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A quality improvement project: implementing safe sleep practice in a neonatal intensive care unit.

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A Quality Improvement Project: Implementing Safe Sleep Practice in a Neonatal Intensive Care Unit

by

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Dedication

This project is dedicated to my family, who have been my pillars through this process. My husband has been my rock and most considerable support in my life. His endless encouragement, love, and support for pursuing my dreams have kept me grounded and moving toward my goals. My children, who bring me joy every day, and who made sacrifices they did not know were necessary or occurring. Finally, my in-laws, especially my mother-in-law. She has been an immense presence and help to our family during this journey.

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To the project site for their dedication to improving patient safety outcomes and experiences. Also, for allowing me to complete my project and participate in enhancing a community's health.

Abstract

Significance: The American Academy of Pediatrics (AAP) recommends safe sleep practices (SSP) to reduce infant sleep-related deaths. Annually 3,500 babies die due to improper sleeping conditions, and Kentucky is among the lower-performing states for infant sleep safety. The AAP recommends initiating SSP with infants in neonatal intensive care units (NICU) and recently expanded recommendations in 2022. Presently, there is no regulation of healthcare clinician education regarding SSP or role-modeling behavior in the in-patient setting.

Purpose: This scholarly project aimed to improve knowledge and awareness of SSP by improving clinician knowledge and behavior of SSP use in NICU and improving parent education on SSP.

Methods: This Quality improvement project followed the Plan-Do-Study-Act cycle framework in a Level III NICU.

Interventions: Provision of clinician education on the AAP's recommendations for SSP, pre/post-education assessment to evaluate NICU clinician knowledge and behavior of SSP. Implementation of a process for determining infant eligibility to initiate SSP, staff documentation of SSP initiation, and educational enhancements provided to parents.

Results: From February 2023 to April 2023, 41 NICU clinicians participated in a pre-and post-education assessment. Statistical analysis of the assessment did not indicate significance. However, assessment scores improved. Additionally, 25 chart audits were conducted to evaluate improvements in placing infants in SSP and parent receipt of education. Chart audits revealed improvement in parent education from 33% to 70% and implementing SSP from 18% to 100%.

Discussion: This initiative has shown that educating clinicians improves their knowledge and behavior surrounding SSP implementation.

Keywords: safe sleep, sudden infant death syndrome, sudden unexplained infant death, neonatal intensive care unit, premature.

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The attribution of sleep-related causes of infant death arises from how and where a baby sleeps. Many risk factors place infants at a greater risk of death from suffocation, entrapment, or strangulation caused by factors related to sleep position, location, or the environment (Moon et al., 2022). The public health issue of sleep-related infant deaths significantly impacts family units, with an increased risk in infants discharged from a neonatal intensive care unit (Sacks et al., 2022).

Sudden unexpected infant death (SUID) is the death of an infant less than one year of age that occurs unexpectedly and suddenly with an unknown cause before investigation (Moon et al., 2022). SUID includes all unexpected deaths, such as those without a clear cause, such as sudden infant death syndrome (SIDS), and those from a known cause, such as accidental suffocation and strangulation in bed (ASSB) (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome [AAPTFSIDS], 2016; Baessler et al., 2019; Centers for Disease Control and Prevention [CDC], 2020).

The etiology of SUID is multifactorial and is best defined through the triple risk model, looking at compounding factors leading to infant death (AAPTFSIDS, 2016; National Institute of Child Health [NIH], 2021; Salada et al., 2022). The triple-risk model contextualizes the convergence of three conditions that may lead to SUID: intrinsic vulnerability, exogenous triggers, and a critical development period (Moon et al., 2022; NIH, 2021). Intrinsic vulnerabilities include impaired arousal, cardiorespiratory, and autonomic responses. Exogenous triggers involve exposure to an unsafe sleeping environment, overheating, or secondhand smoke.

Lastly, a high-risk period is a critical development period that usually occurs in the first six months of life.

Problem

The AAP recommends that infants in the neonatal intensive care unit (NICU) begin safe sleep practices (SSP) during hospitalization due to their vulnerability and extenuating risk post-discharge (Moon et al., 2022; Paul, 2021). Inconsistent modeling of infant SSP during hospitalization influences caregivers' subsequent engagement in SSP at home, increasing SUID risk (Healthy Children, 2021; Paul, 2021). Variations in healthcare clinicians' knowledge and experience significantly factor into infant SSP's inconsistency as clinician training, education, and guidelines for infant eligibility for SSP are not regulated (Patrick et al., 2021). Current literature identifies hospital staff utilization of SSP during infant hospitalization reinforces post-discharge parental behaviors, and those clinicians in a hospital setting have an expanded reach to provide comprehensive education and modeling to parents in a community (Goodstein et al., 2021; McMullen et al., 2016; Patterson et al., 2022).

For this project, the problem arose from the project site's need for standard practice on SSP education for NICU clinicians (registered nurses (RN), occupational therapists (OT), and providers), application of SSP, and parent education documentation. Improving clinician understanding and application of SSP before infant discharge enhances parent/caregiver potential for compliance with SSP post-discharge. Literature supports this as a risk-reduction measure by improving sleep environments and reducing infant deaths related to improper sleep practices at home (Moon et al., 2022; Paul, 2021). This reach for improved home infant sleep practices requires healthcare clinicians to know and understand the implications of safe sleep modeling as a protective measure and to reduce preventable infant sleep-related deaths. Role modeling and

provider education have significantly increased adherence to safe infant sleep guidelines for in-hospital compliance for clinicians and home compliance for parents (Goodstein et al., 2021; Rowe et al., 2016; Salada et al., 2022).

Background

Annually, more than 3,500 infants die in the United States from modifiable factors related to SUID; these modifiable factors include sleep position and environment (AAPTFSIDS, 2016; CDC, 2020; Goodstein et al., 2021; Moon et al., 2022). The first recommendation on infant sleep issued by the AAP occurred in the 1990s: to place supine or side-lying. This campaign aided in improving the number of children placed on their backs or side during sleep, reducing sleep-related infant deaths, yet, those numbers have stagnated (CDC, 2020). The AAP changed its recommendations in 2005, eliminating any indication of side sleep positioning in healthy infants as evidence supports that exclusively supine sleep is associated with the lowest SIDS risk (NIH, 2021). In 2011, the AAP recommendation update expanded to incorporate a safe sleeping environment, which recommended measures beyond sleeping position (AAPTFSIDS, 2016; Naugler & DiCarlo, 2018). This update was pivotal because infant deaths occurred from accidental suffocation/strangulation as SIDS rates declined (CDC, 2020). The 2011 update also introduced recommendations to incorporate guidelines for at-risk and vulnerable populations such as premature or ill infants (AAPTFSIDS, 2016).

Inclusion of sick or premature infants, especially those hospitalized, was added due to prematurity increasing the likelihood of SUID two to three times more than their term counterparts (Moon et al., 2022). The increased likelihood of SUID has been linked to several factors, but modeled sleep behaviors are easily one of the most modifiable (Moon et al., 2016).

However, since the 2011 recommendations to incorporate NICU patients into SSP participation have been available, specific guidance or provider education has yet to be issued.

U.S. Department of Health and Human Services (2022) *Healthy People 2030* continues to endorse infant sleep as a priority health safety topic. The objective MICH-02 from 2020, to reduce the rate of infant deaths, encompasses all infant mortality, was carried forward to the 2030 objective as mortality rates did not decline as expected. The objective MICH-D03, an increased proportion of infants put to sleep in a safe environment, was established for the 2030 aim to supplement the ongoing progress towards MICH-02. CDC data on SUID rates by state from 2016-2020 list Kentucky as having 131.7 SUID cases per 100,000 live births, more than the national average of 91.7 per 100,000 live births (CDC, 2023; Moon et al., 2022). This rate ranks Kentucky nationally among the bottom performers for infant sleep safety (CDC, 2023).

Kentucky's higher-than-national average infant death rate has contributed to a collaboration between Kentucky and the CDC to promote sleep safety through a Kentucky Safe Sleep campaign. The planning began in 2015 with actions to decrease SUID deaths with a media campaign (Human Resources and Services Administration [HRSA], 2022). The Kentucky Safe Sleep program focuses on providing education to parents, healthcare professionals, and community support regarding the "ABCDs of safe sleep" (Kentucky Department for Public Health, 2019). The ABCDs coincide with the AAP recommendations and provide a simplified mnemonic for remembering that "Alone, Back, Crib, and Dangers" must be addressed with each infant's sleep (Kentucky Department for Public Health, 2019).

Surveys conducted for the Ky Safe Sleep campaign focused on why parents chose unsafe sleep behaviors, contradicting safe sleep recommendations (HRSA, 2022). The survey revealed barriers the campaign would need to overcome to promote safe sleep like prone (belly)

positioning to remedy gas or stomach ailments, the assumption that babies sleep better on their stomachs, familial cultural practices influencing sleep practices, and social determinants of health such as poverty, lack of education, lack of resources, substance use, or teenage motherhood (HRSA, 2022). The campaign found that refreshed educational materials were needed to ensure ongoing engagement in the Safe Sleep campaign (HRSA, 2022).

Sleep-related infant deaths are a preventable burden in Kentucky and the United States. As of 2019, infant death from an unsafe sleep environment occurs every five days in Kentucky. Of these deaths, 95% have an estimated attribution to at least one risk factor related to their sleep space (CDC, 2020.; Kentucky Infants Safe & Strong [KISS], 2016; USDHHS, 2021). Furthermore, additional reports revealed anecdotal information regarding safe sleep instruction in hospitals being an afterthought if even completed (KISS, 2016). These risk factors include: sleeping on a surface not intended for sleep, such as an adult bed, couch, car seat, or swing; sharing a bed with another person; using a pillow, blanket, or other soft objects, bedding, or toy in the crib (Kentucky Department for Public Health, 2019). The Kentucky Pregnancy Risk Assessment Monitoring System (PRAMS) survey reported that more than 80% of mothers acknowledged having placed their children to sleep in an unsafe environment (CDC, 2020). Unsafe sleep habits are one of Kentucky's most common reasons for SUID (Kentucky Cabinet for Health and Family Services, 2019). The project's county is among Kentucky's top counties for elevated SUID rates (Kentucky Department for Public Health, 2019).

Evidence suggests that parents need to follow the AAP recommendations but do not due to a lack of knowledge, concerns about infant comfort, or preconceived notions of a safe infant sleep environment (Goodstein et al., 2021). The AAP emphasizes role-modeling sleep practices by medical providers in the in-patient care setting to reduce risk and reinforce good practices

(Moon et al., 2022). Pre-discharge modeling of safe sleep improves parents' adherence to recommended safety practices at home (Patrick et al., 2020; Salada et al., 2022). An unsafe sleep environment contributes to unexpected infant deaths (Goodstein et al., 2021; Moon et al., 2022).

Healthy babies born at term (at least 37 completed weeks of gestation at birth) should be placed exclusively on their backs to sleep. Research expresses that parents habitually used the sleep position at home for their baby that they saw modeled in the hospital setting (Goodstein et al., 2021). Hence, all hospital personnel caring for infants should place babies on their backs for sleep. The consistency of a safe sleep environment used by hospital personnel fluctuates based on their knowledge and personal beliefs in care. Sometimes, babies are placed in non-supine positions in a hospital setting due to transient medical conditions (Goodstein et al., 2021; Healthy Children, 2021). Many historical approaches to care involved non-supine positioning of newborns, for example, side-lying placed for amniotic fluid clearance, elevated head-of-bed for gastroesophageal reflux, and prone positioning for acute respiratory distress.

Babies born prematurely are at a two to three times higher risk for SIDS simply because they were born preterm, emphasizing the critical importance of early modeling of SSP (Moon et al., 2022). Prematurity often has conditions or ongoing development requiring positioning adversely to SSP. Premature or critically ill babies lack muscle tone and other regulatory behaviors due to their size or disease process. These dynamics allow gravity to influence an uncomfortable, flat, and extended resting posture causing positional or structural deformities (Painter et al., 2019). This abnormal positioning leads to developmental delays and permanent disabilities over time (Larkin et al., 2019; Painter et al., 2019).

Therapeutic positioning in the NICU is an essential provision for optimal comfort and is the standard of care (Painter et al., 2019). Therapeutic positioning promotes improved rest and

growth and normalizes neurobehavioral organization until the infant convalesces (Larkin et al., 2019). Comfortably contained infants are more likely to be calmer, require less medication, and gain weight more rapidly (Painter et al., 2019). To maintain and optimize therapeutic positioning, various aids and supports are used, like blanket rolls and commercial positioners, which conflict with current safe sleep recommendations (Goodstein et al., 2021)

Based on a baby's course in the NICU, the length of stay may be days to weeks. To negate unsafe practices in the home, the AAP Task Force recommends placing infants on their backs to sleep as soon as possible once medically stable and by 32 weeks corrected gestational age (Goodstein et al., 2021; Moon et al., 2022). Introducing this practice in-hospital acquaints parents and caregivers with the position they should use at home. In addition, providers should clearly state and endorse diligence surrounding back sleep positioning for every sleep time to reduce the risk of SIDS (Goodstein et al., 2021; Moon et al., 2022).

Literature Review

Search queries in PUBMED, CINAHL, Cochrane Library, and Embase were utilized to locate comparative studies that address the purpose of this review. Each search includes the exact keywords connected to specific Boolean operators. The first row of terms included NICU and MeSH terms Neonatal Intensive Care Unit and Newborn Intensive Care, which were connected by the operator "OR." Using the operator "AND" to connect the second row, terms safe sleep practices and MeSH term safe sleep education. Again, these terms were joined by the operator "OR." The operator connected the third row, "AND," and included the terms infant mortality and MeSH terms infant death, sudden infant death syndrome (SIDS), Sudden Unexpected Infant Death (SUID), and apparent life-threatening event.

A search of PubMed elicited 30 articles after applying filters for publication date (2016 to 2021) and study design (RCT and meta-analysis). A review of abstracts reduced the number of articles to 10. Replication of the search on CINAHL produced 14 articles, of which two were duplications, leaving an additional 12 articles for review. This process was repeated for Cochrane Library and Embase, eliciting eight additional articles. The 30 articles were further narrowed and eliminated if unavailable in English, removing two additional articles. The initial search and filter elicited 30 articles, which were subsequently limited after a repeated abstract review eliminating articles for a final total of 10 that contributed to this review's purpose.

AAP 2022 Safe Sleep Guidelines

The AAP recommends a safe sleep environment to reduce the risk of all sleep-related deaths (Moon et al., 2022). The guidelines are updated periodically and most recently in July 2022. The updates include expanded definitions and recommendations to provide healthcare clinicians with valuable discussion points to aid in educating parents/caregivers (Moon et al., 2022). The following are the enhancements and new recommendations for 2022:

- Risk reduction measures – enhanced from previous recommendations:
    - supine positioning
    - firm, non-inclined surface
    - room sharing without bed sharing
    - avoidance of soft bedding and overheating
- Protective measures – enhanced from previous recommendations:
    - human milk feeding
    - avoidance of nicotine, alcohol, marijuana, opioid, and illicit drug exposure
    - routine immunization

    - use of a pacifier at sleep times

- New recommendations:
    - non-inclined sleep surface
    - identify short-term emergency sleep locations, such as a cardboard box, if no safe sleep alternative is available
    - risk identification and outlining clinician discussions to address bed-sharing, substance use, home cardiorespiratory monitors, and tummy time
    - promotion of open and non-judgmental conversations (Moon et al., 2022)

Staff education

National guidelines and benchmarks for implementing SSP in the hospital are necessary to standardize eligible infants and improve the transition to SSP (Paul, 2021). Inconsistent education of nursing staff can lead to inconsistent messaging to families regarding the importance of safe sleep. Identifying the proper time to transition infants to SSP requires consistent staff and healthcare provider education (Gelfer et al., 2013). Available literature suggests utilizing AAP guidelines and incorporating physiologic and thermoregulatory stability as a standard way to identify infant SSP eligibility (Hwang et al., 2018; Paul, 2021; Shadman et al., 2016). The AAP recognizes that an infant must be at least 32 weeks and medically stable before initiating SSP (Moon et al., 2022). Despite this, no other guidance is available to support or influence decision-making. Using standardized teaching methods, evaluating SSP modeling, and utilizing resources like an algorithm also improve staff participation in providing proper education and modeling to parents/caregivers (Colson et al., 2019; Paul, 2021; Salada et al., 2022). Providing clinicians with up-to-date education surrounding SSP translates into a more

explicit message to parents and caregivers, leading to better compliance in the home setting (Salada et al., 2022).

Modeling Behavior

Research suggests that parents are less likely to place an infant supine if they do not receive education on proper sleep habits (Baessler et al., 2019; Goodstein et al., 2021; Paul, 2021). There is a strong association between parent/caregiver engagement in SSP at home and the modeling performed by nurses while the infant is in the hospital, as parents are more likely to model what they see rather than are told (Baessler et al., 2019; Moon et al., 2016; Patterson et al., 2022; Paul, 2021; Salada et al., 2022). It is fundamentally important to know that staff modeling of SSP techniques leads to improvements in parent and caregiver utilization of safety practices like a flat sleep surface and room sharing but not co-sleeping (Baessler et al., 2019.; Dufer & Godfery, 2017; Hwang et al., 2021; Patterson et al., 2022; Rowe et al., 2016; Zachritz et al., 2016). Modeling of SSP is encouraged for educational reinforcement of parents/caregivers to encourage the use of SSP in the home environment (Moon et al., 2022; AAPTFSIDS, 2016).

Bundle approach

The absence of a national benchmark for healthcare clinician education and established guidelines on engaging SSP has led to various interpretations of implementing standard practices in SSP protocols. These interpretations vary by unit and specificity of parameters surrounding inclusion criteria. However, most include facility policies outlining eligibility parameters, AAP recommendations for a safe sleep environment, and crib card identifiers at the bedside (Partick, 2022; Sacks et al., 2022).

Many SSP bundles include crib cards, policies, order sets, and algorithms. Algorithm utilization in other quality improvement initiatives successfully aided in more consistent

clinician modeling and improved parental compliance with SSP (Gelfer et al., 2013; Goodstein et al., 2021; Hwang et al., 2018; Rowe et al., 2016). Crib cards indicating sleep type and environment (SSP or therapeutic positioning) have demonstrated success in the longevity of clinician knowledge and improved education to caregivers as a constant reminder is present at the bedside (Hwang et al., 2018; Sacks et al., 2022). Incorporating a safe sleep bundle into routine care can improve NICU nurse compliance with SSP in the hospital setting (Paul, 2021; Sacks et al., 2022; Salada et al., 2022). These approaches can result in more consistent modeling and increased parent compliance with SSP (Colson et al., 2021; Goodstein et al., 2021). Combining these items into a bundle standardized the process for determining infant eligibility and improving the transition to SSP (Rowe et al., 2016).

Barriers

Many barriers surround the need for SSP education due to changing recommendations and no national benchmark data regarding recommended goals for hospitalized infants in SSP (Paul, 2021). Ongoing recommendation updates can confuse healthcare clinicians and families, as consistent communication is necessary to deliver a safe sleep message (Colson et al., 2019). Staff compliance with recommendations is essential to successful implementation (Sacks et al., 2022). However, beliefs or confusion regarding recommendations can inhibit the portrayal of a consistent message from the staff (Gelfer et al., 2013; Moon et al., 2016; Salada et al., 2022).

Transitioning from therapeutic positioning to SSP can be delayed due to staff perception and beliefs concerning the comfort of the neonate, improved respiratory status, and risk of aspiration due to gastroesophageal reflux (Hwang et al., 2021; Naugler & DiCarlo, 2018; Paul, 2021). Gastroesophageal reflux is a common issue in infants in NICU, historical recommendations suggested placing an infant side-lying with their head-of-bed elevated, but new

studies refute this information (Goodstein et al., 2021; Hannan et al., 2020; McMullen, 2016; Rowe, 2016). Additionally, due to the limited handling of NICU patients, they are prone to conditions related to this positioning, like an altered head shape (positional plagiocephaly) which again leads to barriers in NICU clinician use of SSP measures as they seek to correct or prevent this occurrence (Goodstein et al., 2021). Supplying education and standardizing the process for healthcare clinicians improves their understanding and compliance with SSP measures which translates to improved parental compliance with SSP at home (Naugler & DiCarlo, 2018).

Economic and political forces can affect the message of safe sleep. Perceived conflict can arise with the encouragement of skin-to-skin and breastfeeding but the discouragement of bed-sharing (Colson et al., 2019). Education outlines to healthcare clinicians can decrease confusion and improve discussion points and problem-solving methods to aid parents/caregivers in blending all recommendations to ensure safe and healthy care at home (Colson et al., 2019; Gelfer et al., 2013; Moon et al., 2016; Paul, 2021; Salada et al., 2022). Financial barriers arise with the recommendations to reduce bed linens by encouraging sleep sacks (Colson et al., 2019). From the hospital perspective, replacing traditional swaddles with sleep sacks increases financial needs as the provision of sleep sacks comes at a cost and requires specific sizing for appropriate fit and ongoing purchases to replenish stock (Colson et al., 2019).

Summary

Communicating a consistent message to families regarding SSP must be a priority among healthcare providers in the NICU (AAPTFSIDS, 2016; Goodstein et al., 2021; Hwang et al., 2018; Moon et al., 2022; Paul, 2021). They can influence parent and caregiver perceptions of SSP, especially for infants who previously required therapeutic positioning (Colson et al., 2019; Moon et al., 2016; Moon et al., 2022). Consistent, relevant communication begins with staff and

provider education. Once clinically applicable, modeling SSP promotes post-discharge parent compliance with the safety recommendations (Moon et al., 2016). Staff education regarding SSP and its implementation in the clinical setting is essential to the safety initiative. Implementing a bundled SSP standard in the NICU would encourage the prospect of transitioning to SSP when the infant becomes eligible (Paul, 2021). The articles in this literature were classified as lower levels of evidence because their designs were quality improvement, case-control, and retrospective cohort based.

Rationale

Needs Assessment

A needs assessment with the project site facility director and clinical educator established the initial need for standardizing the SSP protocol and staff education within the facility. As the AAP revised its safe sleep recommendations in 2022, the project site desires to incorporate updated SSP into routine clinician education and practice.

Feasibility and Sustainability

Leadership within the project site fully supported implementing evidence-based practice (EBP) within the unit and providing care to NICU patients. All education materials were developed and provided for healthcare clinician participants. Identified unit champions supported participants during this initiative's initial implementation and will be integral to supporting the ongoing success after project completion. The educational materials developed for this project were uploaded to the facility’s online learning platform and are available for edits as new recommendations surface in the future. With education easily accessible, onboarding and continuing education are easier maintained by the DCT and champions.

Purpose and Specific Aims

This quality improvement project addressed the practice gap regarding NICU clinician knowledge-related implementation of evidence-based SSP. The gap was predicated on the lack of SSP education and outdated methods currently utilized by the hospital staff. Formal education developed for the NICU clinicians highlighted SSP and its application in the NICU. This project aimed to evaluate staff knowledge and facilitate awareness of their unit's behaviors towards SSP. The established aims sought to promote the appropriate application of SSP in the NICU and to impact the safety of infants in their home environment with improved staff modeling of a proper sleep environment for parents. The project aims were:

- improved NICU clinician knowledge and perceived behaviors of safe sleep practices noted from pre- to post-assessment
- one hundred percent documentation in the EMR of safe sleep implementation by the nursing staff within 48 hours of discharge home
- documentation of parent/caregiver education regarding safe sleep practice at home by NICU clinician at least within 48 hours of discharge home

Quality Improvement Model

In 1992, Langley et al. published the model for improvement, which provided a framework for developing, testing, and implementing changes and processes that lead to improvement. Moen eventually updated this guide in 1994, and the Institute for Healthcare Improvement (IHI) adopted it in 2006 (Agency for Healthcare Research and Quality [AHRQ], 2020.; Institute for Healthcare Improvement [IHI], 2023). The premise of this framework fits with the project as it allows for the management of rapid assessment and changes based on feedback to ensure the project's success.

The PDSA cycle (Plan-Do-Study-Act) articulates an interactive process for a small-scale, iterative approach to test interventions (AHRQ, 2020.; IHI, 2023). This cyclic process enables rapid assessment and flexibility to adapt change according to feedback to ensure aim-focused interventions are developed (AHRQ, 2020). The four steps of the PDSA cycle can be repeated as a part of a repetitious cycle of continual learning and improvement. One PDSA cycle was prepared for this project (Appendix A).

Methods

Design

A pre/post-education assessment was designed to evaluate the effectiveness of a quality improvement program for infant SSP in a NICU. Development and distribution of clinician education highlighting best practices and discussion tactics for improved parent/caregiver education performed by NICU staff. In addition to the assessment and education, a bundled approach to implementing SSP was introduced. An enhanced process for identifying infant eligibility to participate in SSP and improving staff compliance includes a bedside crib card, standard eligibility criteria, and topic inclusion into multidisciplinary rounds.

Setting

The project setting is a level III NICU in a 373-bed acute and skilled care facility, delivering approximately 1,500 babies annually. This facility services 11 counties, primarily rural, with a combined population of approximately 200,000 (World Population Review, 2023). The 20-bed level III Neonatal Intensive Care Unit at the project site has around 230 annual admissions. This unit is the only neonatal intensive care in the region, with the closest level IV being nearly 3 hours away. The facility's Neonatal Transport Team brings in approximately 30 percent of the NICU admissions. Most patients, 59%, are admitted due to prematurity, with

gestational ages ranging from 24 – 36 weeks. Approximately 45% of patients fall into the low-birth-weight category with weights below 2.5 kilograms at birth.

Community focus and improved community health also coincide with the organization's passion for improving health within the community through the vision of leading through clinical experience, compassionate care, and growth to meet the patient's needs. The improved health of the community would be reflected in the safe sleeping environment of the at-risk population in the neonatal intensive care unit, as this population was not initially acknowledged by the American Academy of Pediatrics' aim to establish safe sleep standards for all newborns. Improving the quality of a safe sleep environment demonstrates the organization's leadership vision through clinical experience and growth to meet patient needs.

Participants

The project's target participants for the assessment and education were the NICU clinicians (providers, nurses, and occupational therapists) who have direct contact with positioning infants and provide education to parents and caregivers. The total eligible staff was 43, consisting of 35 RNs, one neonatologist, four nurse practitioners, and three OTs. All the participants had the expectation set by their leadership to complete the education and established practice changes. Exclusion criteria for clinician participants pertained to those who could not complete the assessment and education during this project, such as those on leave or onboarding after the pre-assessment close date. Participant consent was assumed upon entry into the assessment link. Assessment participation recruitment occurred with flyers and e-mail notifications to the unit.

Additional participants included those undergoing chart review, including parents and infants who benefited from the improved SSP modeling and enhanced education provided by the

NICU clinicians. Parent participation was indirect as chart auditing was conducted to determine the receipt of safe sleep education. Also, the infants were screened for SSP eligibility and SSP transition pre-discharge. Infant participant exclusion criteria were limited to the infant's inability to participate in SSP when there was a transfer to higher-level care before achieving SSP or in the event of infant death. Medical conditions requiring positioning alternatively to SSP were not excluded.

Context

The root cause for NICU patients not attaining a safe sleep environment pre-discharge is the lack of a standardized practice and formal education for implementing SSP. Even with the AAP's recommendation on infant sleep, consistent recommendations rooted in science and research have yet to be stipulated. However, there are recommendations for healthcare professionals caring for women and infants to encourage safe sleep education to parents and caregivers (Moon et al., 2022; Moon et al., 2016).

The AAP recommendations originated in the 1990s but have since been updated to combat stagnate SUID rates and to become more comprehensive of all sleep-related practices (Healthy Children, 2021; Moon et al., 2022). At the time of the project implementation, the project unit had no standardized staff education, a guideline for implementing SSP, or a process for documentation. Additionally, the utilization of outdated parent/caregiver educational materials was recognized.

Stakeholders identified for this project included providers, nursing staff, occupational therapists, parents, other infant caregivers, and NICU patients. Additional stakeholders like leadership and third-party payers would benefit from improved unit practices and community adaptations for infant sleep practices. The unit’s adaptation to this process change depends most

heavily on the unit's Developmental Care Team (DCT), comprising the neonatologist, the clinical educator, six bedside RNs representing day and night shifts, and the therapists (occupational and speech). The DCT oversees the unit's implementation of quality improvement and EBP.

The stakeholders' overwhelming support and acceptance of evidence-based changes fostered positivity throughout the unit. Their willingness to adapt coincides with the organization's mission, vision, and values to improve coordinating care and health outcomes and enhance patient safety.

The anticipated project barriers identified were staff buy-in to SSP adaptations and the unit's perception and beliefs. NICU care focuses profoundly on developmental care aspects and therapeutic positioning. Great effort went into influencing habitual change and presenting the evidence clearly and concisely to facilitate ease in adaptation. Other perceived barriers included staff apprehension to change as process changes indicate workflow change. Moreover, perceptions and beliefs regarding the comfort of the neonate, improved respiratory status, and risk of aspiration due to gastroesophageal reflux (Paul, 2021) pose more obstacles to overcome.

Ethical Consideration/Permission

Ethical considerations with this project included HIPAA compliance and protection of participant information through deidentification. The assessment via Microsoft Forms ™ allowed participants to remain anonymous through deidentification upon entering the assessment by providing a four-digit code of their mother's birthday as a unique identifier. Chart audits were deidentified when the collected data was entered into an encrypted Excel ™ spreadsheet on a password-protected computer. Data stewardship was facilitated during assessments and chart audits data collection as all data was stored on a password-protected computer.

The project underwent Institutional Review Board (IRB) submission for the project site's oversight per their required IRB guidelines and the University of Louisville IRB. Approval from both institutional IRBs was received. The project was determined to be quality improvement, not human subjects research. The University of Louisville approval letter can be found in Appendix B.

Procedure

Before the project start date, e-mails were sent, and flyers were posted to the unit to introduce the project and event timeline; the same design was utilized for e-mail and flyer notifications (Appendix C). Conduction of a pre-education assessment, comprised of 20 questions as two subsets, occurred to evaluate the NICU clinician's knowledge and perceived unit behaviors of SSP. The pre-education assessment occurred over three weeks and utilized Microsoft Forms ™ for data collection. A quick response (QR) code was e-mailed to all 43 potential participants for ease of assessment completion.

The developed education was uploaded and provided via the facility's online learning platform and was allotted three weeks for completion. The education included SUID background information; national, state, and local statistics; the AAP recommendations for SSP per the AAP Task Force on SIDS (2022); the rationale of the recommendations; the barriers to safe sleep guidelines; and implementation strategies for the unit. Workflow adaptations were established and discussed in the education to streamline the intervention implementation phase.

The implementation phase occurred over five weeks. During this phase, providers incorporated SSP eligibility into multidisciplinary rounds and noted SSP in their daily notes to ensure SSP was acknowledged and implemented accordingly. Clinicians applied the education into their daily practice to determine infant eligibility to transition to SSP and adapt education to parents by integrating SSP rationales into parental teaching. In addition, crib card identifiers

(Appendix D) were placed at every eligible patient's bedside, indicating the SSP start date and the general SSP guidelines. The double-sided crib card was designed to serve as a reminder and talking point for parents and clinicians based on the infant's eligibility for NICU therapeutic positioning or SSP. The crib card was modeled after Hwang's (2018) implementation utilizing a two-sided card to display information indicating safe sleep and therapeutic positioning. The crib card design also incorporates the "ABCDs" of the Kentucky Safe Sleep Program, the AAP recommendations, and the unit's eligibility criteria.

Documentation of parent education and infant transition to SSP occurred congruently with the implementation. Bedside staff entered education documentation in the Safe Sleep education section of the EMR. The transition date to SSP was also entered into the EMR for patient positioning. Chart reviews were conducted to evaluate compliance with infant placement in SSP and documentation of parent education.

The post-education assessment concluded the project and occurred for three weeks. The post-education assessment utilized the same process (e-mail provided QR code and question template) as the pre-education assessment and was available via Microsoft Forms ™. Confidentiality and deidentification were maintained throughout the assessment collection with the use of the four-digit code (participant's mother's birthday). Responses were transferred from Microsoft Forms ™ to an Excel ™ spreadsheet on a password-protected computer. A codebook was created for data organization, and assessment demographic responses entered into the spreadsheet using the codebook: clinician's role (RN = 1, NNP = 2, MD = 3, OT = 4, Other =5), assigned shift (7a-7p = 1, 7p-7a = 2, 24-hour = 3, Other = 4), degree (Associates = 1, Bachelors = 2, Masters = 3, Doctoral = 4), and neonatal/newborn experience years (0-5 = 1, 6-10 = 2, 11-15 = 3, 16-20 =4, 21-25 =6, more than 25 =7). Pre- and post-assessment scores were entered as pre-

test total, pre-test knowledge, pre-test behavior, post-test total, post-test knowledge, and post-test behavior.

Chart-reviewed data entered into a codebook designed for this project included each infant's date of birth, birth gestational age, birth weight, corrected gestational age at SSP implementation, date infant achieved SSP eligibility, date SSP implemented, date education provided to parents, and discharge date. To ensure security and deidentification, each patient received a unique ID number based on their birth order. It was compared to the unit's census log to ensure the accuracy and completeness of chart audits. All data was entered into an Excel ™ spreadsheet on a password-protected computer.

The project's budgetary impact was minimal as the costs included a printout of flyers and crib cards with lamination. The facility incurred the cost of these items. Additional facility costs included participant time to complete the assessments and education. The projected future cost of this project involves onboarding processes and the potential investment in infant sleep sacks. Sleep sacks are a recommendation of the AAP as a measure to reduce loose linen in a bedspace and allow for ease of temperature control of the infant (Colson et al., 2019; Moon et al., 2022). Sleep sacks were not incorporated in this project due to the upfront cost and coordination for ensuring adequate supply was available for all participants. Costs incurred by the writer were in the form of time spent developing, implementing, and analyzing each aspect of the project. Refer to Appendix E for the project timeline.

Measures

The process measures for the project embrace education module completion by all NICU clinicians, crib card placement and use at infant bedsides, documentation of SSP initiation, and parent education. Outcome measures for the project encompassed improved clinician knowledge

noted from pre-assessment to post-assessment, improved clinician perceived behaviors noted from pre-assessment to post-assessment, and documentation of SSP implementation and parent education. The measures were monitored pre- and post-intervention in the following manner.

NICU clinician (RN and OT) completion of the education module was evaluated weekly, and information was pulled by the facility's education department, which regulates the online education platform. The education department provided weekly updates to the NICU educator, who relayed the percentage of completeness, allowing ample time to send reminders for completion before the pre-assessment deadline. Providers were sent the education module as they were not privy to the facility's online learning; verbal acknowledgment of education completion was obtained from the five providers. As all infants deserve the highest quality of safe care, the push to ensure all clinicians had completed the education was a priority.

Crib cards were printed, laminated, and distributed during the pre-assessment collection. During intervention implementation, rounding by the champions occurred thrice weekly to ensure the cards were visible at the bedside and correlated with the infant's placement. Chart audits also occurred during this time and until the post-assessment conclusion. Chart audit data collection occurred at least twice weekly, and the unit's logbook was integral for ensuring a correct and total count of infant charts were reviewed for documentation of SSP implementation and parent education. Chart audit data was entered into a codebook designed by the student to ensure all pertinent details were collected for evaluation; the codebook information can be found in the Procedure section.

Assessment completion monitoring was reviewed every seven to ten days to determine the number completed and compared to the anticipated participants. Reminders were sent via e-

mail weekly to ensure participation. The assessment was a voluntary portion of this project. Thus, mandatory completion from the unit was not enforced.

Instrument

A broad search was conducted for an instrument to assess clinicians on SSP. Several instruments focusing on parent/caregiver behaviors were available, but the search yielded little focus on clinicians. The lack of instrument availability led to a self-developed instrument for this project. This instrument, found in Appendix F, was developed in three parts to collect demographic data, assess general knowledge of SSP, and assess participants' perceived SSP behaviors within the unit. The demographic data collected includes the clinician's role, neonatal/newborn experience years, educational level or highest degree earned, and assigned shift. The general knowledge subset assessed areas around modeling SSP, NICU cultural norms, positioning, and environmental safety. The perceived behavior subset sought to assess clinician perception of their practices for safe sleep by evaluating their intention to model SSP, cultural inclusion of recommendations, and infant eligibility for SSP. Moreover, the instrument was designed to incorporate aspects of the AAP's SSP recommendations and the Kentucky Safe Sleep Campaign mnemonic "ABCDs of safe sleep" (Kentucky Department for Public Health, 2019; Moon et al., 2022). Due to the nature of the self-developed instrument, no validity or reliability data is available, and subsequent evaluation of the pre/post assessment samples is unable to have validity or reliability conducted.

Scoring

The instrument knowledge portion incorporated ten true or false questions where participants received a percentage score for the number of correct responses. The lowest score in the knowledge subset is 0, with a maximum score of 10. The instrument's perceived unit

behavior subset included ten questions requiring responses on a 4-point Likert scale with the responses of always, usually, sometimes, and rarely. For ease of data analysis, each response was assigned a value as follows: always (4), usually (3), sometimes (2), and rarely (1). One question worded negatively required a reverse score response. In the second subset, the lowest possible score is ten, and the highest is 40. The total cumulative score for the instrument's knowledge and behavior subsets has a minimum of 10 and a maximum of 50; A higher score indicates a higher level of safe sleep knowledge and applied behavior in practice.

Data Analysis

Deidentified assessment information collected via Microsoft Forms ™ was extrapolated and transferred to an Excel ™ spreadsheet for demographic and statistical analysis of the pre-and post-education assessment. Demographic data is described using descriptive statistics and reported in percentages. The most recent version of SPSS 29™ was used to conduct inferential statistical analysis using two-tailed paired samples *t*-tests for a comparative analysis of means from the instrument's pre-and post-education assessment for the totality and each subset. The significance of the analysis was set at $p = .05$. The quantitative data collected is discussed in the results section.

Demographic information from chart reviews was collected, deidentified, and then placed into an Excel ™ spreadsheet. The information collected included the infant's date of birth, birth gestation, birth weight, corrected gestation upon transition to SSP, the date the infant achieved SSP eligibility, discharge date, length of stay, and parental education receipt. This information is described using descriptive statistics and reported in percentages.

Evaluation of Process

Online tracking for assessment and education facilitated the data collection and analysis process. With their logbook, the project site ensured all infants were accounted for by providing a reference to deidentify and ensure the accuracy of the chart audit sample. The use of Microsoft Forms ™ also allowed for ease of data collection and ensured completeness of and pairing assessments at project completion.

The relatively small paired sample size poses a potential problem in translating the statistical analysis of the assessment results to a larger scale. An additional barrier was the data collection for education completion, as the responsibility of the task was placed on others to conduct auditing to ensure completion.

Results

Assessment Participant Demographic Data

The NICU staff and providers were notified to complete the assessments and education through e-mail and unit flyers. Initial anticipation for clinician participation was 40; however, with turnover and FMLA, this concluded with 43 clinicians eligible to participate in the assessments. Forty-one (95% of total clinicians) clinicians participated in the education, pre-assessment, and post-assessment. In the totality of 41, most clinician participants were registered nurses (76%, *n* = 31), held bachelor's degrees (66%, *n* = 27), and worked the 7p to 7a shift (34%, *n* = 14). Of the 41 participants, 13 completed both the pre-and post-education assessment and will be defined as the paired pre/post sample. Comparable to the totality pre/post sample, the paired pre/post sample were majority nurses (69%, *n* = 9), held bachelor's degrees (46%, *n* = 6), and worked 7p to 7a shifts (62%, *n* = 8). Participant demographic data of healthcare clinician assessment samples for the total and paired pre/post samples are described in Table 1.

TABLE 1

Demographic Data of Healthcare Clinician Assessment

	Total Pre/Post Sample (N = 41)		Paired Pre/Post Sample (N = 13)	
	n	%	*n*	%
Role				
RN	31	76	9	69
NNP	4	10	2	15
MD	1	2	1	8
Occupational Therapy	2	5	1	8
Other	3	7	0	0
Shift				
7a – 7p	17	42	3	23
7p – 7a	14	34	6	46
24-hour shift block	5	12	3	23
Other	5	12	1	8
Degree				
Associates	3	7	1	8
Bachelors	27	66	8	62
Masters	10	24	3	23
Doctorate	1	3	1	8
Years experience				
0-5	11	27	3	23
6-10	13	32	3	23
11-15	10	24	5	33
16-20	2	5	0	0
21-25	4	10	1	8
More than 25	1	2	1	8

Assessment Results

The pre-assessment had 33 participants (77% of total clinicians), and the post-assessment had 21; 13 completed pre and post. There were no incomplete pre or post-tests collected. A paired samples *t*-test was conducted to compare the means of the two groups for the paired pre/post sample. The following statistical analysis is in Table 2. The average pre-assessment score for the paired pre/post sample was 41.5 (*SD*=2.933), with an average post-assessment score of 43.31 (*SD*=2.106). For reference, the scoring range was a minimum of 10 to a maximum of 50. Although there was an increase in the scores, the results did not indicate a significant

difference [*t* (12) =-1.84 *p*=.091]. Additionally, paired samples *t*-tests were conducted on each subset of the assessment (Knowledge and Behavior). Both subset results indicated no significance with both Knowledge [*t* (12) = -1.76 *p* =.104] and Behavior [*t* (12) = -1.686 *p* =.118] subsets.

Table 2

Paired Samples t-tests Mean Comparison of Paired Pre/Post Sample

	Mean		*N*	Std. Deviation		Std. Error Mean		Significance
	Pre	Post		Pre	Post	Pre	Post	Two-Sided *p*
Total	41.54	43.31	13	2.933	2.016	.813	.559	.091
Knowledge	9.31	9.62	13	.630	.506	.175	.140	.104
Behavior	32.15	33.62	13	2.703	1.938	.750	.538	.118

Education placed into the online learning format was assigned to 36 staff of RNs and OTs. The five providers were provided education in PowerPoint format with verbal communication of their completion. 100% (*N* = 41) of the education modules were completed.

Patient Demographic Baseline Data

Before project implementation, 35 infants were admitted to the NICU during the baseline data collection; two infants were deemed ineligible for their data due to subsequent transfer to another facility within the first day of life. With a mean completed gestation of 36 weeks, 58% (*n* = 19) were in the 37 weeks gestation and up category. These 35 infants were admitted during the first six weeks of the year.

Data collection for the project implementation phase began on February 22, 2023. Twenty-five admissions to NICU occurred during implementation, and 23 were eligible for data collection. The two exclusions were due to a transfer to a higher level of care prior to achieving eligibility for SSP participation. The 23 eligible NICU patients for chart review during implementation had an average completed gestation of 34 weeks, which coincides with the

majority of patients being 34 weeks of completed gestation and under at 39% (*n* = 9). Refer to Table 3 for demographic data for baseline and implementation infant groups characteristics.

Table 3
Demographic Characteristics of Chart-Reviewed Infants

	Baseline (*N* = 33)		Implementation (*N* = 23)	
	%	*n*	%	*n*
Gestation at birth				
37 weeks and up	58	19	26	6
34 weeks to 36 weeks	33	11	35	8
Less than 34 weeks	9	3	39	9
Birth weight				
2.5 Kg and above	67	22	48	11
1.5 Kg to 2.499 Kg	33	11	30	7
Less than 1.5Kg	0	0	22	5

Chart Review Results

For baseline data, retrospective data collection was assessed to determine when infants were placed in SSP. Data collection occurred over six weeks. The baseline data collection analysis revealed that 18% (*n* = 6) achieved safe sleep within two days of discharge, and 33% (*n* = 11) had documentation of parental receipt of safe sleep education at least two days before discharge. Descriptive data for SSP implementation and parent education is found in Table 4.

A chart review conducted for education documentation during implementation revealed an improvement, with staff achieving 70% (*n* = 16) documentation compliance compared to 33% (*n* = 11) during baseline data collection. There was also a noticeable improvement in parent education for younger gestational ages, as demonstrated in Table 4.

Table 4

Education and SSP Baseline and Implementation Data

	Baseline (*N* = 33)		Implementation (*N* = 23)	
	%	*n*	%	*n*
Education received at least two days before discharge				
Total (all gestations)	33	11	70	16
37 weeks and up	37	7	50	3
34 weeks to 36 weeks	55	6	75	6
Less than 34 weeks	33	1	78	7
SSP implemented at least two days before discharge				
Total (all gestations)	18	6	100	23
37 weeks and up	16	3	100	6
34 weeks to 36 weeks	18	2	100	8
Less than 34 weeks	33	1	100	9

Note. SSP = Safe Sleep Practice

During the implementation phase, a chart review of the placement of babies in SSP revealed that 100% (*n* = 23) of babies were placed in SSP at least two days before discharge. This was an improvement from baseline data collection in which only 18% (*n* = 6) of babies were placed in SSP before discharge. The entire surveyed population achieved 100 % (*N* = 23) SSP placement within two days of discharge, thus allowing ample time for staff to model SSP to parents and allowing habituation of the baby for home sleeping practices. Reviewing the gestation at which each baby was placed in SSP, it was determined that babies had been placed in SSP an average of 2.6 days after they achieved eligibility and averaged being in SSP for 11.2 days before discharge. There were no modifications required during the project implementation. Refer to Table 5 for sample data for the average days to achieve safe sleep pre-discharge and days placed in SSP after eligibility is achieved.

Table 5

Sample Data for Average Days to Achieve Safe Sleep Pre-Discharge

	Baseline	Implementation
Average number of days baby placed in SSP pre-discharge		
Total	0.7	11.2
>37 weeks gestation at birth	0.7	7.1
34 to 36 weeks gestation at birth	0.6	11
< 34 weeks gestation at birth	1.6	13.8
Project Goal: Placement achieved at least days before discharge		
Number of days baby placed in SSP after eligibility achieved		
Total	7.3	2.6
>37 weeks gestation at birth	4.9	0
34 to 36 weeks gestation at birth	8.5	2.2
< 34 weeks gestation at birth	18.3	5.2

Discussion

Summary

Any healthy infant needs to be placed in a safe sleep environment as recommended by the AAP, but just as imperative is the transition to safe sleep for babies in the hospital setting (AAPTFSIDS, 2016; Moon et al., 2022). Parents mimic observed behaviors; thus, encouraging the modeling of safe sleep environments by healthcare clinicians is a vital risk reduction measure (Naugler & DiCarlo, 2018). This project evaluated staff knowledge and facilitated awareness of their unit's behaviors towards SSP. These aims were established to promote the appropriate application of SSP in the NICU and to impact the safety of infants in their home environment with improved staff modeling of a proper sleep environment for parents.

The NICU populace of premature, low-birth-weight, and ill infants are at greater risk of SUID post-discharge (Moon et al., 2022; Sacks et al., 2022). Further validating that modeling safe sleep and encouraging parental use of safe sleep environments is essential to reducing the SUID rate in the NICU population. It has been discussed how sleep practices in NICU are contrary to home care as NICU interventions are necessary to treat medical conditions

(Goodstein et al., 2021). However, as a baby's condition improves, the transitional eligibility to a safe sleep environment is not easily determined. The results of this project are favorable in that education coupled with a bundled approach (crib card, multidisciplinary rounds, and policy) improved clinician determination for infant transition to SSP, and the project's specific aims were appropriately achieved.

Interpretation

The assessment results show NICU clinicians' knowledge and behavior practices increased during implementation. Furthermore, staff and providers displayed a positive attitude during the transition. They readily embraced the changes demonstrated anecdotally by using the crib card reminders in the room and the provider's incorporation of safe sleep expectations in their notes and during rounds. The chart review data further confirmed improvement as families received education on sleep practices sooner and modeling of SSP occurring well before discharge ensuring adequate time for baby and parents to adjust.

The unit leaders, namely the DCT and nurse educator, promptly recognized the necessity of establishing a standardized guideline for gestational age and weight in addition to medical stability when implementing SSP. The themes of the literature review were well-defined (staff education, role modeling, bundle approach to implementation, and common barriers) and thoroughly vetted to ensure the success, feasibility, and sustainability of this initiative.

As a result, a specific policy on SSP for the unit was developed. Although the suggested transition criteria for a baby to SSP is a gestation of 32 and a weight of 1500 grams once medically stable, the policy for this facility was established to promote and ensure compliance with SSP. The unit policy encourages considering a medically stable infant at 32 weeks and weighing 1500 grams for SSP. However, it indicates that all infants at 34 weeks and weighing

1800 grams must be placed in SSP if medically stable. Medical stability is discussed during multidisciplinary rounds and indicated on the bedside crib cards (Appendix D). This process was adapted to ensure staff compliance based on the average acuity and population of the project's unit.

Reflecting on the anticipated facilitators, the overwhelming acceptance of the staff and leadership further augments the success and sustainability leading to a unit cultural change in practice and the anticipated impact within the region. The project site's county has one of the highest SUID rates in Kentucky, and this initiative will hopefully show a regional impact on reducing SUID cases.

Overall, the cost of educating staff is worth the payoff. Improving clinician application of SSP through improved knowledge, their ability to model SSP, and educating parents will impact the community through improved home sleep practices. The project intended to keep costs low for initial adaptations by not incorporating costly items beyond the initial clinician education costs. Future cost incurrence comes from onboarding, continuing education, and updating materials with recommendation changes.

Limitations

The most significant limitation of this project was the timeframe for completion of the education and intervention. Having a limited time narrowed the amount of change that could occur successfully. However, this was factored into the feasibility and sustainability of creating change, and conclusion discussions with leadership incorporated ongoing recommendations to PDSA and adaptations to thoroughly incorporate developmental care into NICU SSP. These would include adaptations for NICU-specific problems like ensuring appropriate head

positioning to promote adequate infant neck range of motion due to bed placement in a NICU room.

Anticipated barriers and limitations for this project focused on the culture change of the unit as NICU is heavily rooted in developmental care and positioning that is not congruent with SSP (Naugler & DiCarlo, 2018; Paul, 2021). Thus, creating culture change in NICU to envelope safe sleep can be challenging (Goodstein et al., 2021). As anticipated, staff hesitation from all disciplines was present in the beginning. However, that improved as staff understood the intention of the education, process, and subsequent policy induction. By the project's conclusion, the staff adopted SSP into their daily routine and continued using crib cards and positioning awareness.

The overall size of this unit posed some limitations in participation with pre/post assessments as the smaller size left broader variables for FMLA and turnover. The rural area has minimal population diversity, which may hinder translating the message appropriately in in-frequent situations. This poses a risk for an incongruent SSP message as experts indicate disparities in SUID based on race and socioeconomic status.

With the primary focus of this project being clinician education and modeling SSP, translating this project to another unit or setting would be conducive. Adaptations beyond this project site would require a review of normal unit culture and patient population as the main areas of focus prior to running multiple PDSA cycles.

Although the literature review indicated algorithms and education are beneficial and enhance consistency of practice, establishing clear guidelines reduces confusion for those who fall within a gray area of care. For this project, policy development with clear indicators for eligibility aided in eliminating clinician confusion about infant eligibility to transition to SSP.

Conclusion

Transitioning infants to a safe sleep environment is a priority health concern. SSP is a risk-reduction measure endorsed by the AAP, U.S. Department of Health and Human Services (2022), *Healthy People 2030* initiatives, and other leading experts in infant care. Healthcare clinicians are pivotal in advocating and affecting this change among parents. Developing a standardized approach to determining eligibility and implementing safe sleep in a timely fashion will emphasize to parents the importance of safe sleep recommendations and their use at home (AAPTFSIDS, 2016; Goodstein et al., 2021; Moon et al., 2022; NIH, 2021).

The DCT will assume the sustainability of practice changes for this project as it focuses on the unit's quality improvement and EBP implementation. Presently, the initiative is up-to-date with recommendations as the latest from the AAP released in 2022. However, the DCT will continue monitoring updates and adapting the policy, education, and practices as necessary. The project will continue adapting recommendations into practice by performing a second PDSA. This additional cycle enlists further adjustments to NICU SSP by addressing the need for head adjustments to prevent torticollis and monitor for outliers in eligibility.

Potential for use in other contexts has been discussed for this site. Implementing this initiative in the newborn nursery is the next best approach to improving SUID rates in the project county. The framework to reproduce this project within the facility was developed, is available, and can be redefined to support the changes necessary to implement this project on another unit. Further replication in larger units would be prudent as identification and early transition to SSP is essential to decreasing SUID risk for this vulnerable population. There need to be more general guidelines to standardize when SSP should be implemented in a NICU setting by healthcare leaders like the AAP. However, improving patient safety outcomes by reducing

practice inconsistencies lessens staff frustrations and parent stress when preparing a child for discharge.

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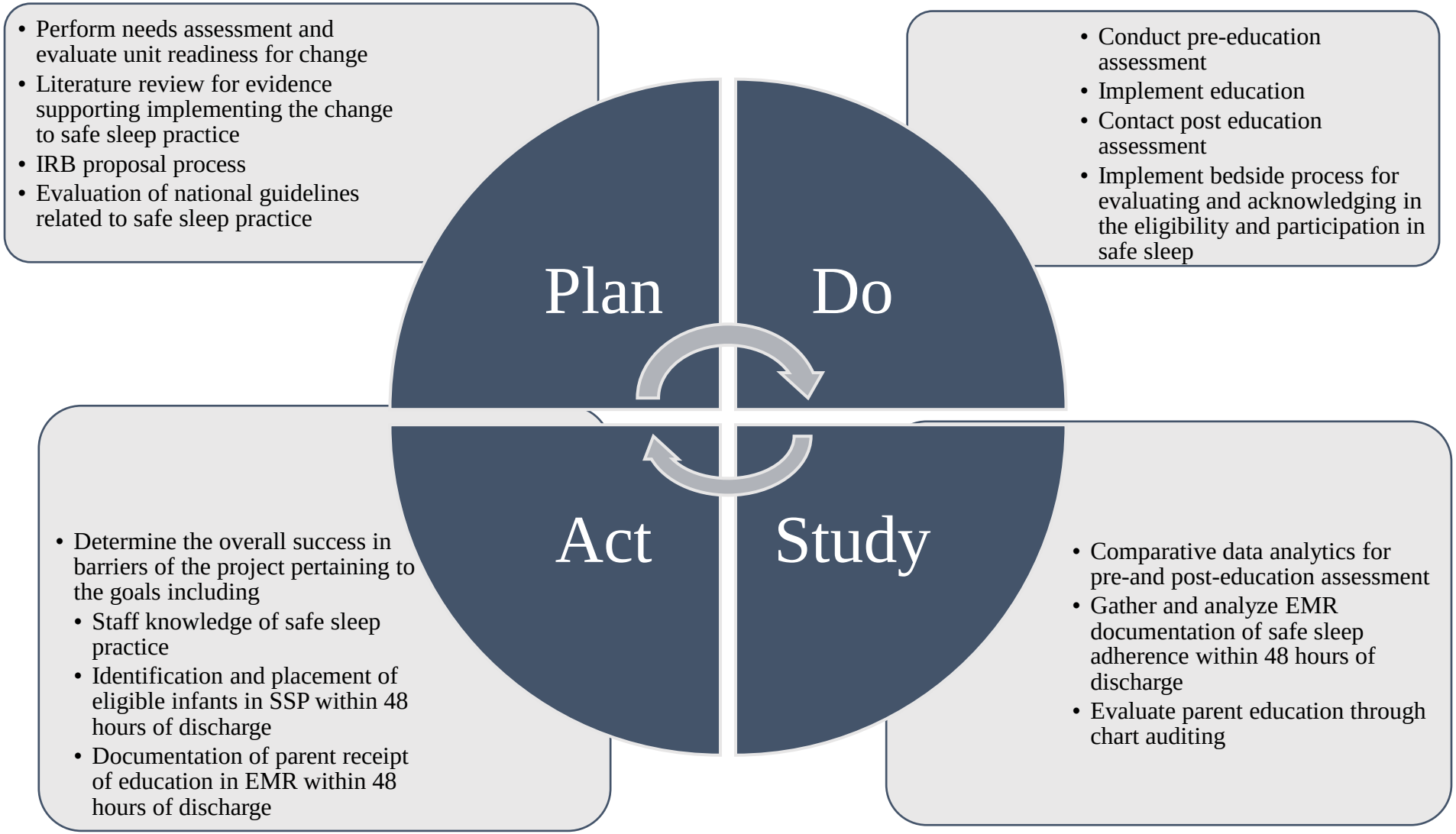
APPENDIX A

Project Framework: PDSA Cycle



APPENDIX B

The University of Louisville IRB Approval

University of Louisville

Human Subjects Protection Program Office
300 East Market Street, Suite 380
Louisville, Ky 40202
P: 502. 852.5188 E: hsppofc@louisville.edu

DATE:	December 11, 2022
TO:	Lela A. Baker
FROM:	The University of Louisville Institutional Review Board
IRB NUMBER:	22.1027
STUDY TITLE:	**A Quality Improvement Project: Implementing Safe Sleep Practice in a NICU**
REFERENCE #:	756900
DATE OF REVIEW:	12/10/2022
CONTACT:	Sherry Block 852-2163 slbloc04@louisville.edu Sent by Cathy J. Carter, cathy.carter@louisville.edu

An IRB Vice-Chair has reviewed your submission. The project described does not meet the "Common Rule" definition of human subjects' research. The IRB has classified this project as Non-Human Subjects Research (NHSR). The project can proceed.

This submission has been determined to be quality improvement, and not human subjects research, based on the goal(s) stated in the protocol.

Institutional policies and guidelines on participant privacy must be followed. If you are using protected health information, the HIPAA Privacy rules still apply.

Any changes to this project or the focus of the investigation must be submitted to the IRB to ensure that the IRB determination above still applies.

Amendments for personnel changes or study closures are not required.

Thank you,

Paula Radmacher, Ph.D., Vice Chair, Biomedical Institutional Review Board

We value your feedback; let us know how we are doing: https://www.surveymonkey.com/r/CCLHXRP

APPENDIX C

Flyer and e-mail

NICU Safe Sleep Project

- **January 17 – February 6** Pre-education Assessment
  (Microsoft Forms ™ link will be sent via e-mail)
- **January 30 – February 19** Education on Develop You
- **February 22 – March 31** Implementing process change
- **April 1 – April 22** Post-education Assessment
  (Microsoft Forms ™ link will be sent via e-mail)

Supine sleep is the safest home sleep position!

APPENDIX D

Crib card

NICU Therapeutic Positioning

Evaluate for readiness to start safe sleep protocol

Who	How

• Respiratory: tachypnea, retractions, grunting,
  ○ O2 dependency
  ○ O2 device (BCPAP, Vapotherm, NC) other than home oxygen requirement (wall O2 setup)
• Gestation less than 32 weeks
• Phototherapy
• Scalp IV or central line
• NAS on treatment
• Lack of handling d/t social reasons (address as necessary)
• Medical condition requiring side-lying or prone positioning
	• Positions used other than back:
	  ○ Stomach
	  ○ Side-lying
	  ○ Elevated head-of-bed
	• Developmental positioning aids and/or blanket rolls may also be used for medical purposes.

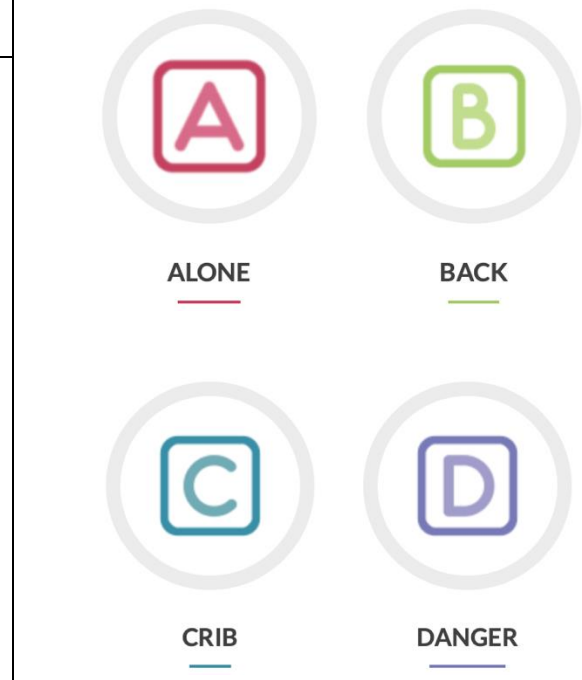
Therapeutic positioning is NOT recommended or safe for home sleeping.

Safe Sleep

American Academy of Pediatrics

- Back to sleep
- Firm, flat mattress
- NO sleeping in a swing or car seat
- NO soft objects in the bed
- NO positioners
- NO hat, do not overheat

SAFESLEEP KENTUCKY

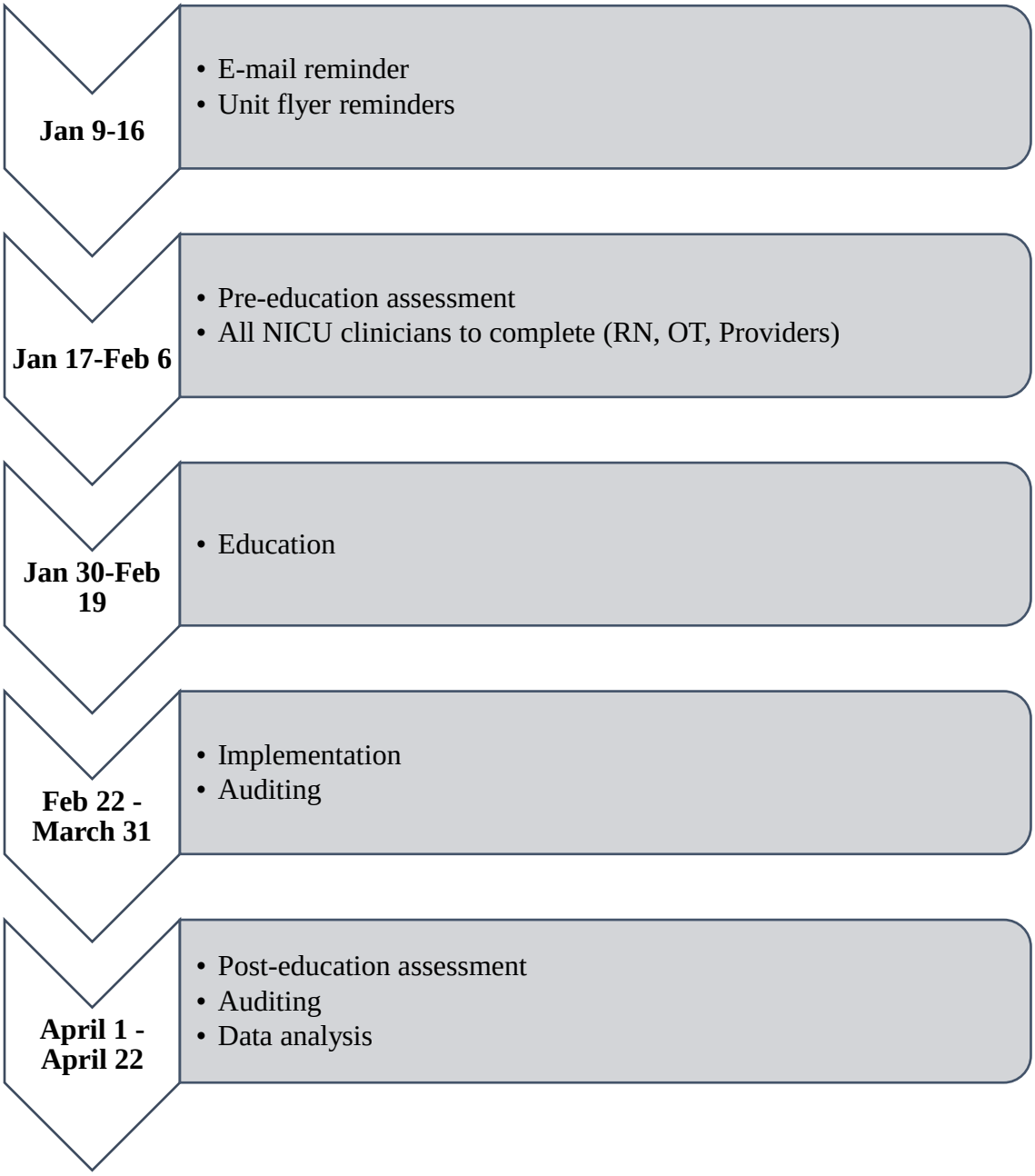


SSP initiated (date): _____

Parent education provided (date): _____

APPENDIX E

Project Timeline



APPENDIX F

Self-developed Instrument

NICU Safe Sleep Practices

Participants mother's date of birth (4 digits): _____

Role: RN_____ MD_____ NNP_____ OT_____ Other_____

Shift: 7a-7p_____ 7p-7a_____ 24 hours_____ Other _____

Highest level of education: Associates_____ Bachelors_____ Masters_____ Doctorate_____

Years of experience in NICU/NBN: 0-5____ 6-10____ 11-15____ 15-20____ 21-25____ >25____

Knowledge

Please respond to the following questions true or false.

1. I can influence my parent/caregiver's decisions regarding safe sleep practices by modeling and educating them about safe sleep.
2. It is safe to place babies in a swing for sleep.
3. Babies should not have pillows or other sleep positioners unless medically indicated.
4. Room-sharing and bed-sharing are defined the same.
5. Commercial cardiac monitors such as Owlet™ are not recommended as protective measure against SUID/SIDS.
6. Reflux can be prevented by using prone/belly or side0lying positioning.
7. A consistent message from healthcare clinicians is important to change the attitudes and perspectives of parents/caregivers regarding safe sleep practices.
8. The appropriate time to delivery SUID risk-reduction recommendations to parents is at discharge.
9. A consistent message from healthcare clinicians is important to change the attitudes and perspectives of parents/caregivers regarding safe sleep practices.
10. Protective measures for SUID reduction include breastfeeding, routine immunization, and appropriate prenatal care.

Behavior

Please answer the following questions with always, sometimes, rarely, and never.

1. I initiate safe sleeping practices as soon as a baby is clinically stable.
2. I educate parents/caregivers on safe sleeping practices before discharge – including supine sleeping, alone in their crib, and no soft objects in the crib.
3. How likely are you to encourage different sleep spaces in the same room? (Room-share but not bed-share)
4. I routinely assess if my patients are in safe sleep environment.
5. How frequently do you encounter families with cultural practices that contradict safe sleep practices?
6. How often does safe sleep practice being within 48 hours of discharge?
7. I consider safe sleep practices to hinder providing care in the NICU.
8. I feel this unit adequately implements safe sleep practice as recommended by the American Academy of Pediatrics.
9. How likely are you to elevate the head of an infant with reflux?
10. How often do you place infants in a swing/bouncer for upright positioning during sleep?