# Nursing Bundle to Improve Infant Safe Sleep in the Pediatric Emergency Department

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## Abstract

**Problem:** In a large urban pediatric emergency department (PED), visual inspections of rooms revealed that only 27% of patients younger than 1 year adhered to the American Academy of Pediatrics (AAP) safe sleep recommendations. These guidelines outline safe sleep practices for infants to prevent sudden unexpected infant death (SUID), a leading cause of infant mortality in the U.S. Infants in unsafe sleep environments face an increased risk of injury and SUID during their hospitalization and after discharge, highlighting the necessity for healthcare staff to model safe sleep practices.

**Purpose:** The aim of this DNP project was to implement an evidence-based nursing bundle in the PED to improve infant safe sleep practices.

**Methods:** The implementation period lasted for 15 weeks, from September to December 2024. The bundle included nursing education, visual cues and reminders, promotion of sleep sacks, and standardization of nursing documentation. Education was shared with the PED nursing staff through email and in-services. Chart audits were conducted for all infants in the PED to monitor the documentation of sleep practices and education. Visual room audits were regularly performed for infants in the PED to evaluate sleep practices using a sleep score.

**Results:** Visual audits revealed an average sleep score of 2.11 out of 4, with inconsistent scores throughout implementation, ultimately showing declines toward the project's end. Most patients were found in a supine position with the head of the bed flat; however, only 32.3% of infants were placed in a crib or bassinet despite availability, and just 41.9% of infants were left alone, with blankets being the most frequently found additional item. Documentation rates averaged 22%, with 74.5% of all infants eligible for inclusion. Sixty-one percent of the staff received in-person education.

**Conclusions:** The bundle demonstrated partial success in achieving the desired outcomes. Sleep scores were variable, decreasing toward the end of the project, likely due in part to increased unit acuity and volume, but peaked following enhanced staff education. Documentation rates remained stable and largely unchanged throughout the project. The results indicate a need for ongoing re-education, increased visual audits and crib cards, optimized workflows, and the acquisition of additional sleep sacks.

# Nursing Bundle to Improve Infant Safe Sleep in the Pediatric Emergency Department

## Problem Description

Sudden unexpected infant death (SUID) is a leading cause of death among US infants, and significant health disparities exist among American Indian, Black, and Hawaiian Native/Pacific Islander infants, as well as those in lower-income states and cities (Centers for Disease Control & Prevention, 2023). As most instances of SUID are sleep-related (AAP, 2023), these deaths are largely preventable by following safe sleep recommendations. The AAP developed evidence-based guidelines for safe infant sleep to reduce the risk of SUID, which include placing all infants under 1 year of age on their backs on a crib or firm surface, alone, with the bed's head flat during every sleep, including when in the hospital (Moon et al., 2022).

Baseline internal data from visual room audits of an urban pediatric emergency department (PED) indicated that only 27% of infants were placed in a safe sleep environment that meets AAP recommendations. Parents of hospitalized infants are more likely to position their infant in the sleep positions modeled by healthcare staff (Brenner et al., 1998), and many infants who died from SUID had recent contact with healthcare staff prior to their death (Salada & Badke, 2022). This underscores the vital importance of modeling and encouraging safe sleep practices by staff at every healthcare encounter. A significant portion of the population served at this site includes inner-city, low socioeconomic status, and racial minority patients, further amplifying health disparities when safe sleep practices are neither adhered to nor modeled.

## Specific Aims

The aim of this DNP project was to increase rates of safe sleep practices in the PED as recommended by AAP guidelines. A root cause analysis revealed that the PED is a fast-paced unit with high patient volume and acuity, making adherence to preventative measures challenging (Appendix A). Staff often report difficulties in engaging parents in safe infant sleep discussions, and there is no standardized safe sleep policy or documentation strategy for the unit. Additionally, cribs and bassinets can be hard to find when needed, and current workflows may hinder implementation even when appropriate sleep surfaces are available.

**Available Knowledge**

A literature review was conducted using PubMed to identify articles addressing safe sleep and behavior change strategies (Appendix B and C). Twenty-four articles were screened, and seven were selected for inclusion, with eight additional articles added after searching the references of other articles. Each article was appraised, and the findings were synthesized (Appendix D and E), including two level I articles, one level II, five level III, and seven level V (Dang et al., 2022).

The evidence gathered supports the use of visual cues and reminders in hospitals, such as crib cards and educational posters, to enhance patient safety and quality of care. This includes increasing adherence rates to safe sleep guidelines among families and staff (Caris et al., 2018; McCarthy et al., 2019; O'Shea et al., 2022; Uduwana & Nemerofsky, 2020; Leong et al., 2020; Sleutel et al., 2018; Kellams et al., 2017; Paul, 2022; Uduwana & Nemerofsky, 2020; Sleutel et al., 2018). Furthermore, changes to electronic medical records (EMR) can enhance documentation rates and quality, as well as staff adherence to guidelines, including safe sleep (Bunting & de Klerk, 2022; McCarthy et al., 2019; Kaiser et al., 2019; Salm & Yasin, 2022; Bunting & de Klerk, 2022; Kaiser et al., 2019; Kellams et al., 2017; O'Shea et al., 2022; Paul, 2022; Uduwana & Nemerofsky, 2020). Access to sleep sacks has also been shown to improve adherence to safe sleep recommendations among both staff and families (Shaikh et al., 2022; Paul, 2020).

Additional evidence supports the use of strategies and tactics such as audit and feedback, pre- and post-education quizzes, email reminders, paper checklists, and weekly compliance reporting to enhance healthcare provider adherence to guidelines and safe sleep practices (Geary et al., 2022; Bunting & de Klerk, 2022; McCarthy et al., 2019; Shaikh et al., 2022; Paul, 2020; Leong et al., 2020). Evidence also supports face-to-face family education to improve parental intent to follow safe sleep recommendations (Ellis et al., 2022). This QI project implemented a bundle of EMR changes, visual cues and reminders, infant sleep sacks, and staff education, incorporating additional evidence-based tactics throughout the project.

### Rationale

The Promoting Action on Research Implementation in Health Services (PARiHS) framework (Appendix F) illustrates the interactions between evidence, context, and facilitation of knowledge translation by emphasizing the significance of the specific setting and methods for implementation alongside the best available evidence. PARiHS was utilized to guide this DNP project during planning and implementation by concentrating on broad and varied organizational changes, rather than merely altering individuals' behaviors. Changes to the EMR addressed the need to standardize documentation for ease of use and tracking while underscoring the integration of evidence into the workflow through visual cues, reminders, and sleep sacks designed to simplify implementation for staff. These interventions aim to eliminate existing barriers to enhance the likelihood of adoption at the site.

## Methods

### Context

The project site was a 28-bed, level 1 pediatric emergency department and trauma center affiliated with a large, well-respected academic institution in a densely populated urban area of a mid-Atlantic city. The unit featured a multidisciplinary team comprising nursing staff, physicians, advanced practice providers, child life specialists, respiratory therapists, and social workers to serve a diverse patient population aged 0-21 years with various mild to immediately life-threatening conditions. Sleep practices were generally assessed and managed on the unit by registered nurses (RNs) with support from nursing staff. The RNs had a mix of experience and were primarily bachelor-prepared, with a small percentage holding associate or master's degrees.

The Organizational Culture Assessment Questionnaire was employed to evaluate the site culture prior to implementation, aiming to identify barriers and strengths that can support the project's success. The assessment revealed that staff often understand what is expected of them; however, the reasoning behind these expectations is not always entirely clear, which can lead to dissatisfaction with changes. This underscores the necessity of communicating the rationale for changes to staff. Furthermore, it was found that staff are committed to achieving the best outcomes for their patients, necessitating education focused on reducing risk to patients. The assessment emphasized the significance of collaboration at the site, which was enhanced by including all PED nursing staff in the intervention. Interventions, such as education and reminders, aimed to boost staff satisfaction and confidence. It was crucial that these interventions did not increase the existing workload but instead leveraged current resources, including support staff and existing workflows. The current and desired processes were mapped out to visualize the workflows (Appendix G, figures G1 and G2).

## Interventions

Interventions included making changes to the EMR, disseminating visual reminders throughout the unit, highlighting the nursing staff's use of existing infant sleep sacks, and enhancing nursing education. Structure, process, and outcome goals, along with a clear timeline, were established to guide implementation over 15 weeks in fall 2024 (Appendix H). The structural goals prior to the project's implementation involved modifying the EMR and creating visual cues/reminders (such as crib cards and computer signage) for parents and staff in the PED. The project lead (PL) facilitated the EMR changes to modify existing Epic workflows utilized by PED nursing staff, enabling simplified and standardized infant safe sleep education and practice documentation by incorporating check boxes in various documentation areas (Figure I1). The distribution and use of infant sleep sacks were incorporated into the EMR during these documentation changes. Visual cues and reminders, such as crib cards (Figure I2) attached to all unit cribs and bassinets, as well as computer signage (Figure I3) on all unit nursing station computers, were developed by the PL. Strategies like collaboration and staff input were employed to ensure adequate buy-in and achieve the success of the structural goals.

Process goals included providing in-person education to 100% of nursing staff in the PED about the project interventions and ensuring that 100% of eligible infants under 1 year of age in the PED received EMR documentation of safe sleep practices and/or family education by the project's completion. Staff were educated by the PL through email, a new hire lecture, and unit in-services, where staff were reminded of safe sleep practices and project interventions and expectations. Strategies to achieve these goals included targeted staff feedback and identifying unit champions. The outcome goal was to have 100% of eligible sleeping infants under 1 year of age in the PED found in a safe sleep environment during visual audits by the end of the project. Strategies for achieving this goal included strong leadership support for project objectives and frequent staff feedback. Eligible infants were defined as PED patients under 1 year of age who were not involved in active resuscitation or treated in the hallway or waiting room throughout their care, and who had an RN assigned to them during their stay.

**Measures**

The goals of EMR modification and the creation of visual cues/reminders were each measured for one-time completion via yes/no by the PL. Staff education rates were assessed by the PL using an audit tool (Figure J1) and represented as the number of nursing staff educated divided by the total number of nursing staff employed in the PED. Safe sleep documentation rates were measured weekly by the PL using documentation audits (Figure J2) and expressed as the number of eligible infants with any documentation of safe sleep practices or education divided by the total number of eligible infants.

Infant safe sleep data was quantified as a sleep score based on the number of safe sleep criteria met (in a crib, alone, supine, head of the bed flat). This was evaluated using a visual audit tool (Figure J3) and represented as the sleep scores for each eligible audited infant divided by the total number of eligible audited infants, resulting in a weekly average sleep score. These visual audits were conducted by the PL and project champions twice per week on any eligible infants present in the unit at the time of the audit. All audit tools were developed by the PL to meet the specific needs of this project, drawing from examples of similar tools in the literature.

**Ethical Considerations**

The interventions implemented posed no threat of harm to patients, families, or staff. They were designed to reduce the risk of harm to infants resulting from unsafe sleep practices by staff and families. The interventions and any potential benefits were made available to all eligible infants. Data collection processes emphasized the privacy and confidentiality of patient information by utilizing REDCap to securely store data.

The project received approval for implementation as Quality Improvement (QI) from the UMB Human Research Protections Office (HRPO), as well as from the Director of Pediatric

Nursing Programs and the head of the Pediatric Clinical Inquiry Committee, before implementation to ensure that it qualifies as non-human subject research. The Principal Investigator (PL) demonstrated HIPAA and CITI compliance prior to the project's commencement. As a potential conflict of interest, the project was implemented in the PL's unit of paid employment. Measures were taken to minimize this conflict, and no financial benefits were gained from the project's implementation.

## Results And Analytics

Project outcome data were compiled and analyzed to identify trends and generate meaningful insights over time. EMR documentation and visual audit data were collected at baseline and during implementation and aggregated weekly. Data were analyzed using run charts, with the x-axis displaying the project week number and the y-axis showing the rate of infants with any documentation of safe sleep education or practices, as well as the weekly average sleep score, to illustrate the nature of the changes over time. This analysis helps determine whether the variability in data is due to the interventions or if it arises from random or unrelated phenomena, such as overall unit acuity or staff schedules and preferences.

Results from the staff education list indicated that 61% of nursing staff received in-person training on safe sleep practices and documentation (Table K1). Findings from documentation audits revealed that approximately 25.5% of patients under 1 year of age in the PED were ineligible for documentation audits (i.e., they were not assigned to a nurse, left without being seen, were treated in the hallway, etc.). The number of eligible, audited patients with any safe sleep documentation was averaged weekly and plotted on a run chart as described previously (Figure K1). An average of 22% of patients per week had any safe sleep documentation, showing little variation from week to week, including when comparing rates before and during implementation. Rates ranged from 14% to 29% on a weekly basis. “Comfort Measures: Crib/bassinet” was the most commonly documented measure, used for 15.1% of eligible patients (Figure K2).

Safe sleep scores from visual audits were averaged weekly and plotted on a run chart as described above (Figure K3). This chart showed that the average safe sleep score is 2.11 out of 4, peaking at 3.5 during weeks 4 and 9. Rates for each of the four sleep criteria were documented (Figure K4). More audits were conducted during the day shift than at night (83% versus 17%). Only 32.3% of infants were found in a crib or bassinet as recommended. Among those not in a crib or bassinet, 48% were located on a stretcher, despite an appropriate crib or bassinet being available on the unit 95.2% of the time during the audit. Most patients, regardless of where they slept, were found on their back (83.9%) and with the head of the bed flat (61.3%), although only 41.9% of infants were found alone on the sleep surface as recommended. When not alone, the most common item present on the sleep surface with patients was extra blankets, observed 42% of the time (Figure K5).

## Discussion

This project implemented an evidence-based nursing bundle aimed at promoting safe infant sleep in a busy PED. Despite these interventions, results revealed only modest success in increasing safe sleep documentation and observed safe sleep practices. Safe sleep scores periodically increased, reaching peak levels following mass education events, such as the project's initiation and the hospital-wide Safe Sleep Week, which emphasized the importance of ongoing education. However, rates were generally suboptimal, suggesting barriers that hindered adherence to the project’s interventions. These barriers likely included the fast-paced, high-turnover PED environment and the overlapping respiratory season, which led to increased unit volume, acuity, and strain on the PED's resources. Additional limitations involved the intermittent availability of sleep sacks and crib cards due to low stock and loss, as well as the inability to embed the project's interventions into official unit policy, limiting accountability and sustainability. While documentation practices were more stable, rates remained low, averaging 22% throughout the project's implementation. Suboptimal documentation adherence may reflect variability in individual staff buy-in or a lack of emphasis on documentation practices in a high-acuity ED setting. These findings reinforce the need for ongoing education and more integrated systems of support.

Barriers identified during this project are somewhat consistent with those found in the literature; however, similar projects typically achieved better outcomes. Notably, these projects were implemented in inpatient units, such as pediatric units and labor and delivery wards, as well as in outpatient offices, yet very few articles mentioned interventions specifically designed to address the unique workflows of an emergency department (ED) setting. The literature broadly suggests that implementing any quality improvement (QI) project in ED settings is challenging (Schwartz et al., 2024).

This project's findings will guide future efforts to enhance safe sleep practices in the PED. While current interventions incur no financial costs, the future expansion of this project may necessitate additional investment. The low availability of sleep sacks resulted from the loss of a grant that supplied these items to the unit. Without this grant, sleep sacks are no longer accessible to patients in the PED. Leadership is discussing expanding access to the inpatient sleep sack supply to meet the needs of the PED, which would involve purchasing more sleep sacks for reuse and adjusting existing laundering and stocking workflows, rather than making an upfront investment in sleep sacks to be distributed to patients who would then be charged for the items. However, the recommendation to integrate the interventions into the unit's nursing policies would not incur any additional financial requirements.

## Conclusion

This project demonstrated that a nursing bundle can be partially effective in improving infant safe sleep practices in the PED, though significant challenges remain. The results highlight the need for ongoing attention to this often neglected, yet important, healthcare area. ED settings are known for notoriously high turnover rates, staffing challenges, and violence toward staff members, as well as high unit volume and acuity, which makes implementing and adhering to preventative efforts a struggle. However, the PED serves a large number of vulnerable patients who can benefit from this project's objectives. This project underscores the necessity for additional supports in the PED to promote the adherence to nursing interventions that can enhance patient safety outcomes beyond the hospital.

Sustainability has been a topic of discussion, and visual audits will continue on the unit following the completion of the project. The unit's Patient Education Committee is dedicated to trialing additional interventions that may enhance staff adherence to the project's initiatives. Given the lack of evidence for interventions specifically aimed at the PED setting, future research should focus on identifying PED-tailored interventions that consider the unique workflow and challenges of this type of unit.

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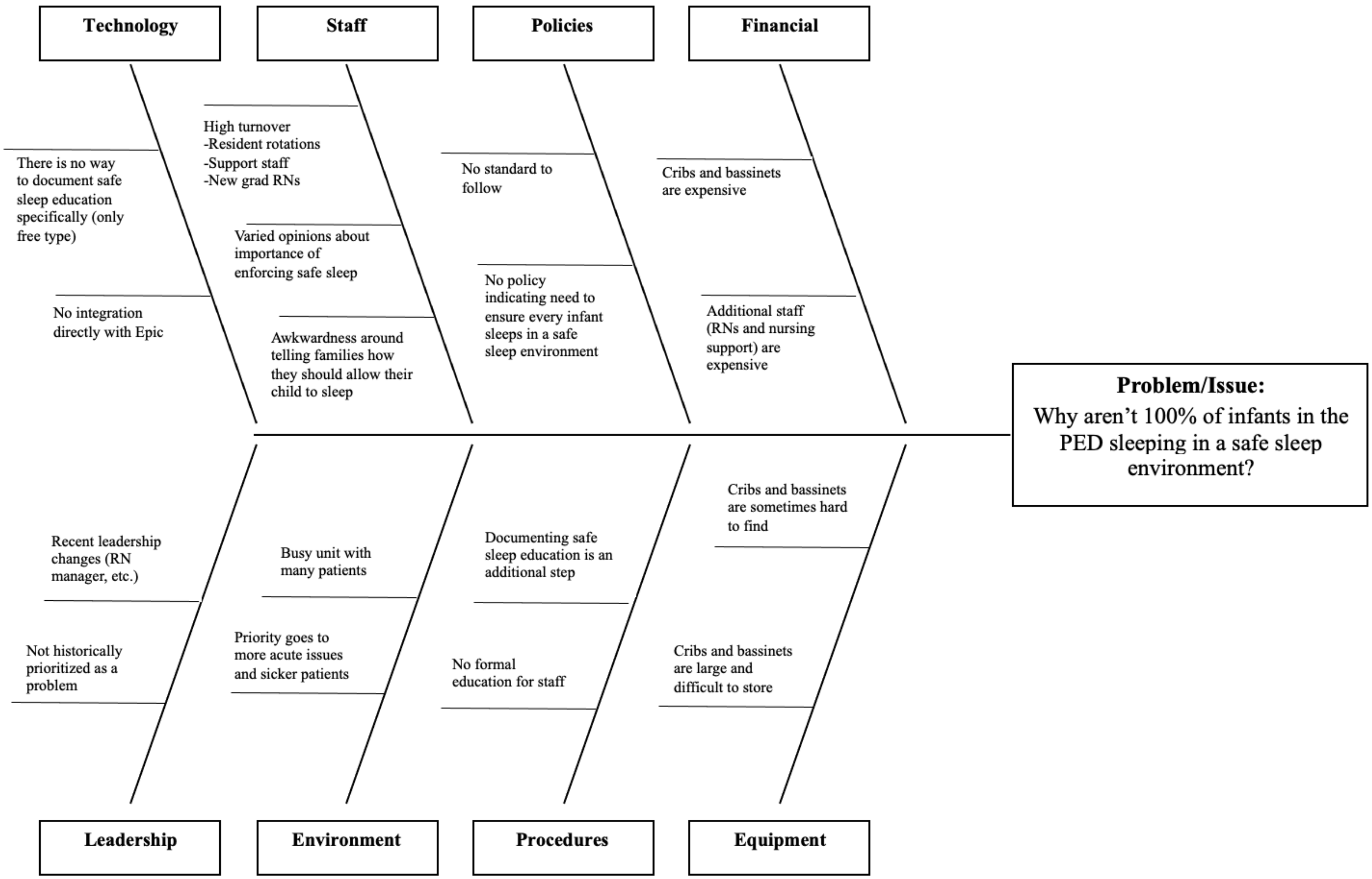
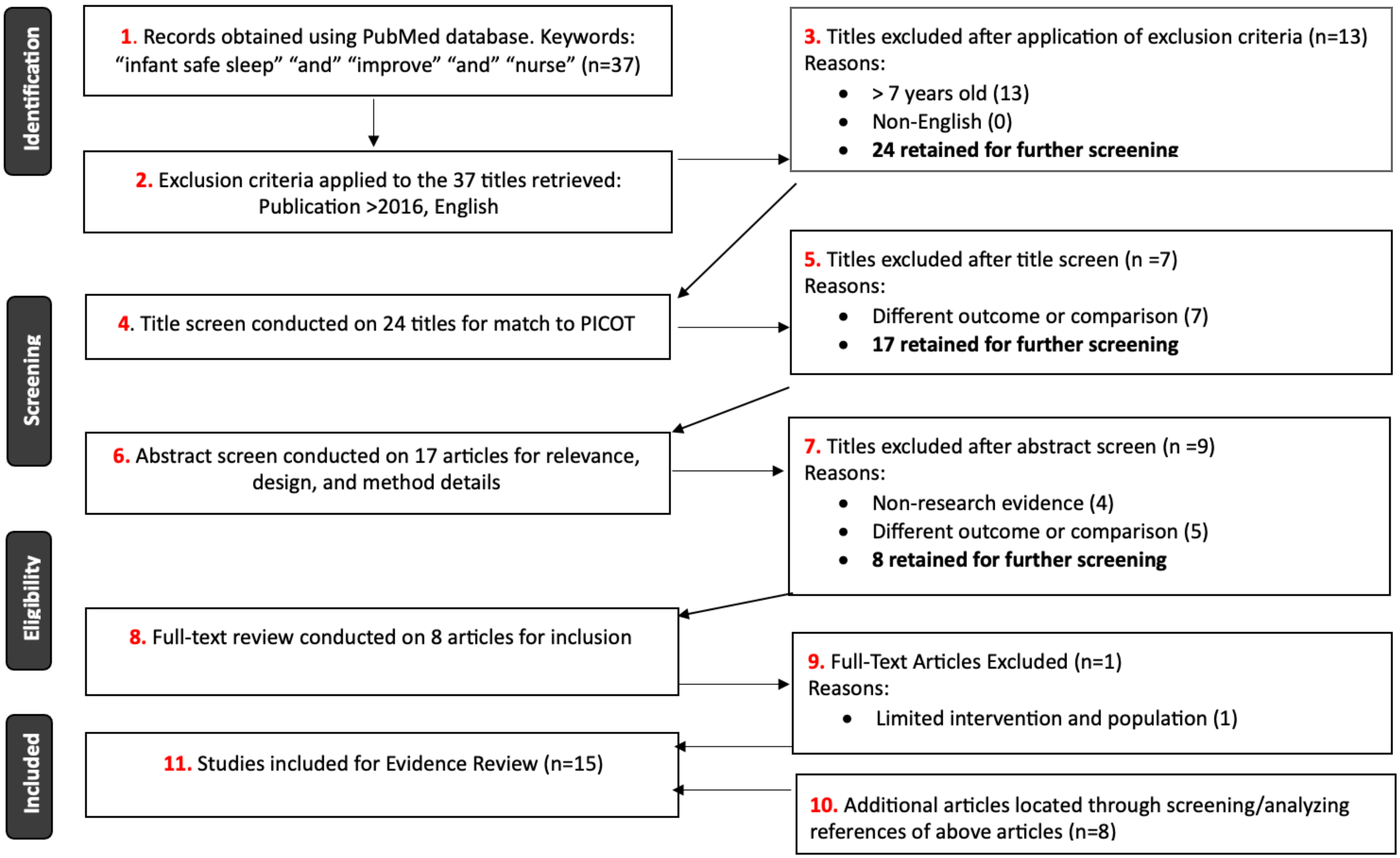
## Appendix A

### Root Cause Analysis



**Appendix B**

**Evidence Selection (PRISMA)**



# Appendix C

## Evidence Search

### History and Search Details

Download Delete

| Search | Actions | Details | Query | Results | Time |
|---|---|---|---|---|---|
| #3 | ••• | > | Search: **infant safe sleep AND improve AND nurse** Filters: **English, from 2017 - 2024** | 24 | 13:00:33 |
| #2 | ••• | > | Search: **infant safe sleep AND improve AND nurse** Filters: **from 2017 - 2024** | 24 | 13:00:29 |
| #1 | ••• | > | Search: **infant safe sleep AND improve AND nurse** | 37 | 13:00:18 |

Showing 1 to 3 of 3 entries

## Appendix D

## Evidence Review Table

| | | | | | |
|---|---|---|---|---|---|
| **Citation #1:** Shaikh, S. K., Chamberlain, L., Nazareth-Pidgeon, K. M., & Boggan, J., C. (2022). Quality improvement initiative to improve infant safe sleep practices in the newborn nursery. *BMJ Open Quality, 11*(3). doi: 10.1136/bmjoq-2022-001834. | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "To improve the percentage of infants with a composite measure of 'perfect sleep' (sleeping on their backs in an empty bassinette without any additional items, appropriately bundled and with the head of the bassinette flat) from a baseline of 41.9% to 70% within a year of project start…We hypothesized that the main barrier to achieving infant perfect sleep was a lack of knowledge by both nursing and parents as to the AAP recommendations…" | QI | **Sampling Technique:** Convenience<br><br>**Eligible Participants:** Every infant who was rounded on by any attending involved in the study.<br><br>**Excluded Participants:** Infants being treated with phototherapy, infants under a warmer, or infants whose bassinette was being prepared for a procedure.<br><br>**Setting:** Newborn nursery.<br><br>**# Accepted:** 3,376<br>**# Control:** 186<br>**# Intervention:** 3,190<br><br>**Power Analysis:** Not completed. | **Control:** Usual care at baseline, prior to implementation of interventions.<br><br>**Intervention:** Powerpoint and before/after quiz sent to all mother-baby nurses and nursing assistants. Newborn attending provided paper door hanger/crib card and education to families during first rounding. Sleep sacks given to every family. Email reminders sent to L&D nurses who prepared the bassinets.<br><br>**Intervention Fidelity:** Powerpoint and before/after quiz with 65% completion rate. | **Dependent Variable:** Safe sleep environment<br><br>**Measure:** Pre-/post audits using modified audit tool. | **Statistical Results:**<br><br>Statistical process control charts, plus 2-sided Fisher's exact test were used.<br><br>"Perfect sleep" increased from 41.9% to 67.3% (statistically significant).<br><br>**Conclusions:** Interventions improved adherence to AAP safe sleep practices and were sustained for 12 months following implementation. |
| **Citation #2:** Kellams, A., Parker, M., G., Geller, N. L., Moon, R. Y., Colson, E. R., Drake, E., Corwin, M. J., McClain, M., Golden, W. C., & Hauck, F. R. (2017). Todaysbaby quality improvement: Safe sleep teaching and role modeling in 8 US maternity wards. *Pediatrics, 140*(5). doi: 10.1542/peds.2017-1816 | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "We therefore developed | QI | **Sampling Technique:** | **Control:** Usual care at | **Dependent** | **Statistical Results:** |

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| a quality improvement (QI) intervention for safe sleep education as part of a multicenter trial for promoting AAP safe sleep recommendations. In this article, we describe the strategies used to improve safe sleep education and role modeling at 8 US maternity units and the extent to which participating maternity units achieved the goals of ≥90% maternal-reported, in-hospital safe sleep education on sleep position: an environment without objects, room-sharing (but not bed-sharing), pacifier use after established breastfeeding, and ≥90% of infants with observed safe sleep practices (supine in a separate sleep environment [ie, crib or bassinette] free of other objects).” | | Convenience.<br><br>**Eligible Participants:** Not discussed.<br><br>**Excluded Participants:** Not discussed.<br><br>**Setting:** 8 maternity wards.<br><br>**# Accepted:** Not discussed.<br>**# Control:** Not discussed.<br>**# Intervention:** Not discussed.<br><br>**Power Analysis:** Not completed. | baseline, prior to implementation of interventions.<br><br>**Intervention:** The toolkit included a powerpoint for nursing staff, posters, pocket-sized cards for counseling families, sample letters to raise awareness, a sample hospital policy, and a website with additional resources. Each site could independently decide which to utilize.<br><br>**Intervention Fidelity:** Each site received a 2-3 hour-long enrollement visit to introduce the toolkit, instruction manual, and data collection tools and procedures, as well as a conference call for additional education and clarification. | **Variables:** Maternal safe sleep education by mothers; and safe sleep environments.<br><br>**Measure:** Education was assessed via maternal report and sleep environment via visual assessment during unannounced audits. | Averages from all sites compared. Run charts completed. Unable to perform statistical process control charts or confidence limits.<br><br>Infants observed in a safe sleep environment increased on average from 57% to 88% and maternal reports of receiving education increased on average from 47% to 87%.<br><br>**Conclusions:** Nursing-based safe sleep interventions improved safe sleep education and practices among a diverse group of maternity units. |
| **Citation #3:** O’Shea, S., Mohr, L., & Blancarte, A. (2022). Safe sleep program for the NICU nursing staff: A pilot program. *Neonatal Network, 41*(2). DOI: 10.1891/11-T-702 | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| “Due to a low SSP rate at a large midwestern NICU, this project’s aim was to investigate if a safe sleep program would increase SSP | QI | **Sampling Technique:** Convenience.<br><br>**Eligible Participants:** All infants 32 weeks corrected gestational age and >1,500 | **Control:** Usual care at baseline, prior to implementation of interventions.<br><br>**Intervention:** Education | **Dependent Variable:** Safe sleep environments<br><br>**Measure:** Visual sleep environment | **Statistical Results:**<br><br>Independent t-test with a 95% confidence interval.<br><br>Safe sleep environments |

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| adherence and increase NICU nurses' safe sleep knowledge." | | grams who were in an open crib. Infants must be asleep at time of audit.<br><br>**Excluded Participants:** Infants with congenital deformities or diseases that require positioning other than supine.<br><br>**Setting:** Level III NICU with 60 rooms.<br><br>**# Accepted:** 92<br>**# Control:** 48<br>**# Intervention:** 44<br><br>**Power Analysis:** Not completed. | for nurses via an online module and an in-person in-service. Safe sleep cards were created. The current safe sleep policy was edited.<br><br>**Intervention Fidelity:** 34% of nurses completed both online and in-person education. 100% completed the online education only. | audit. | increased from 25% to 61% ($p < 0.001$).<br><br>**Conclusions:** The interventions successfully increased nurse's safe sleep knowledge and practice. |
| **Citation #4:** Paul, E. T. (2022). Increasing safe sleep practices in the neonatal intensive care unit. *Advanced Neonatal Care, 22*(5). doi: 10.1097/ANC.0000000000000957. | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "The purpose of this QI initiative was to increase the percentage of eligible infants being placed in safe sleep environments by registered nurses in a NICU." | QI | **Sampling Technique:** Convenience.<br><br>**Eligible Participants:** Infants in the NICU who were at least 32 weeks corrected gestational age, at least 1,500 grams, on 0.5 L or less oxygen via nasal cannula, in an open crib, and no medical contra-indications for supine positioning.<br><br>**Excluded Participants:** All other infants. | **Control:** Usual care at baseline, prior to implementation of interventions.<br><br>**Intervention:** Nurse education, posters, safe sleep algorithm, EMR documentation, a paper checklist, and sleep sacks.<br><br>**Intervention Fidelity:** | **Dependent Variable:** Safe sleep environments.<br><br>**Measure:** Unannounced weekly crib and EMR audits. | **Statistical Results:**<br><br>Chi-square test.<br><br>Safe sleep improved from 13% to 81% ($p < 0.001$).<br><br>**Conclusions:** The interventions successfully increased the percentage of infants in safe sleep environments. |

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| | | **Setting:** Level IV NICU in the Southeastern US.<br><br># **Accepted:** 1,123<br># **Control:** 379<br># **Intervention:** 744<br><br>**Power Analysis:** Not completed. | | | |
| **Citation #5:** Uduwana, S., Garcia, L., & Nemerofsky, S. L. (2020). The wake project: Improving safe sleep practice in a neonatal intensive care unit. *Journal of Neonatal-Perinatal Medicine, 13*(1): 115-127. doi: 10.3233/NPM-180182. | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "This quality improvement (QI) project aimed to develop and implement an educational initiative on infant safe sleep (SS) to improve "Safe Sleep Practices (SSP) in a level III neonatal intensive care unit (NICU) for one of the highest risk populations in the country." | QI | **Sampling Technique:** Convenience.<br><br>**Eligible Participants:** "Safe sleep practices eligible infants"<br><br>**Excluded Participants:** Not discussed.<br><br>**Setting:** Level III NICU<br><br># **Accepted:** Not discussed.<br># **Control:** Not discussed.<br># **Intervention:** Not discussed.<br><br>**Power Analysis:** Not completed. | **Control:** Usual care at baseline, prior to implementation of interventions.<br><br>**Intervention:** Nursing education, crib cards, posters, standardized documentation, and temperature control on the unit.<br><br>**Intervention Fidelity:** | **Dependent Variable:** Safe sleep environments.<br><br>**Measure:** Crib audits. | **Statistical Results:**<br><br>Run charts.<br><br>Infants in a safe sleep environment improved from 7% to 96%.<br><br>**Conclusions:** The interventions successfully increased the percentage of infants in safe sleep environments. |
| **Citation #6:** Leong, T., Roome, K., Miller, T., Gorbatkin, O., Singleton, L., Agarwal, M., & Lazarus, S. G. (2020). Expansion of a multi-pronged safe sleep quality improvement initiative to three children's hospital campuses. *Injury Epidemiology, 7*(1). doi: 10.1186/s40621-020-00256-z. | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "The objective of this study was to evaluate the impact of an expanded | QI | **Sampling Technique:** Convenience. | **Control:** Usual care at baseline, prior to implementation of | **Dependent Variable:** Safe sleep environments | **Statistical Results:**<br><br>Chi square analysis, |

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| safe sleep initiative at three Georgia free-standing children's hospital campuses before and after a multipronged safe sleep initiative.” | | **Eligible Participants:** Infants <12 months and asleep at time of audit.<br><br>**Excluded Participants:** Infants who were awake, intubated, had craniofacial anomalies, required non-invasive positive pressure ventilation or high-flow nasal cannula, were less than 32 weeks gestation, had incomplete data in the audit, were in an ICU, or required an isolette or temperature support.<br><br>**Setting:** General inpatient units at 3 pediatric hospital campuses.<br><br>**# Accepted:** 478<br>**# Control:** 204<br>**# Intervention:** 274<br><br>**Power Analysis:** Not completed. | interventions.<br><br>**Intervention:** Nursing education, safe sleep champions, cribs cards, crib audits, and weekly reporting of unit compliance via tracking boards.<br><br>**Intervention Fidelity:** | **Measure:** A modified crib audit. | Fisher’s exact test, and logistic regression.<br><br>Compliance with safe sleep environments increased from 4.4% to 32.5% (p <0.01).<br><br>**Conclusions:** The interventions significantly improved compliance with safe sleep in 3 inpatient hospitals. |
| **Citation #7:** Sleutel, M. R., True, B., Gustus, H., Baldwin, K., & Early, B. (2018). Response to a national issue: Moving beyond “back to sleep” at three hospitals. *Journal of Pediatric Nursing, 43*, 16-22. https://doi.org/10.1016/j.pedn.2018.07.013 | | | | | **Level & Quality:**<br>V-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| “To measure changes in registered nurse (RN) knowledge/beliefs and practices, parents' recall of infant safe sleep (ISS) teaching, and inpatient infant sleep environments and safety after implementing an | QI | **Sampling Technique:**<br><br>**Eligible Participants:**<br><br>**Excluded Participants:**<br><br>**Setting:** A variety of mother-baby, L&D, and pediatric units at 3 hospitals. | **Control:** Usual care at baseline, prior to implementation of interventions.<br><br>**Intervention:** Nursing education, family education, posters, and crib cards and room | **Dependent Variable:** Safe sleep environments<br><br>**Measure:** Crib audit tool. | **Statistical Results:**<br><br>Chi-square, Cramer’s V and odd’s ratio.<br><br>Average safe sleep compliance increased from 65.6% to 95.5%. |

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| ISS initiative." | | **# Accepted:** 462<br>**# Control:** 234<br>**# Intervention:** 228<br><br>**Power Analysis:** Not completed. | cards.<br><br>**Intervention Fidelity:** | | **Conclusions:** The interventions successfully increased the percentage of infants in safe sleep environments. |
| **Citation #8:** Caris, M. G., Labuschagne, H. A., Dekker, M., Kramer, M. H. H., van Agtmael, M. A., & Vandenbroucke-Grauls, C. M. J. E. (2018). Nudging to improve hand hygiene. *Journal of Hospital Infection, 98*(4), 352-528. https://doi.org/10.1016/j.jhin.2017.09.023 | | | | | **Level & Quality:** I-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "To investigate whether behavioral nudges, displayed as posters, can increase the use of alcohol-based hand rub." | Mixed methods study (cross-sectional survey and controlled before-after trial) | **Sampling Technique:** Convenience.<br><br>**Eligible Participants:** Hospital nurses, doctors, and students.<br><br>**Excluded Participants:** Not discussed.<br><br>**Setting:** 2 hospital wards in a university medical center.<br><br>**# Accepted:** N/a<br>**# Control:** N/a<br>**# Intervention:** N/a<br><br>**Power Analysis:** Not discussed. | **Control:** Baseline.<br><br>**Intervention:** Nudges as posters hung near hand sanitizer dispensers.<br><br>**Intervention Fidelity:** Based on strong body of evidence. | **Dependent Variable:** Number of dispenser activations.<br><br>**Measure:** Hand hygiene compliance rate via electronic hand sanitizer dispensers. | **Statistical Results:**<br><br>Poisson regression analyses.<br><br>Posters increased use of entrance dispensers on 1 of the 2 wards and did not increase use in patient rooms.<br><br>**Conclusions:** Certain nudges may be effective for increasing hand hygiene compliance. |
| **Citation #9:** Salm, T. C. & Yasin, T. (2022). Hospital-based inpatient quality improvement initiatives on safe infant sleep: Systematic review and narrative synthesis. *Sleep Medicine Reviews, 63*. https://doi.org/10.1016/j.smrv.2022.101622 | | | | | **Level & Quality:** III-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "This review aimed to better understand the application of Quality Improvement (QI) processes to in- crease | Systematic review (QI) | **Sampling Technique:** N/a<br><br>**Eligible Participants:** 27 articles included. | **Control:** N/a<br><br>**Intervention:** Staff education, parent education, policy, and | **Dependent Variable:** Safe sleep practice adherence.<br><br>**Measure:** Audits, | **Statistical Results:** N/a<br><br>**Conclusions:** All articles reported improvements in safe sleep adherence. |

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| adherence to safe infant sleep recommendations in inpatient hospital settings." | | **Excluded Participants:** N/a<br><br>**Setting:** Varied.<br><br>**# Accepted:** N/a<br>**# Control:** N/a<br>**# Intervention:** N/a<br><br>**Power Analysis:** N/a | unit environment changes.<br><br>**Intervention Fidelity:** | surveys, focus groups, etc. | |
| **Citation #10:** Bunting, J. & de Klerk, M. (2022). Strategies to improve compliance with clinical nursing documentation guidelines in the acute hospital setting: A systematic review and analysis. *SAGE Open Nursing*. https://doi.org/10.1177/23779608221075165 | | | | | **Level & Quality:**<br>II-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "The aim of this systematic review is to qualitatively and quantitatively analyze the literature in an attempt to determine which strategies to improve compliance with clinical nursing documentation guidelines, and improve the quality of nursing documentation, have been most effective in the acute setting." | Systematic review (RCT and quasi-experimental studies) & meta-analysis | **Sampling Technique:** N/a<br><br>**Eligible Participants:** 76 articles included.<br><br>**Excluded Participants:** N/a<br><br>**Setting:** Varied.<br><br>**# Accepted:** N/a<br>**# Control:** N/a<br>**# Intervention:** N/a<br><br>**Power Analysis:** N/a | **Control:** Baseline.<br><br>**Intervention:** Education, audit and feedback, standardized nursing language, EHR modifications, policies.<br><br>**Intervention Fidelity:** | **Dependent Variable:** Nursing documentation quality.<br><br>**Measure:** Documentation audits. | **Statistical Results:**<br><br>44% of education only studies, 72% of audit and feedback studies, 40% of standardized nursing language studies, 70% of HER modification studies, and 42% of policy studies showed final compliance rates >70%.<br><br>**Conclusions:** Education, audit and feedback, standardized nursing language, EHR modifications, and policies are moderately effective to improve nursing documentation quality. |
| **Citation #11:** McCarthy, B., Fitzgerald, S., O'Shea, M., Condon, C., Hartnett-Collins, G., Clancy, M., Sheehy, A., Denieffe, S., Bergin, M., & Savage, E. (2019). Electronic nursing documentation interventions to promote or improve patient safety and quality care: A systematic review. *Journal of Nursing Management, 27*, 491-501. https://doi.org/10.1111/jonm.12727 | | | | | **Level & Quality:**<br>III-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "To review the evidence | Systematic | **Sampling Technique:** N/a | **Control:** Baseline. | **Dependent** | **Statistical Results:** N/a |

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| on the effects/impact of electronic nursing documentation interventions on promoting or improving quality care and/or patient safety in acute hospital settings." | review (quasi-experimental studies) | **Eligible Participants:** 6 articles included.<br><br>**Excluded Participants:** N/a<br><br>**Setting:** Hospitals.<br><br>**# Accepted:** N/a<br>**# Control:** N/a<br>**# Intervention:** N/a<br><br>**Power Analysis:** N/a | **Intervention:** EMR implementation, template improvements, visual reminders, educational sessions, audit/feedback, etc.<br><br>**Intervention Fidelity:** | **Variable:** Quality of care and/or patient safety in acute hospital settings.<br><br>**Measure:** Documentation audit, error rates, surveys. | **Conclusions:** Documentation interventions can save time and reduce rates of documentation errors, falls, and infections. |
| **Citation #12:** Ellis, C., Pease, A., Garstang, J., Watson, D., Blair, P. S., & Fleming, P. J. (2021). Interventions to improve safer sleep practices in families with children considered to be at increased risk for sudden unexpected death in infancy: A systematic review. *Frontiers in Pediatrics, 9*. doi: 10.3389/fped.2021.778186 | | | | | **Level & Quality:**<br>III-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "This systematic review focuses on the third key area addressing the research question: what safer sleep interventions have been tested for families with infants at risk of SUDI, and what can these tell us about what works to reduce the risk and embed safer sleep practices for infants at higher risk?" | Systematic review (RCT, observational, prospective cohort study, feasibility study, pre-post study, etc.). | **Sampling Technique:** N/a<br><br>**Eligible Participants:** 23 articles that included 7-6515 participants. Participants were pregnant women or mothers/families that had some vulnerability or characteristic that increased the risk of SIDS in their infants.<br><br>**Excluded Participants:** N/a<br><br>**Setting:** Varied.<br><br>**# Accepted:** N/a<br>**# Control:** N/a<br>**# Intervention:** N/a<br><br>**Power Analysis:** N/a | **Control:** Usual care.<br><br>**Interventions:** Educational programs (9 papers), home visiting services (4 papers), peer ambassadors (2 papers), health education/awareness interventions (5 papers), and targeted education messages (3 papers).<br><br>**Intervention Fidelity:** 10% of records were screened by 2 authors with a 97% agreement rate. 87% of papers scored about 50% on quality. | **Dependent Variable:** Parental knowledge and safe sleep intentions and behaviors.<br><br>**Measure:** Self-report, surveys, SIDS rates. | **Statistical Results:** N/a<br><br>**Conclusions:** The evidence suggests that the strongest interventions are ones that are "personalized, culturally sensitive, enabling, empowering, relationship building, interactive, accepting of parental perspective, non-judgmental, and are delivered over time." Multi-modal interventions and face to face sleep education is supported. |
| **Citation #13:** Geary, L., Hasselstrom, J., Carlsson, A. C., Schenck-Gustafsson, K., & von Euler, M. (2020). An audit and | | | | | **Level & Quality:** |

| feedback intervention for improved anticoagulation use in patients with atrial fibrillation in primary care. *Cardiology, 310*, 67-72. https://doi.org/10.1016/j.ijcard.2020.04.027 | | | | | I-B |
|---|---|---|---|---|---|
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "The objective was to test if an audit & feedback intervention aimed at directors in primary care centers could increase the use of anticoagulants in patients with AF." | Experimental study (RTC) | **Sampling Technique:** Cluster randomized.<br><br>**Eligible Participants:** From a random sample of half the primary care centers in Stockholm County (94 in the intervention group), all patients at least 18 years, not in a nursing home, with diagnosed a fib, registered at a primary care center in the county, with a CHA2DS2VASc score of at least 2 (indicating they meet the treatment threshold).<br><br>**Excluded Participants:** Patients from the Norrtalje area.<br><br>**Setting:** Primary care centers<br><br>**# Accepted:** 31,477<br>**# Control:** 15,781<br>**# Intervention:** 15,696<br><br>**Power Analysis:** Not discussed. | **Control:** Usual care at a non-intervention primary care center.<br><br>**Intervention:** Audit and feedback sent to primary care center directors in the intervention group.<br><br>**Intervention Fidelity:** Patients in both groups had similar ages and comorbidities, though there were small but statistically significant differences in sex, socioeconomy, use of statins, and prevalence of hypertension. No differences between primary care centers. | **Dependent Variable:** Anticoagulant use<br><br>**Measure:** Proportion of patients with atrial fibrillation who were dispensed anticoagulants at least twice during the 18-month period, derived from the local healthcare database. | **Statistical Results:**<br><br>Chi-square and student's t-test. Logistical regression. Odds ratios.<br><br>Anticoagulant use in patients was slightly more likely in the intervention centers. Women remained less likely than men to use anticoagulants, but those in the intervention centers were more likely to than women in non-intervention centers after the intervention.<br><br>**Conclusions:** Audit and feedback had a small but statistically significant effect on adherence to guidelines that recommend anticoagulant use in certain patients. |
| **Citation #14:** Kaiser, S. V., Shadman, K. A., Biondi, E. A., & McCulloh, R. J. (2019). Feasible strategies for sustaining guideline adherence: Cross-sectional analysis of a national collaborative. *Hospital Pediatrics, 9*(11), 903-908. https://doi.org/10.1542/hpeds.2019-0152 | | | | | **Level & Quality:** III-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| "Our objectives for this | Non- | **Sampling Technique:** | **Control:** None. | **Dependent** | **Statistical Results:** |

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| study were to (1) assess the feasibility of various strategies for sustaining pediatric guideline adherence by using a diverse national sample of hospitals and (2) describe factors influencing the long-term use of these strategies.” | experimental (cross-sectional, observational study) | Entire population included.<br><br>**Eligible Participants:** 104<br><br>**Excluded Participants:** 0<br><br>**Setting:** 133 hospitals that participated in a previous study.<br><br>**# Accepted:** 104 (58 participated)<br>**# Control:** 0<br>**# Intervention:** 104 (58 participated)<br><br>**Power Analysis:** Not discussed. | **Intervention:** Varying QI projects and surveys from hospital leaders.<br><br>**Intervention Fidelity:** All participants were involved in the same previous study. Each received the same survey. | **Variable:** Short- and long-term adherence to guidelines.<br><br>**Measure:** Surveys from hospital leaders to include number of initiatives used during and after initial implementation. | Chi-square and Fisher’s exact tests. Thematic content analysis.<br><br>Many strategies were statistically significant in the short term, including QI and PowerPoints, though were not as strong in the long term.<br><br>**Conclusions:** While initially strong, QI and education declined over time. Electronic strategies and hospital policies were most effective for long-term change. |
| **Citation #15:** Brenner, R. A., Simons-Morton, B. G., Bhaskar, B., Mehta, N., Melnick, V. L., Revenis, M., Berendes, H. W., & Clemens, J. D. (1998). Prevalence and predictors of the prone sleep position among inner-city infants. *JAMA, 280*(4), 341-346. Doi:10.1001/jama.280.4.341 | | | | | **Level & Quality:**<br>III-B |
| **Purpose/ Hypothesis** | **Evidence Type/Design** | **Sample (Population, size, setting)** | **Intervention Procedures** | **Primary Outcomes & Measures** | **Results** |
| “To describe infant sleep position in a cohort of infants born to predominantly low-income, inner-city mothers and to identify predictors of the prone sleep position in this population.” | Prospective, observational cohort study | **Sampling Technique:** Systematic.<br><br>**Eligible Participants:** DC residents and ability to speak English or Spanish. Mothers of singleton births.<br><br>**Excluded Participants:** Infants born not alive, died during hospitalization, weight <1800grams, major congenital malformations, placed up for adoption.<br><br>**Setting:** 3 DC hospitals | **Control:** Standard practice of mother-infant dyad care after birth/delivery.<br><br>**Intervention:** None.<br><br>**Intervention Fidelity:** N/a. | **Dependent Variable:** Infant sleep position in the home.<br><br>**Measure:** Surveys of mothers. | **Statistical Results:**<br><br>Chi-square and Fisher’s exact tests for categorical variables and Student t test for continuous variables.<br><br>Of mothers of infants placed prone to sleep in the hospital, 93% intended to continue this practice in the home.<br><br>**Conclusions:** Seminal article that shows that parents tend to replicate the |

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| | | **# Accepted:** 394<br>**# Control:** 394<br>**# Intervention:** None.<br><br>**Power Analysis:** Not discussed. | | | sleep position that they see their baby in while in the hospital. |

## Appendix E

### Evidence Synthesis

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| **Project Title:** A Bundle to Improve Infant Safe Sleep in the PED | | | |
| **PICOT:** Does implementing a safe sleep bundle comprising of hospital policy changes, crib cards, and standardized EMR documentation improve safe sleep environment visual audits for infants younger than 12 months of age in the pediatric emergency department compared to current practice? | | | |
| **JHNEBP Level** | **Number of Sources** | **Study/Quality Rating** | **Synthesis of Findings** |
| **Level I**<br>Experimental study. Randomized Controlled Trial (RCT). Systematic review of RCTs with or without meta-analysis. | 1 RTC;<br>1 mixed methods, controlled study | Caris et al., B<br>Geary et al., B | Visual reminders can be effective in improving healthcare provider and family adherence (Caris et al., 2018; McCarthy et al., 2019). EMR changes are effective to improve documentation and guideline adherence (Bunting & de Klerk, 2022; McCarthy et al., 2019; Kaiser et al., 2019). Policy changes were shown to improve documentation and guideline adherence (Salm & Yasin, 2022; Bunting & de Klerk, 2022; Kaiser et al., 2019). Face to face family education is effective to improve intent to adhere to safe sleep practices (Ellis et al., 2022). Audit and feedback has been shown to improve healthcare provider adherence to guidelines (Geary et al., 2022) and nursing documentation quality (Bunting & de Klerk, 2022; McCarthy et al., 2019). These interventions are further supported by evidence showing parents tend to replicate the sleep position they see in the hospital when they go home (Brenner et al., 1998).<br><br>All QI studies found that nursing education was effective to increase the portion of infants sleeping in safe sleep environments. O'Shea, et al. (2022),Uduwana & Nemerofsky (2020), Leong, et al. (2020), and Sleutel, et al. (2018) all found that crib cards improved the percent of infants sleeping safely. Shaikh, et al. (2022) and Paul (2022) both found access to sleep sacks contributed to improved safe infant sleep. Kellams, et al. (2017) and O'Shea, et al. (2022) found that policy creation or changes demonstrated increased safe sleep for infants. Kellams, et al. (2017), Paul (2022),Uduwana & Nemerofsky (2020), and Sleutel, et al. (2018) found that the presence of educational posters around the unit increased safe infant sleep environments. Paul (2022) and Uduwana & Nemerofsky (2020) found that documentation changes can increase the number of infants who are in safe sleep environments. Shaikh, et al. (2022) found that a pre-/post-nursing |
| **Level II**<br>Quasi-experimental studies. Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis. | 1 systematic review of RTCs and quasi-experimental studies | Bunting & de Klerk, B | |
| **Level III**<br>Non-experimental study. Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis. Qualitative study or systematic review of qualitative studies with or without meta-synthesis. | 3 systematic reviews of RTCs, quasi-experimental studies, and/or non-experimental studies;<br>2 non-experimental study | Salm & Yasin, B<br>McCarthy et al., B<br>Ellis et al., B<br>Kaiser et al., B<br>Brenner et al., B | |
| **Level IV**<br>Opinion of respected authorities and/or reports of nationally recognized expert committees/consensus panels based on scientific evidence. | | | |
| **Level V**<br>Evidence obtained from literature reviews, quality improvement, program evaluation, financial | 7 QI articles | Shaikh, et al., B<br>Kellams, et al., B<br>O'Shea, et al., B<br>Paul, B | |

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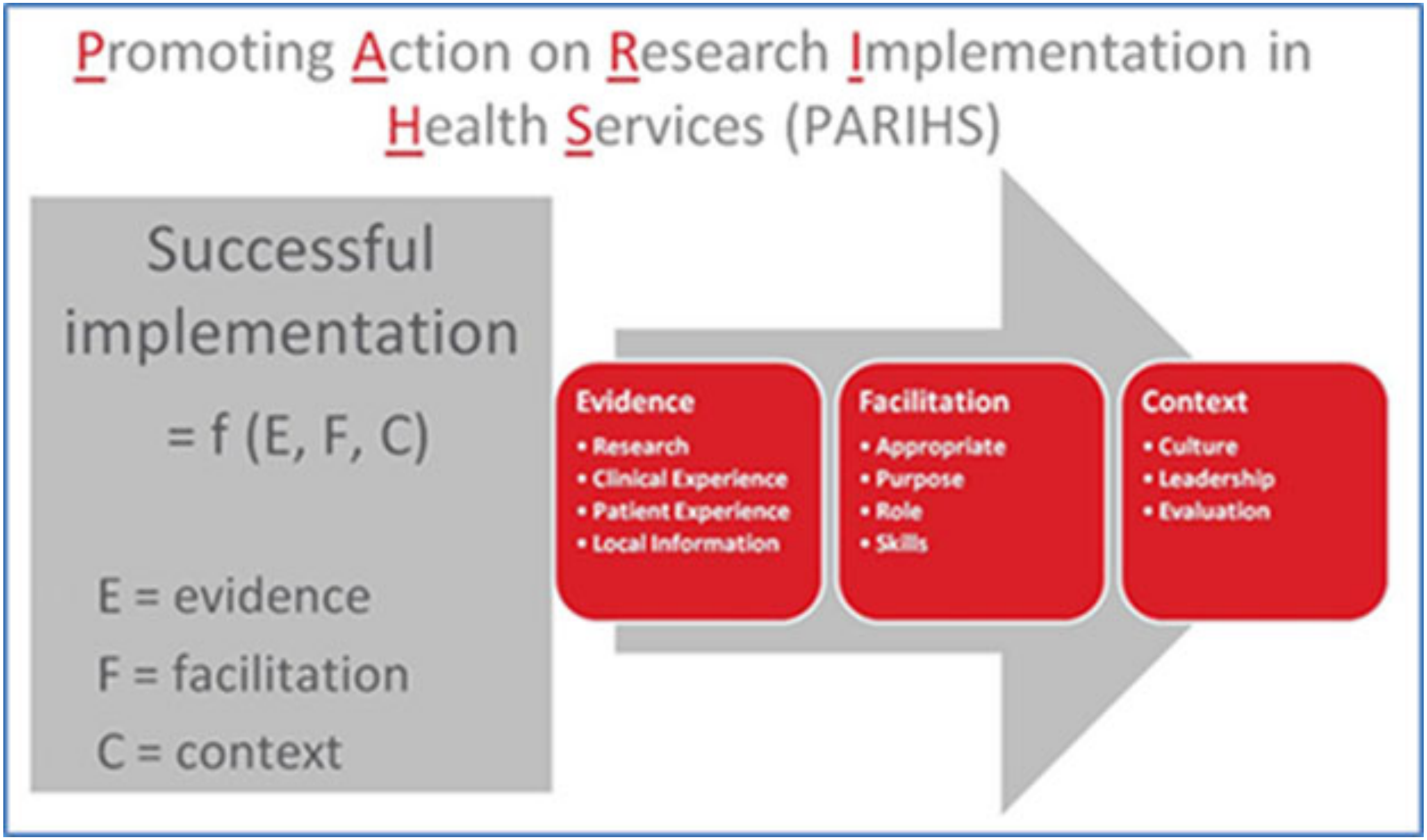
| evaluation, or case reports. Opinion of nationally recognized expert(s) based on experiential evidence. | | Uduwana & Nemerofsky, B<br>Leong, et al., B<br>Sleutel, et al., B | education quiz and email reminders helped to improve safe infant sleep. Paul (2022) found that paper checklists can improve safe sleep for infants. Leong, et al. (2020) showed that weekly compliance reporting improved safe infant sleep environments. |
| **Overall Quality Rating and Recommendation:** B; Evidence is good and consistent to support practice change. | | | |

**Appendix F**

**Conceptual Framework Diagram**



## Appendix G

## Process Maps

**Figure G1. Current Process Map**

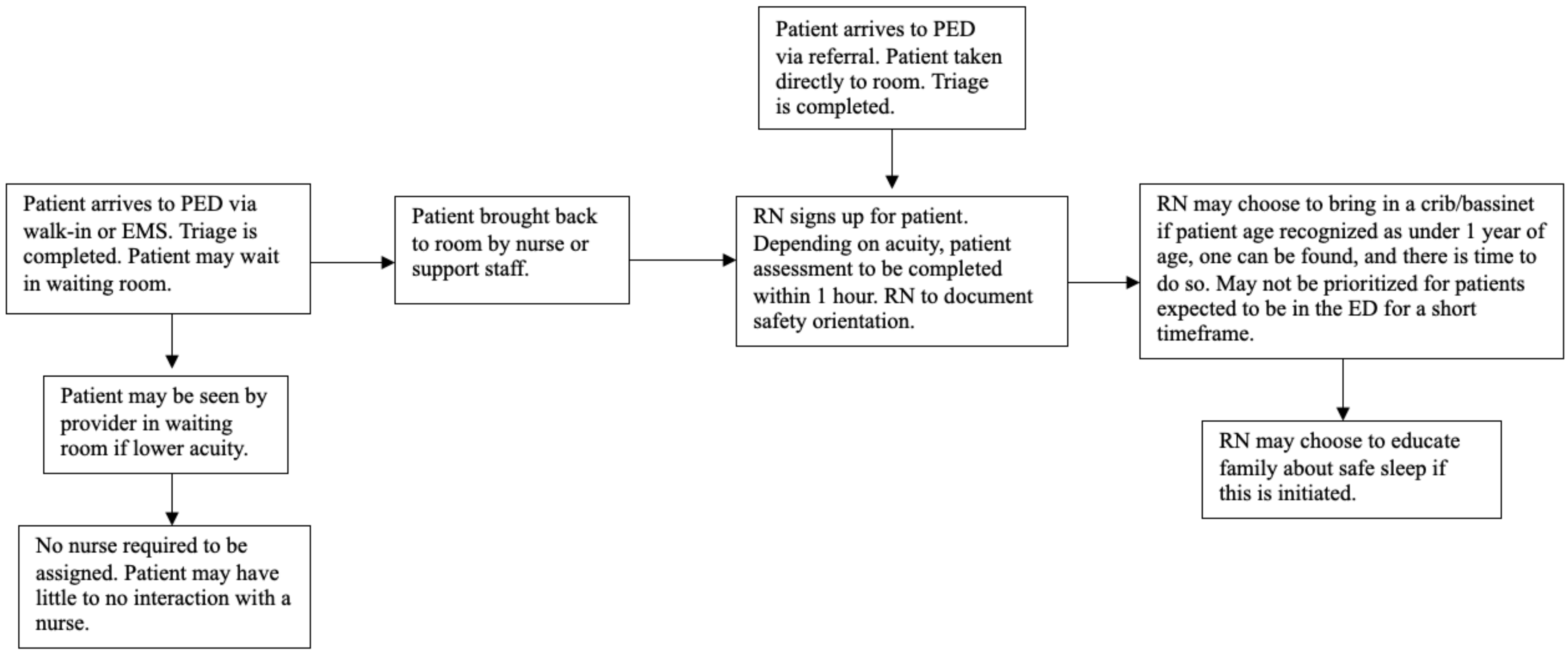
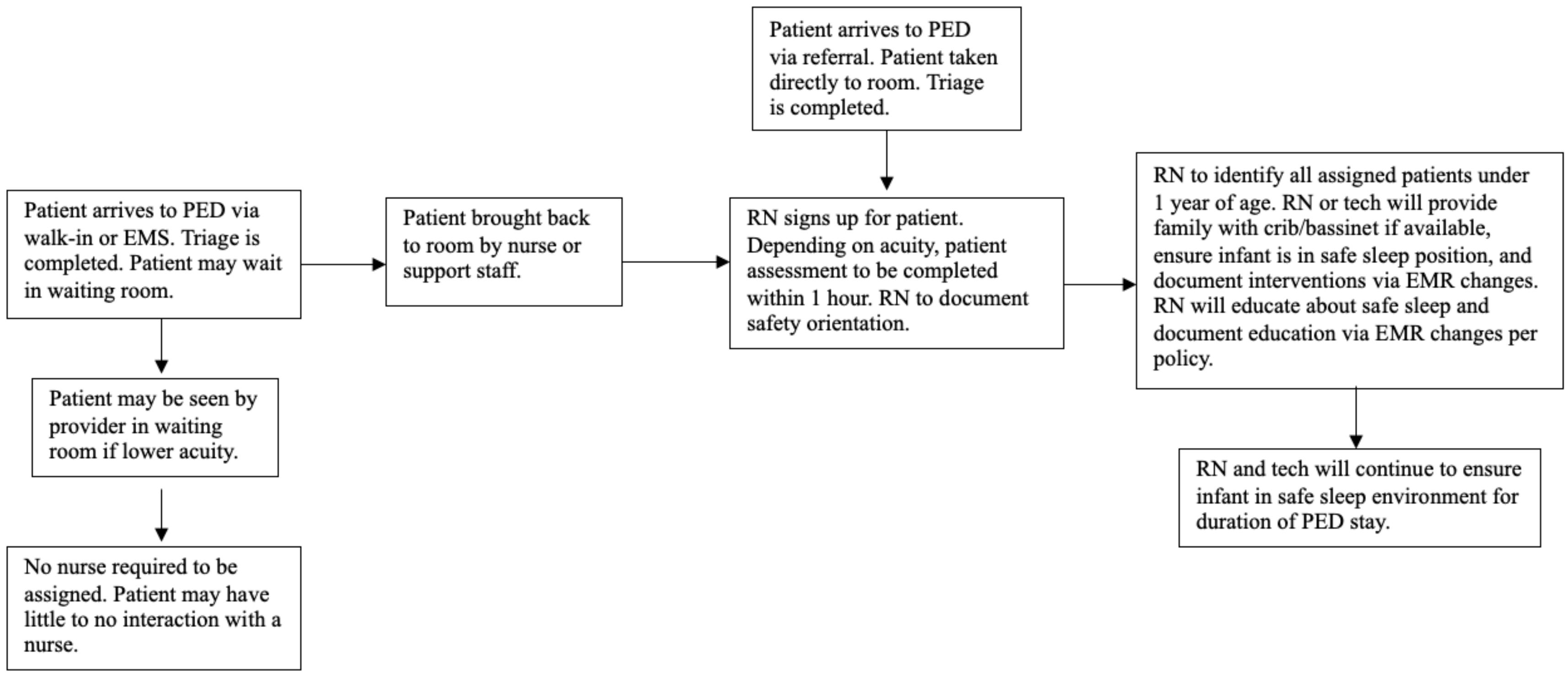
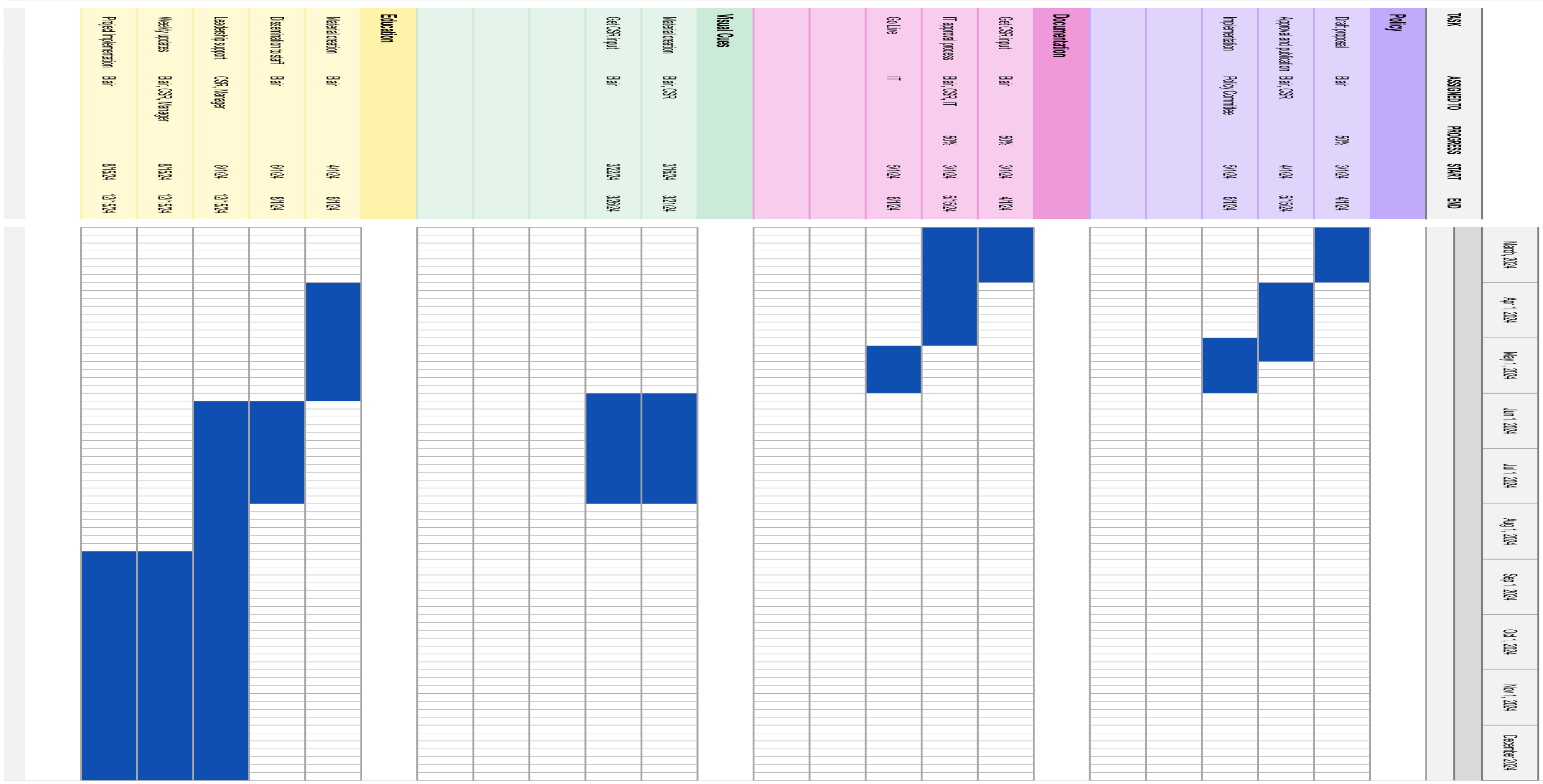


**Figure G2. Desired Process Map**



# Appendix H

## GANTT Chart



# Appendix I

## Intervention Visuals

### Figure I1. Changes Made to EMR

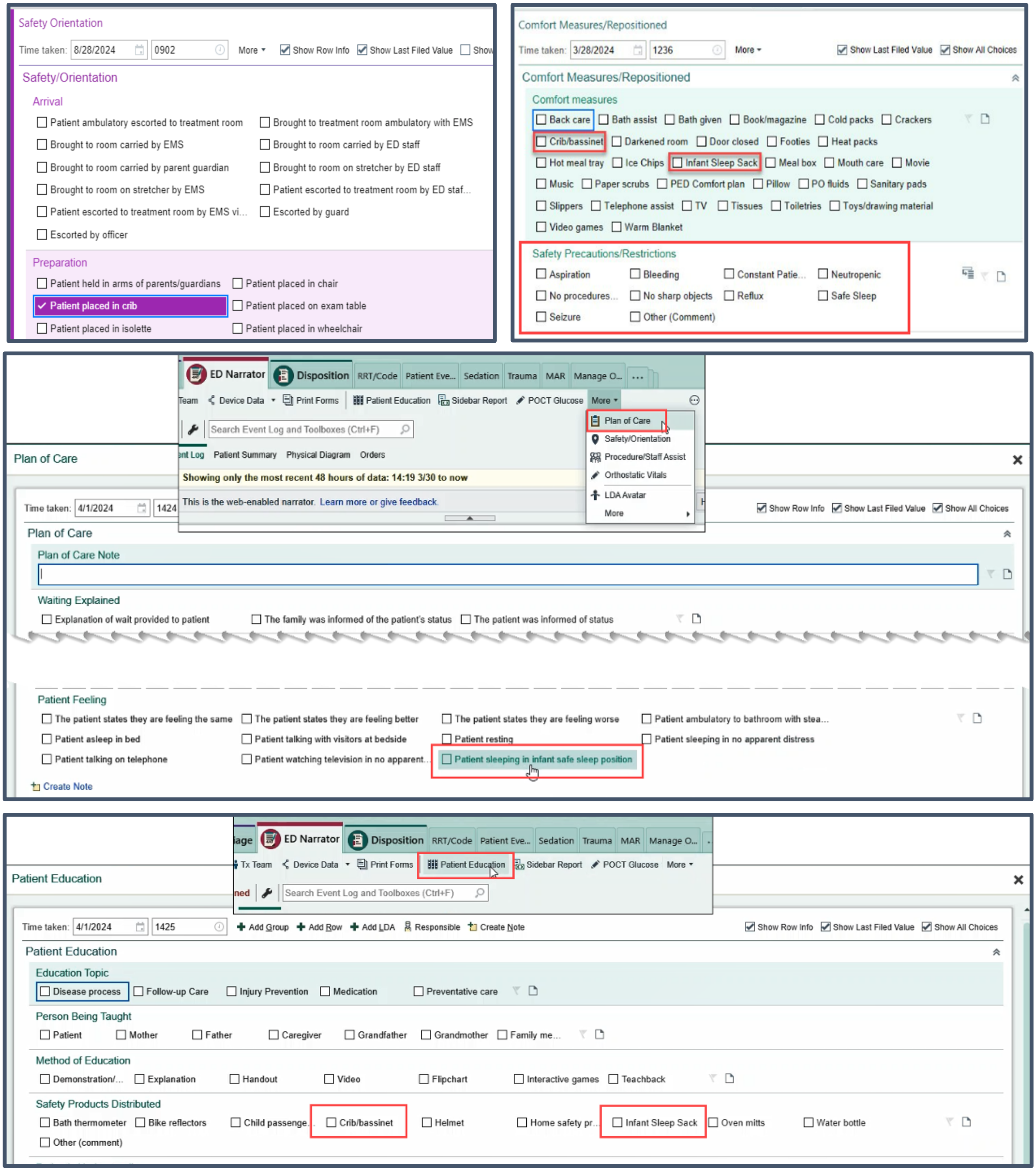


**Figure I2. Crib Cards**

# Safe Sleep ABCs

Keep your baby safe while they sleep by making sure they are:

**A**lone
- Do not place pillows, blankets, toys, or any other objects in the crib with your baby.
- Do not share a bed with your baby.
- A pacifier is okay.

on their **B**ack
- Place your baby to sleep on their back.
- If your baby can roll, you can let them roll themselves onto their stomach after placing them on their back.

in a **C**rib
- Place your baby on a flat, firm surface to sleep.

JOHNS HOPKINS
CHILDREN'S CENTER

# Infant Safe Sleep ABCs

**Keep your baby safe while they sleep by making sure they are:**

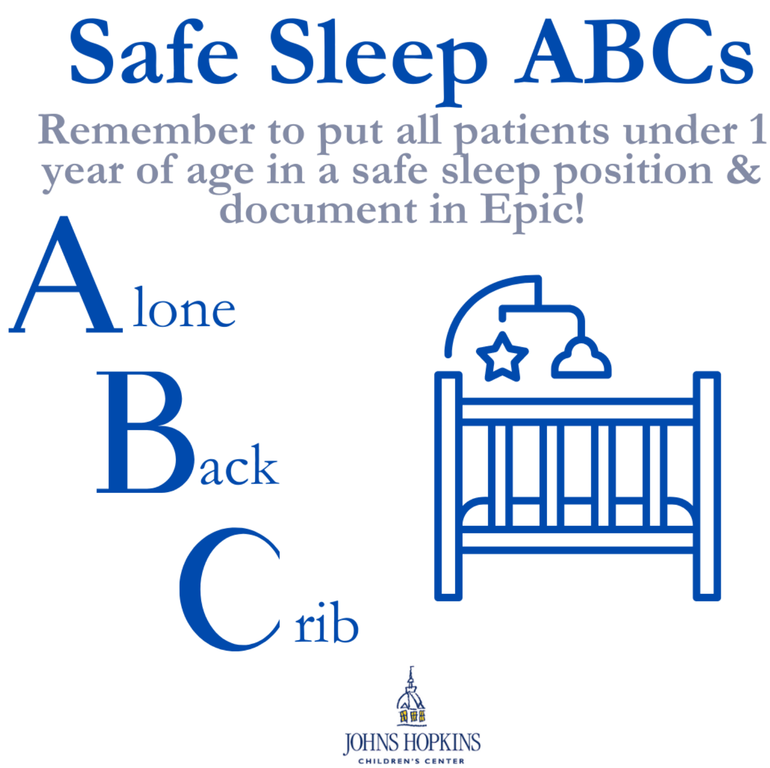
**A**lone

on their **B**ack

in a **C**rib

JOHNS HOPKINS
CHILDREN'S CENTER

**Figure I3. Computer Signage**



## Appendix J

## Audit Tools

**Figure J1. Staff Education Audit**

Page 1

# Staff Education List

Please complete the survey below.

Thank you!

1) Date (00/00/0000): ______________________________

2) Name of staff member who received/completed the education: ______________________________

**Figure J2. Documentation Audit**

*Page 1*

# Documentation Data Audit

Please complete the survey below.

Thank you!

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Date (00/00/00): ______________________________

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Patient MRN ______________________________

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Is the infant excluded from the interventions for any reason (i.e., they were unstable/treated in Critical Care, they left without being seen, they received all of their care in the waiting room, they never had a nurse assigned to them, etc.)?

- ○ Yes
- ○ No

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Which type of safe sleep documentation was completed?

- ☐ Comfort Measures: Crib/bassinet
- ☐ Comfort Measures: Infant sleep sack
- ☐ Comfort Measures/Safety: Safe Sleep
- ☐ Plan of Care: Patient sleeping in infant safe sleep position
- ☐ Patient Education/Safety Products Distributed: Crib/bassinet
- ☐ Patient Education/Safety Products Distributed: Infant sleep sack
- ☐ None

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If any documentation is present, what is the name of the staff member who documented it? ______________________________

**Figure J3. Visual Infant Sleep Audit**

*Page 1*

# PED Safe Sleep Audit

Please complete the survey below.

Thank you!

| | |
|---|---|
| Date (00/00/00): | ________________ (Note: Only complete on eligible, asleep patients!) |
| What shift is this audit being performed? | ○ AM (7a-7p)<br>○ PM (7p-7a) |
| Patient MRN | ________________ (Note: Start with JH) |
| Is the asleep patient excluded from the safe sleep score (i.e., the patient is being held or is in a carseat)? | ○ Yes<br>○ No |
| If the patient is excluded, where is the patient? | ○ Being held by an awake caregiver<br>○ Being held by an asleep caregiver<br>○ In a carseat<br>○ Other |
| Is the patient in a crib or bassinet? | ○ Yes<br>○ No |
| Is the patient alone on the sleep surface (EXCEPT for a swaddle on the infant, a pacifier, and required/attached medical equipment only)? | ○ Yes<br>○ No |
| Is the patient on their back? | ○ Yes<br>○ No |
| Is the head of bed is flat? | ○ Yes<br>○ No |
| How many (out of 4) of the safe sleep variables were met for this patient? | ________________ |
| If the child is not in a crib or bassinet, where is the child? | ☐ On a stretcher<br>☐ Being held by an awake caregiver<br>☐ Being held by an asleep caregiver<br>☐ In a carseat<br>☐ Other |
| If the child is not in a crib or bassinet, are there appropriate cribs/bassinets available on the unit? | ○ Yes<br>○ No |

*Page 2*

| | |
|---|---|
| If the crib or bassinet is not empty, what else is in the crib or bassinet? | ☐ Extra blanket(s) (including those draped over patient)<br>☐ Pillow(s)<br>☐ Bottle<br>☐ Toys<br>☐ Non-essential medical equipment (thermometer, BP cuff, etc.)<br>☐ Other |
| If the infant has not met all 4 safe sleep variables, is there documentation of parent/family refusal to adhere to safe sleep practices under Plan of Care and/or Patient Education? | ◯ Yes<br>◯ No |
| If any safe sleep criteria are met, what is the name of the staff member(s)? | ________________________________ |

## Appendix K

## Results

**Table K1. Staff Education**

| Project Week Number | Number of Staff Educated (n=71) |
|---|---|
| -1 | 7 (10%) |
| 1 | 0 (0%) |
| 2 | 0 (0%) |
| 3 | 17 (24%) |
| 4 | 11 (15%) |
| 5 | 1 (1%) |
| 6 | 6 (8%) |
| 7 | 0 (0%) |
| 8 | 1 (1%) |
| **Total:** | 43 (61%) |

**Figure K1. Documentation Rates**

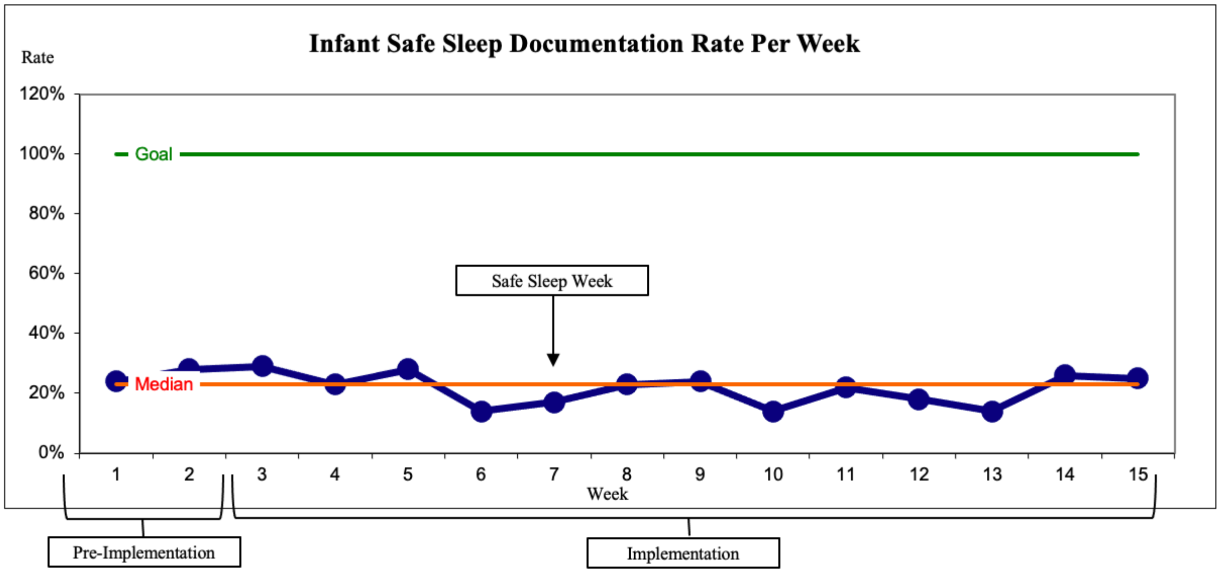

**Figure K2. Rates of Documentation Types**

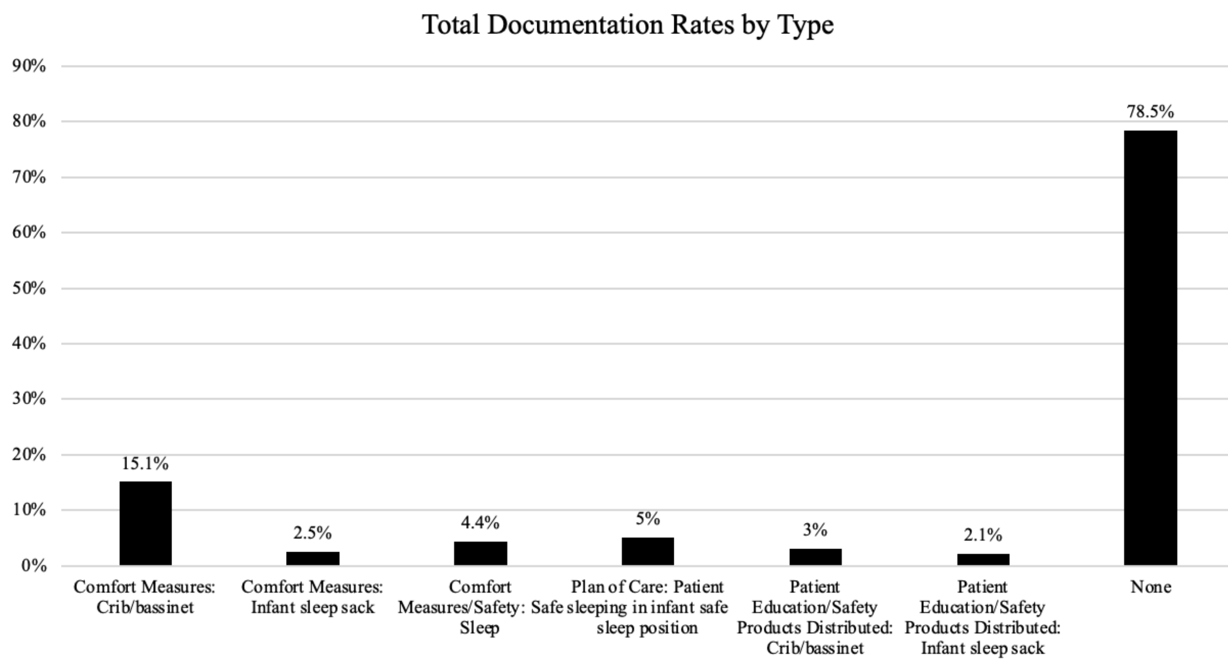

**Figure K3. Safe Sleep Scores**

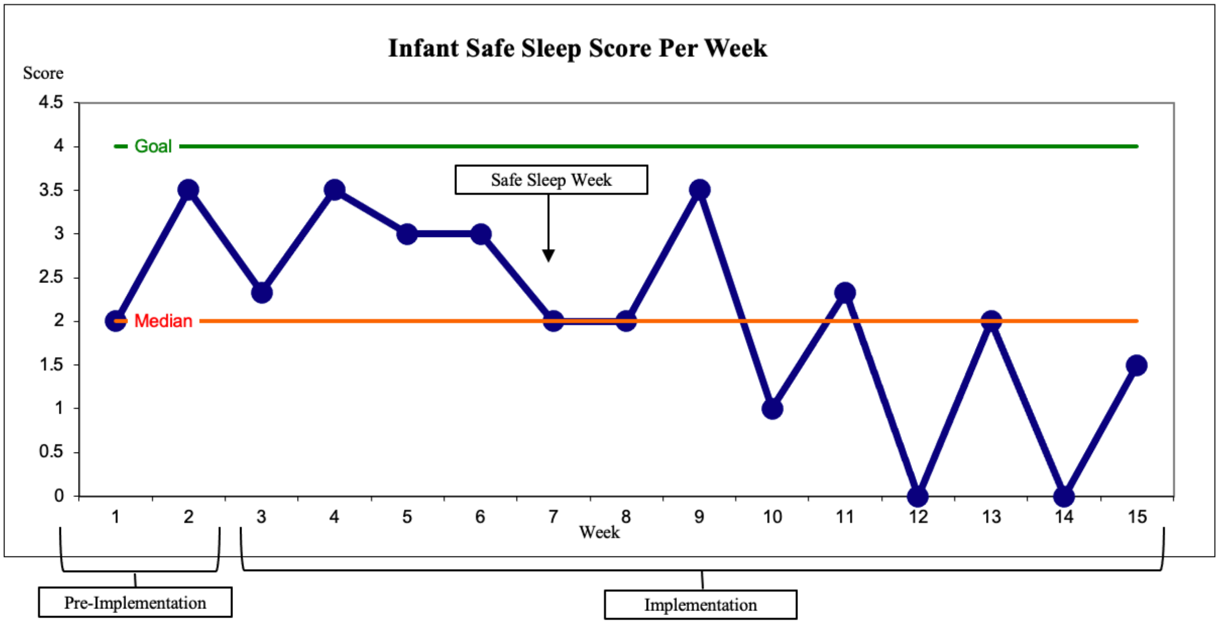

**Figure K4. Rates of Safe Sleep Criteria Types Met**

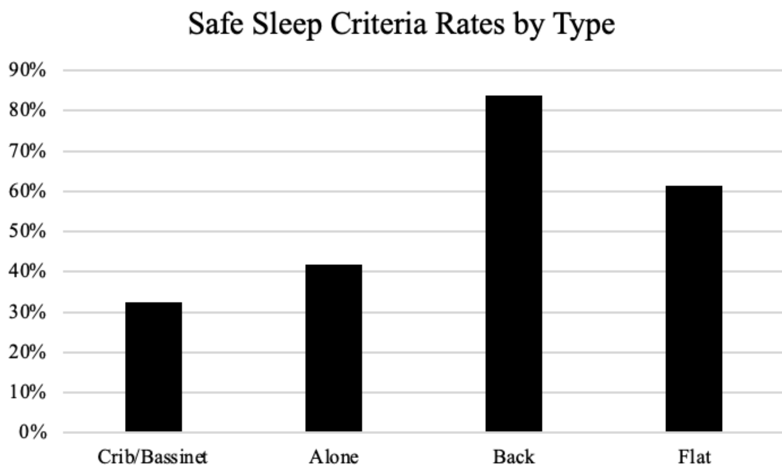

**Figure K5. Items on Sleep Surface**