Plan-To-Do-Study-Act was used to implement the project. In the plan phase, a literature review was conducted to gather information on the best evidence-based practices to improve accuracy of scoring with the Finnegan Scoring Tool. The goal of the project was to improve nurses' inter-rater reliability while using the tool to assess infants with neonatal abstinence syndrome. During the Do phase, participants were asked about total number of years in practice as a NICU nurse and viewed a video of an infant with neonatal abstinence syndrome while scoring the infant using the Finnegan Scoring Tool in a pre-assessment to evaluate their current knowledge. Participants were asked to also rate their confidence level on a scale of 1 to 5 for each item within the scoring tool; 1 being the least confident and 5 being the most confident. Then, they viewed an educational PowerPoint presentation about the Finnegan Neonatal Abstinence Scoring Tool (FNAST). The content for the educational PowerPoint was developed after review of literature on correct use of the FNAST. After the educational session, participants watched the same video of the infant with neonatal abstinence syndrome while scoring the infant in a post-assessment to evaluate for improvement. A bedside guide was developed to assist the nurses with their scoring evaluation in the post-assessment. They were also asked to rate their confidence level for each item in the scoring tool once again. During the Study phase, the results from the pre-assessment and post-assessment were evaluated and compared to determine if the education and bedside guide were effective. During the Act phase, the results from the study will indicate if improvements to the educational program are needed or if the educational program was effective and is ready for implementation.

I. **Study design**

The project was a quantitative design using pre and post-tests. Participants assessed a video of an infant with neonatal abstinence syndrome prior to the educational intervention, then given a post-test by evaluating the same video. They also rated their confidence level for each item they scored on a scale of one to five; one being the least confident and five being the most confident. Signed permission was obtained from Dr. D'Apolito to utilize a video of her demonstrating an examination of a newborn with neonatal abstinence syndrome from her Inter-observer Reliability Training Program for the project (D'Apolito & Finnegan, 2010).

II. **Setting**

The project took place in a 70-bed neonatal intensive care unit in a hospital in South Florida.

III. **Sample**

24 voluntary neonatal intensive care registered nurses participated in the study.

IV. **Intervention**

A PowerPoint presentation was developed along with a bedside guide to educate nurses and help to define the items on the Finnegan Neonatal Abstinence Scoring Tool (FNAST). Content for the educational PowerPoint and bedside guide were obtained from the review of literature. Educational sessions were conducted inside a classroom setting with small groups.

V. **Measures/Instruments**

Demographic data for project participants included total years of nursing practice as a neonatal intensive care nurse. Participants completed pre and post assessments.

Nurses were given the Finnegan Neonatal Abstinence Scoring Tool (FNAST) to score the infant in the video, then also score their confidence level in scoring each item on the FNAST on a scale of 1 to 5; five being the most confident and one being the least confident.

VI. Data Collection Procedures

Participants were recruited through hospital email. Emails were sent to all the nurses in the unit explaining the purpose of the project and the methods that will be used for the project. The educational sessions took place in a classroom setting inside the conference room on the unit.

VII. Data Analysis

The pre-test evaluated the participant's prior knowledge with using the Finnegan Neonatal Abstinence Scoring Tool (FNAST) and their confidence level while using it. The post-test evaluated if the educational program and bedside guide helped improve scoring accuracy and confidence levels among the nurses.

VIII. Protection of Human Subjects

Participants received an implied consent and HIPPA compliance for this study. The benefit of this study is to improve the accuracy of scoring of neonates with neonatal abstinence syndrome using the Finnegan Neonatal Abstinence Scoring Tool (FNAST). Participants were educated about the benefits of improving scoring accuracy which can possibly help decrease the length of hospital stay and time on pharmacotherapy for infants with neonatal abstinence syndrome.

Analysis

Data results were examined for years of practice as a NICU nurse, FNAST accuracy, and changes in confidence levels. The tests were grouped into pre-tests and post-tests for analyzation. The demographic portion, years of practice as a NICU nurse, was examined first. Tests were grouped into subgroups of 5-year increments. Then, the percentage of correct responses in agreement with the established expert FNAST score for the video was calculated for both the pre-tests and post-tests. The literature supports 90% or greater inter-rater reliability for the number of items that are acceptable for a rater to vary from an accepted score to use a tool reliably (Clark, 2019). Lastly, the mean confidence level for each item on the FNAST and the overall mean was calculated for comparison.

Results

A volunteer sample of 24 nurses participated in the project. Table 1 displays the years of practice as a NICU nurse in increments of 5 years for the participants: 0 to 5 years (n=13), 6 to 10 years (n=8), 11 to 15 years (n=1), 16 to 20 years (n=1), and greater than 20 years (n=2).

Accuracy

Participants improved by 25% in correctly identifying neonatal abstinence symptoms using the FNAST from before the training session to after the training session. As demonstrated in Table 2, inter-rater reliability increased from 46%, 11 participants, in the pre-educational session to 71%, 17 participants, in the post-educational session in meeting the minimum benchmark score of 90%. The results of the two-tailed Wilcoxon signed rank test were significant (alpha value of .05, V = 37.50, z = -2.59, p = .010). This indicates that the differences between Pre-tests and Post-tests are not likely due to random variation. The median of Pre-tests (*Median*=85) was significantly lower than the median of Post-tests (*Median* =90).

Table 4 illustrates the number and percentage of correct symptom identification for each individual item in the FNAST. Most of the participants showed a small improvement in the central nervous system disturbances category, with tremors being the most improved item. Mild tremors when disturbed improved by 25%, moderate/severe tremors when disturbed improved by 29%, mild tremors when undisturbed improved by 8%, and moderate/severe tremors when undisturbed improved by 29%. The central nervous symptoms of hyperactive Moro reflex; 54% on the pre-test and 46% on the post-test, markedly hyperactive Moro reflex; 63% on the pre-test and 46% on the post-test, and moderate to severe tremors while undisturbed; 13% on the pre-test and 42% on the post-test, were the most mis-identified items. Participants scored fairly the same for metabolic, vasomotor, and respiratory disturbances in the pre-test and post-test, with an increase in percentage scores of 8% for yawning and 4% for sneezing, and a decrease in percentage score of 5% for nasal stuffiness. For gastrointestinal disturbances, participants scored 100% on both the pre-test and post-test for all categories except for excessive sucking which showed a decrease from 92% in the pre-test to 88% in the post-test.

Table 3 shows the accuracy of inter-rater reliability scores for participants based on their years of practice as a NICU nurse. Participants with less than 5 years of practice showed an increase in inter-rater reliability by 39%, from 3 participants in the pre-test to 8 participants in the post-test out of a total of 13 participants. Participants with 6 to 10 years of experience showed an increase by 14%, from 6 participants in the pre-test to 7 participants in the post-test out of a total of 7 participants. There was 1 participant with 11 to 15 years of experience that showed an increase by 100%, not meeting the benchmark score in the pre-test but successfully meeting it in the post-test. A Participant with 16 to 20 years of experience met the minimum benchmark score in both the pre-test and post-test. Of the 2 participants with more than 20 years

of experience as a NICU nurse, 1 participant met the benchmark score in the pre-test while neither of the participants met the benchmark score in the post-test.

Confidence

Participants were more confident using the FNAST after participating in the educational session. The results of the two-tailed Wilcoxon signed rank test were significant based on an alpha value of .05, $V = 0.00$, $z = -4.86$, $p < .001$. This indicates that the differences between confidence levels in the pre-tests and confidence levels in the post-tests are not likely due to random variation. The median confidence level in the pre-tests (*Median* = 4.29) was significantly lower than the median confidence level in the post-tests (*Median* = 4.75).

Table 3 and Figure 1 illustrate the overall mean confidence levels based on years of practice as a NICU nurse. The participant with 16 to 20 years of experience felt the most confident in the pre-test with an overall mean of 4.94, while participants with less than 5 years of experience and more than 20 years of experience felt the least confident in the pretest, with overall means of 3.87 and 3.94, respectively. Participants with more than 20 years of NICU experience showed the greatest increase in average mean of confidence level, from 3.94 to 4.73. However, neither participant reached a minimum benchmark score of 90% in the post-test. Participants with less than 5 years of experience on the other hand, had an average mean increase in confidence level from 3.87 to 4.55 and demonstrated an increased percentage of participants meeting the minimum benchmark score from 23% in the pre-test to 62% in the post-test.

Table 5 shows the mean confidence levels for each item in the FNAST from the pre-tests and post-tests. Participants felt the least confident scoring central nervous system disturbances in both the pre and post-tests, with an overall mean of 3.68 in the pre-test and an overall mean of 4.51 in the post-test. Participants felt most confident scoring for fever with a mean of 4.8 and

least confident scoring for myoclonic jerk with a mean of 2.5 in the pre-tests. They felt most confident scoring for fever and sweating with means of 4.9, and felt least confident scoring for Moro reflex, undisturbed tremors, and myoclonic jerk with means of 4.2 after the educational session in the post-test. Myoclonic jerk had the most significant increase in confidence level after the educational session, with a mean of 2.5 in the pre-test and a mean of 4.2 in the post test.

Discussion

Accurately identifying neonatal abstinence symptoms and scoring them appropriately can result in appropriate care being initiated to improve health outcomes and reduce hospital costs by decreasing length of hospital stay and time on pharmacotherapy. The training program and bedside guide did prove to be effective in increasing inter-rater reliability from 46% to 71% among the participants, but 29% of the participants still failed to meet the minimum benchmark score after the educational session in the post-assessment indicating a need for more Finnegan Scoring Tool education. Participants were the least accurate in scoring central nervous system disturbances which correlated with the lowest means in confidence levels for both the pre-assessments and post-assessments. They felt the most confident scoring for fever, with all the participants scoring it correctly in the pre-assessment and post-assessment. Fever is an objective, measurable vital sign, whereas the other items within the FNAST are more subjective. Respiratory rate is also objective, but nurses struggled to identify whether the infant in the video displayed retractions or not. Participants also felt confident scoring for gastrointestinal disturbances which also correlated with a high percentage of inter-rater reliability.

Years of practice as a NICU nurse did demonstrate an impact on the confidence levels and scoring accuracy for participants with less than 5 years of experience. On the other hand, participants with over 20 years of experience felt less confident and had lower scoring accuracy

which could indicate that experience does not influence competence. There were only 2 participants with over 20 years of experience as a NICU nurse, so a broader group of participants with that experience level would be necessary to accurately assess competence levels.

Limitations

There were some limitations noted after the project was implemented that prevents generalizability such as low participation rate, low participation among experienced nurses, limited geographic area, and the quality of the video used.

The sample size of 24 participants all came from the neonatal intensive care unit. The majority of infants with neonatal abstinence syndrome are treated in the NICU, however some of the infants are initially scored in the mother-baby unit and nurses from mother-baby, pediatrics, and pediatric ICU often float to the neonatal intensive care unit to care for infants with neonatal abstinence syndrome. Representation from other units may provide additional knowledge about the effectiveness of the educational session and bedside guide, especially because they do not provide care to infants with neonatal abstinence syndrome as often.

The majority of participants had less than 10 years of experience as a NICU nurse. There were 20 participants with less than 10 years of experience and 4 participants with greater than 10 years of experience. A larger sample size of participants with greater than 10 years of practice as a NICU nurse would allow for a more accurate depiction of competence and confidence levels among this group and level of experience.

The quality improvement project took place in a single hospital in South Florida. Additional studies are required among other organizations to establish generalizability.

Lastly, the video of the assessment of the infant with neonatal abstinence syndrome was created in 2010 and was viewed by participants on a computer screen. Some participants

commented about the difficulty of assessing the withdrawal symptoms of the infant in the video. Although, the same video was used in the prior studies detailed in the literature review where participants did show improvement in scoring accuracy, newer videos may need to be created in the future to allow participants to visualize the symptoms more clearly.

Implications for Advanced Nursing Practice

Withdrawal scores are the primary criteria guiding pharmacological treatment plans and length of hospital stay for neonates with neonatal abstinence syndrome so accuracy and inter-rater reliability among caregivers responsible for assessing these neonates is essential. Developing an educational competency and providing the necessary tools to define the scoring items within the Finnegan Scoring Tool can help caregivers differentiate signs and symptoms specific to withdrawal from normal newborn behaviors. The goal of the quality improvement project was to establish an advanced training program for caregivers to be completed during orientation and annually afterwards along with a bedside guide to be placed at the bedside of all neonates with neonatal abstinence syndrome with the hopes of increasing the inter-rater reliability among scorers. If 90% inter-rater reliability is not established after training, it is recommended for the individuals to receive additional training until they meet the minimum benchmark score.

The findings from the project support the notion that nurses caring for infants with neonatal abstinence syndrome need education and training to accurately score using the Finnegan Scoring Tool and to increase inter-rater reliability. Although the participants reported feeling confident in scoring most of the items in the Finnegan Scoring Tool, many still did not score the infant in the video accurately which indicates that confidence does not always result in competence.

Positive feedback was received from both the participants and the clinical nurse education specialist on the unit. Participants also expressed positive feedback about the bedside guide stating that it was an effective tool to have at the bedside of infants with neonatal abstinence syndrome to assist with scoring. Currently, there is not a training program in place in the organization where the project took place for neonatal abstinence scoring. The results from this project indicate that establishment of an educational program, not only for nurses in the neonatal intensive care unit but for all units with nurses that care for infants with neonatal abstinence syndrome, is necessary so that these infants are scored accurately and receive the appropriate treatments. Training could also be beneficial to other healthcare team members including providers that care for these infants to enhance trust and collaboration.

With the success of the educational program and bedside guide in increasing inter-rater reliability among the participants in the project, the plan is to implement the educational program as an annual educational competency and utilize the bedside guide for all the infants with neonatal abstinence syndrome.

Dissemination Plan and Sustainability

To sustain the quality improvement project in the organization, there must be support from the providers and an improvement in patient outcomes. Every year the quality improvement project's educational session will be assessed to determine if the plan is effective in increasing inter-rater reliability while using the Finnegan Scoring Tool. The educational session will be reviewed and revised to support the most recent evidence-based practices. Findings from the study will be presented to the Neonatologists, neonatal nurse practitioners, and NICU nurses on the unit. It will also be presented at the Florida International University's DNP Symposium. Two

peer-reviewed journals were also identified for submission: The Journal of Perinatal & Neonatal Nursing and The Journal of Obstetric, Gynecological, & Neonatal Nursing.

Conclusion

Substance use among pregnant women is an ongoing public health crisis that negatively impacts newborns and their families. Improving health outcomes for newborns with neonatal abstinence syndrome requires accurate assessments of withdrawal symptoms. This allows the infants to receive the appropriate care which could help decrease length of hospital stay and time on pharmacologic therapy. The educational program and bedside guide featured in this project were associated with increased inter-rater reliability among scorers and increased confidence levels while using the Finnegan Scoring Tool. Scoring the symptoms appropriately is a better indicator or correct use of the FNAST than total score alone. The Finnegan Scoring Tool is very complex and implementation of a training program about neonatal abstinence scoring is essential to improve neonatal abstinence syndrome assessments. Sustainability for the project can be established with support from the organization’s administrators and providers.

Tables

Table 1: Participants' Years of Experience as a NICU Nurse, *N* = 24				
0-5	6-10	11-15	16-20	20+
13	7	1	1	2

Table 2: Percentage of Participants Achieving Inter-rater Reliability ≥ 90%	
Pre-training	46%
Post-training	71%

Table 3: Participants' Years of Experience as a NICU Nurse, Mean Confidence Levels, Percentage of Participants Achieving Inter-rater Reliability ≥ 90%, *N* = 24					
Years of Experience	0-5	6-10	11-15	16-20	20+
N	13	7	1	1	2
Pre-Test Confidence Level, *Mean*	3.87	4.31	4.2	4.94	3.94
Post-Test Confidence Level, *Mean*	4.55	4.67	4.74	4.94	4.73
Pre-Test % of Participants Achieving Inter-Rater Reliability≥ 90% (*n*)	23% (3)	86% (6)	0% (0)	100% (1)	50% (1)
Post-Test % of Participants Achieving Inter-Rater Reliability≥ 90% (*n*)	62% (8)	100% (7)	100% (1)	100% (1)	0% (0)

Table 4: Individual Finnegan Scoring Tool Symptom Analysis, *n* (%) *N* = 24			
	Variable	Correct at Pre-test	Correct at Post-test
Central Nervous	Crying: Excessive High Pitched	23 (96)	23 (96)
	Crying: Continuous High Pitched	24 (100)	24 (100)
	Sleeps < 1 Hour After Feeding	24 (100)	24 (100)
	Sleeps < 2 Hours After Feeding	24 (100)	24 (100)

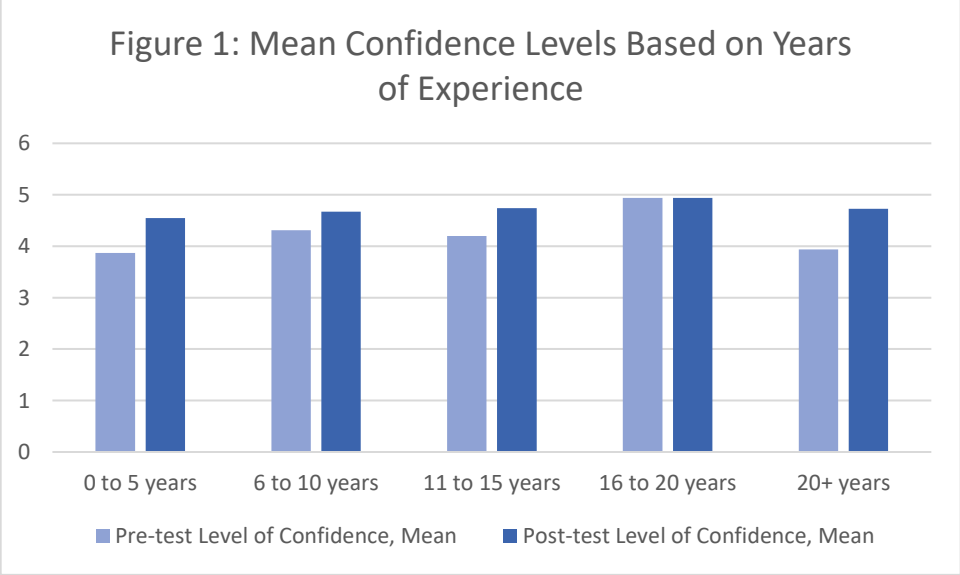
	Sleeps < 3 Hours After Feeding	21 (88)	22 (92)
	Hyperactive Moro Reflex	13 (54)	11 (46)
	Markedly Hyperactive Moro Reflex	15 (63)	11 (46)
	Mild Tremors: Disturbed	17 (71)	23 (96)
	Moderate to Severe Tremors: Disturbed	16 (67)	23 (96)
	Mild Tremors: Undisturbed	18 (75)	20 (83)
	Moderate to Severe Tremors: Undisturbed	3 (13)	10 (42)
	Increased Muscle Tone	24 (100)	24 (100)
	Excoriation (Nose, Knees, Toes)	24 (100)	24 (100)
	Myoclonic Jerk	22 (92)	21 (88)
	Generalized Convulsions	24 (100)	24 (100)
Metabolic, Vasomotor, Respiratory Disturbances	Sweating	24 (100)	24 (100)
	Fever: 37.2 to 38.3C	24 (100)	24 (100)
	Fever: > 38.4C	24 (100)	24 (100)
	Frequent Yawning > 3 Times	22 (92)	24 (100)
	Mottling	21 (88)	21 (88)
	Nasal Stuffiness	21 (88)	20 (83)
	Sneezing > 3 Times	22 (92)	23 (96)
	Nasal Flaring	23 (96)	23 (96)
	Respiratory Rate > 60/min	20 (83)	20 (83)
	Respiratory Rate > 60/min With Retractions	20 (83)	20 (83)
GI Disturbances	Excessive Sucking	22 (92)	21 (88)
	Poor Feeding	24 (100)	24 (100)
	Regurgitation	24 (100)	24 (100)
	Projectile Vomiting	24 (100)	24 (100)
	Loose Stools	24 (100)	24 (100)
	Watery Stools	24 (100)	24 (100)

Table 5: Individual Finnegan Scoring Tool Confidence Level Analysis
Scale 1-5, $N = 24$

	Variable	Pre-test Mean	Post-test Mean
Central Nervous System Disturbances	Crying: Excessive High Pitched	3.7	4.8
	Crying: Continuous High Pitched	3.7	4.8
	Sleeps < 1 Hour After Feeding	4.5	4.8
	Sleeps < 2 Hours After Feeding	4.5	4.8
	Sleeps < 3 Hours After Feeding	4.5	4.8
	Hyperactive Moro Reflex	3.4	4.2
	Markedly Hyperactive Moro Reflex	3.4	4.2
	Mild Tremors: Disturbed	3.4	4.4
	Moderate to Severe Tremors: Disturbed	3.4	4.4
	Mild Tremors: Undisturbed	3.4	4.2
	Moderate to Severe Tremors: Undisturbed	3.4	4.2
	Increased Muscle Tone	4.1	4.7
	Excoriation (Nose, Knees, Toes)	4.1	4.8

	Myoclonic Jerk	2.5	4.2
	Generalized Convulsions	3.2	4.3
Metabolic, Vasomotor, Respiratory Disturbances	Sweating	4.5	4.9
	Fever: 37.2 to 38.3C	4.8	4.9
	Fever: > 38.4C	4.8	4.9
	Frequent Yawning > 3 Times	4.5	4.5
	Mottling	4.3	4.8
	Nasal Stuffiness	4.3	4.7
	Sneezing > 3 Times	4.3	4.8
	Nasal Flaring	4.2	4.6
	Respiratory Rate > 60/min	4.5	4.8
	Respiratory Rate > 60/min With Retractions	4.5	4.8
GI Disturbances	Excessive Sucking	4.2	4.6
	Poor Feeding	4.3	4.8
	Regurgitation	4.3	4.7
	Projectile Vomiting	4.3	4.8
	Loose Stools	4.7	4.8
	Watery Stools	4.7	4.8

Figures



Appendix A

Letter of Support

BROWARD HEALTH MEDICAL CENTER | Salah Foundation Children's Hospital

To Whom It May Concern

My name is Jennifer Bilecki, I am the Clinical Specialist of the Neonatal Intensive Care Unit (NICU) at Salah Foundation Children's, Hospital Broward Health Medical Center. I'm writing to express my support to Kelly Cartagena's Doctor of Nursing Practice project in the NICU.

Kelly, who is a graduate nursing student at Florida International University, has proposed a project titled "Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project". The project addresses an issue with interrater reliability of utilizing a scoring system for Neonatal Abstinence Syndrome infants in the NICU. The current evidence supports Kelly's proposal to improve scoring constancy, acracy, and confidence.

The procedures, interventions, and data collection involved in the project is designed to be in person within the NICU utilizing a PowerPoint presentation and a bedside guide to educate nurses.

Altogether, this project has the potential to improve the quality of the care we provide and presents no risk to the productivity of our staff or the well-being of our patients and their families.

Thank you for your time.

Sincerely,

Jennifer Bilecki

Jennifer Bilecki, MSN, APRN, RNC-NIC

Appendix B

IRB Approval from Institution

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. Rosa Roche
CC: Kelly Cartagena

From: Maria Melendez-Vargas, MIBA, IRB Coordinator

Date: July 12, 2022

Protocol Title: "Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project"

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-22-0327 **IRB Exemption Date:** 07/12/22
TOPAZ Reference #: 111985

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

MMV/em

Appendix C

IRB Approval from Hospital

Institutional Review Board - Human Research Protections

Broward Health Medical Center
Broward Health Coral Springs
Broward Health Imperial Point
Broward Health North
Salah Foundation Children's Hospital
Broward Health Weston
Community Health Services
Broward Health Physician Group

Improving Nurses' Inter

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1600 S Andrews Avenue, Fort Lauderdale, FL 33316 , T - 954.355.4941 or 4358, F - 954.355.5135, http://www.browardhealth.org/pages/irb
IRB document version dated 8.19.22

Appendix D

Recruitment Letter

Recruitment Email for Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project

Dear NICU Nurse,

My name is Kelly Cartagena, and I am a graduate student from the Nursing Department at Florida International University. I am writing to invite you to participate in my quality improvement project to improve nurses' inter-rater reliability and confidence using the Finnegan Neonatal Abstinence Scoring Tool to score infants with Neonatal Abstinence Syndrome. You are eligible to participate in this project because you are a Registered Nurse in the NICU at Broward Health Medical Center and provide care to infants with Neonatal Abstinence Syndrome. I am contacting you with permission from the Clinical Nurse Education Specialist and the Broward Health Medical Center's Research Council.

If you decide to participate, you will watch a video of an infant with Neonatal Abstinence Syndrome and take a pre-test using the Finnegan Scoring Tool to score the infant to the best of your ability which should take approximately 10 minutes to complete. Then you will be asked to view an approximately 20-minute-long educational presentation. Then you will be asked to re-watch the video and complete a post-test to score the infant with Neonatal Abstinence Syndrome using the Finnegan Scoring Tool which is expected to take about 10 minutes to complete. No compensation will be provided.

Remember, this is completely voluntary. If you would like to participate, please contact me via email at kkozi001@fiu.edu or phone (954) 444-0010 so we can arrange a date and time.

Thank you.

Sincerely,

Kelly Cartagena

Appendix E

Informed Consent

Study Information Sheet for Research

Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome: A Quality Improvement Project

SUMMARY INFORMATION

This quality improvement project aims to improve nurses' inter-rater reliability and confidence using the Finnegan Neonatal Abstinence Scoring Tool to score infants with Neonatal Abstinence Syndrome. The results from this study will help understand gaps in knowledge and room for improvement.

Things you should know about this study:

- **Purpose:** The purpose of the study is to improve nurses' inter-rater reliability and confidence using the Finnegan Neonatal Abstinence Scoring Tool.
- **Procedures**: If you choose to participate, you will be asked to take a pre-assessment by scoring an infant with NAS from a video, participate in an educational session, then take a post-assessment and score the infant with NAS from the video once again.
- **Duration:** This will take about 1 hour.
- **Risks**: Participants are not expected to experience any risks, harms, or discomfort through participation in this study.
- **Benefits:** The main benefit to you from this research is increased knowledge about using the Finnegan Neonatal Abstinence Scoring Tool to score neonates with Neonatal Abstinence Syndrome.
- **Alternatives:** There are no known alternatives available to you other than not taking part in this study.
- **Participation:** Taking part in this research project is voluntary.

Please carefully read the entire document before agreeing to participate.

You are invited to participate in a research study. Scientists do research to answer important questions which might help change or improve the way we do things in the future.

This document will give you information about the study to help you decide whether you want to participate. Please read this form, and ask any questions you have, before agreeing to be in the study.

PURPOSE OF THE STUDY

The purpose of this study is to help improve nurses' inter-rater reliability and confidence using the Finnegan Neonatal Abstinence Scoring Tool.

NUMBER OF STUDY PARTICIPANTS

If you decide to be in this study, you will be one of approximately 30 people in this research study.

DURATION OF THE STUDY

Your participation will involve approximately 45 minutes of your time

PROCEDURES

If you agree to be in the study, we will ask you to do the following things:

1. The study will take place in the conference room in the unit. You will watch a brief video of an infant with Neonatal Abstinence Syndrome while taking a pre-assessment to score the infant using the Finnegan Scoring Tool. You will also be asked to rate your confidence level for each section that you score.
2. You will then view an educational PowerPoint presentation about the Finnegan Scoring Tool. You will also be educated about how to use the bedside reference guide provided to assist with the scoring process.
3. Then, you will watch the same video of the infant with Neonatal Abstinence Syndrome while taking a post-assessment to score the infant using the Finnegan Scoring Tool. You will also be asked to rate your confidence level for each section that you score once again.

RISKS AND/OR DISCOMFORTS

There may be some risks that include a breach of confidentiality. No personal information will be collected or recorded for research purposes. Only data that will be collected is your tests scores from Pre and Posttests.

BENEFITS

You may benefit from participation by increasing your knowledge and improving accuracy using the Finnegan Neonatal Abstinence Scoring Tool.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study.

CONFIDENTIALITY

We will protect your information and make every effort to keep your personal information confidential, but we cannot guarantee absolute confidentiality. No information which could identify you will be shared in publications about this study

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report, we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely, and only the researcher team will have access to the records. However, your records may be inspected by authorized University, Broward Health, or other agents who will also keep the information confidential.

You will not be paid for participating in this study and there is no cost to participate in the study.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your employment will not be affected by your participation in this study. You will not lose any benefits if you decide not to participate or if you quit the study early. The investigator reserves the right to remove you without your consent at such time that he/she feels it is in the best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Kelly Cartagena at 954-444-0010 or Kkozi@fiu.edu

IRB CONTACT INFORMATION

For questions about your rights as a research participant, to discuss problems, complaints, or concerns about a research study, or to obtain information or to offer input, please contact the Broward Health Institutional Review Board at (954) 355-4941 or at irb@browardhealth.org.

You may also contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this information sheet and I agree to participate in this study by taking the survey. I understand that I can and ask for a copy of this document if requested.

Appendix F

Pre/Post Assessments

FLORIDA INTERNATIONAL UNIVERSITY

Improving Nurses' Inter-rater Reliability and Confidence Using the Finnegan Neonatal Abstinence Scoring Tool to Score Infants with Neonatal Abstinence Syndrome

Pre-Test/Post-Test **(Circle One)**

Introduction: This test is part of a quality improvement project aiming to improve nurses' inter-rater reliability and confidence using the Finnegan Neonatal Abstinence Scoring Tool to score infants with Neonatal Abstinence Syndrome. The results from these pre and post-tests will help understand gaps in knowledge and room for improvement.

Instructions: Please watch the video of the assessment of an infant with Neonatal Abstinence Syndrome. Use the following page with the subcategories listed from the Finnegan Neonatal Abstinence Scoring Tool to score the infant to the best of your ability. Then, please rate your confidence level for each subcategory score, even if you score a "0" for that subcategory, on a scale of "1" to "5" with "1" being the least confident and "5" being the most confident. After completing the scoring assessment, please add up your total score and record your answer at the bottom. **Please do not include your name or personal information. Your answers are anonymous and will be kept confidential. Your participation is voluntary and will not have any bearing on your position.**

Demographics:

Number of Years Employed as a NICU Nurse: _____

Finnegan Neonatal Abstinence Scoring Tool				
	Signs and Symptoms	**Score**	**Your Score**	**Confidence Level Scale 1 (Least) to 5 (Most)**
Central Nervous System Disturbances	Crying: Excessive High Pitched	2		
	Crying: Continuous High Pitched	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		
	Moderate to Severe Tremors: Disturbed	2		
	Mild Tremors: Undisturbed	3		
	Moderate to Severe Tremors: Undisturbed	4		
	Increased Muscle Tone	2		
	Excoriation (Nose, Knees, Toes)	1		
	Myoclonic Jerk	3		
	Generalized Convulsions	5		
Metabolic, Vasomotor, Respiratory Disturbance	Sweating	1		
	Fever: 37.2 to 38.3C	1		
	Fever: > 38.4C	2		
	Frequent Yawning > 3 Times	1		
	Mottling	1		
	Nasal Stuffiness	1		
	Sneezing > 3 Times	1		
	Nasal Flaring	2		
	Respiratory Rate > 60/min	1		
	Respiratory Rate > 60/min With Retractions	2		
GI Disturbances	Excessive Sucking	1		
	Poor Feeding	2		
	Regurgitation	2		
	Projectile Vomiting	3		
	Loose Stools	2		
	Watery Stools	3		
	TOTAL SCORE			

Appendix G

Bedside Reference Guide

Finnegan Neonatal Abstinence Scoring Tool Defined		
CRYING	It is normal for a full-term infant to cry occasionally. The infant will usually self-console within a 15 second period by finger sucking or fist sucking. If the infant is unable to self-console, they may need interventions from caregivers such as rocking, holding, or offering a pacifier.	☐ **Score 2: Excessive High-Pitched** • Infant is unable to self-console within a 15 second period • Infant cries continuously or intermittently for up to 5 minutes despite caregiver interventions during exam. • If above criteria are met, can be scored whether cry is high-pitched or not. ☐ **Score 3: Continuous High-Pitched** • Infant is unable to self-console within a 15 second period • Infant cries continuously or intermittently for greater than 5 minutes despite caregiver interventions during exam. • If above criteria are met, can be scored whether cry is high-pitched or not.
SLEEP	The longest period of sleep displayed by the infant whether the infant is in light sleep or deep sleep.	☐ **Score 1**: Infant sleeps < 3 hours after a feeding ☐ **Score 2:** Infant sleeps < 2 hours after a feeding ☐ **Score 3:** Infant sleeps < 1 hour after a feeding
MORO-REFLEX	A normal newborn reflex to evaluate an infant's central nervous system. When performed, the infant's arms straighten, the wrists are extended, and there is fanning of the fingers. Slight jitteriness is a normal response.	☐ **Score 2 Hyperactive Moro Reflex:** Pronounced jitteriness at the end of the Moro Reflex or more than 2 non-elicited Moro reflexes during examination. ☐ **Score 3 Markedly Hyperactive Moro Reflex:** Jitteriness and clonus (involuntary repetitive jerks of the wrist or ankle) during or after the initiation of the Moro Reflex
TREMORS	Involuntary movements or quivers that are rhythmical with equal amplitude or strength. Normal infants can have startle or jerking movements during sleep which should not be scored.	☐ **Score 1 Mild Tremors when Disturbed:** Observable tremors of the hand or foot during hands on care with the infant. ☐ **Score 2 Moderate to Severe Tremors when Disturbed:** Observable tremors of one or both arms, or one or both legs, without tremors of the hands and feet while the infant is asleep or awake during hands on care. ☐ **Score 3 Mild Tremors when Undisturbed:** Observable tremors of the hands or feet during at least two one-minute undisturbed periods during the exam. ☐ **Score 4 Moderate to Severe Tremors when Undisturbed:** Observable tremors of one or both arms, or one or both legs, without tremors of the hands or feet during at least two one-minute undisturbed periods during the exam
INCREASED MUSCLE TONE	Muscle tone should be assessed while the infant is quiet, alert, or awake and moving. It should not be assessed when the infant is asleep or crying.	☐ **Score 2** • **Pull-To Sit:** When grasping infant's hands and pulling infant from lying supine to a sitting position the infant's body is totally rigid (like a board) and there is no head lag. • **Upright Suspension:** While hold the infant under the arms up in front of you the infant remains rigid like a board while displaying continued flexion of the legs. • **Flexion and Extension**: While the infant is lying supine and attempting to extend and release the arms and legs to observe for recoil there is an inability to slightly extend arms or legs due to tight flexion. • **Ventral Suspension:** While supporting the infant's chest and abdomen to hold the infant prone above and parallel to the bed, the infant hyperextends head and there is prolonged flexion of the legs and hip.
EXCORIATION	Excoriation is caused by the constant rubbing against a flat surface like bed linen and blankets.	☐ **Score 1:** Excoriation is present on the chin, knees, cheeks, elbows, toes, or nose and should continue to be scored until it is no longer present.
MYOCLONIC JERKS	Spasms or twitching of a muscle that are involuntary.	☐ **Score 3:** Infant displays twitches or jerking movements, short quick contractions of muscles, of the muscles of the face or extremities.
CONVULSIONS	Tonic seizures or tonic extension of all extremities. Can be accompanied by apnea.	☐ **Score 5:** Infant displays generalized seizure activity. If touching or flexing of the extremities fails to stop the jitteriness, it is the result of a seizure

Finnegan Neonatal Abstinence Scoring Tool Defined		
SWEATING	Should not be scored if infant is overheated due to the use of several blankets covering the baby or overdressing.	☐ **Score 1:** If wetness can be felt on the infant's forehead, back of neck, or upper lip.
FEVER	Temperature. Remove excess clothing for accuracy.	☐ **Score 1**: Temperature is 37.2˚C to 38.3˚C. ☐ **Score 2:** Temperature is > 38.4˚C.
FREQUENT YAWNING	Yawning during the assessment.	☐ **Score 1:** Infant yawns more than 3 times during assessment.
Mottling	Mottling can be seen on the infant's chest, trunk, arms, or legs and resembles a marbled or lacy appearance with pink and pale areas.	☐ **Score 1:** Mottling is present on infant's chest, trunk, arms, or legs.
NASAL STUFFINESS	Noisy respirations due to partially blocked nasal passages from the presence of exudates that may or may not be accompanied by a runny nose.	☐ **Score 1:** Infant has noisy respirations due to partially blocked nasal passages from the presence of exudates with or without a runny nose.
SNEEZING	Sneezing during the assessment. Can be individual episodes or occur serially.	☐ **Score 1**: Infant sneezes > 3 times during the assessment.
NASAL FLARING	When the nostrils spread outwardly during breathing to allow more air to enter the lungs.	☐ **Score 2:** Nasal flaring is present during the assessment.
RESPIRATORY RATE	Respirations must be counted for a full minute and assessed while the infant is quiet, not crying.	☐ **Score 1:** Respiratory rate > 60/min ☐ **Score 2:** Respiratory rate > 60/min with retractions
EXCESSIVE SUCKING	Increased rooting reflex (turning head to one side looking for food) while attempting to suck or failed attempts to suck on a pacifier.	☐ **Score 1:** • Infant expresses the rooting reflex more than 3 times while attempting to suck on their fists, hands, or a pacifier. • Infant moves head side to side attempting to suck on a pacifier but is unable adequately suck on it.
POOR FEEDING	Can be scored during current scoring interval or the next scoring interval, but the pattern of documentation should be used consistently with each assessment.	☐ **Score 2** • Infant displays excessive sucking but sucks infrequently during a feeding. • Infant displays uncoordinated sucking, swallowing, and breathing. • Infant stops sucking frequently to breathe.
REGURGITATION & VOMITING	Regurgitation is the effortless return of gastric contents from the mouth that may or may not be associated with burping. Projectile vomiting is the forceful ejection of gastric contents from the mouth.	☐ **Score 2 Regurgitation:** Infant has 2 or more episodes of regurgitation during a feeding not associated with burping. ☐ **Score 3 Projectile Vomiting:** Infant has one or more projectile vomiting episodes during or immediately after a feeding.
STOOLS	Can be scored with or without the presence of a diaper rash.	☐ **Score 2 Loose Stools:** Stool is more liquid than a normal stool and can be slightly curdy, mushy, or seedy. ☐ **Score 3 Watery Stools:** Any type of stool accompanied by a water ring on the diaper.

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