

NICU Nurses' Knowledge and Discharge Teaching Related to Infant Sleep Position and Risk of SIDS

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Abstract:

Infants requiring neonatal intensive care are often placed prone during their acute illness. After hospital discharge the American Academy of Pediatrics (AAP) recommends supine sleep position to reduce the risk of Sudden Infant Death Syndrome (SIDS). Little is known about nursing knowledge and practice regarding best sleep positions for infants as they transition from neonatal intensive care to home.

Objective- To explore and describe neonatal intensive care unit (NICU) nurses' knowledge and practice in the NICU, and to determine the content of parent instruction regarding infant sleep position at discharge.

Study Design- This survey was conducted in 2 phases. In Phase I, a questionnaire was designed and completed by 157 neonatal nurses currently practicing in Level III and IV NICUs in the state of New York. After content analysis of responses and item revisions, a panel of experts reviewed questionnaire items. Phase II involved completion of the final questionnaire by 95 NICU nurses in 4 additional hospitals. The combined results of Phase I and II are reported.

Results- Of 514 questionnaires distributed, 252 (49%) were completed and analyzed. During NICU hospitalization, nurse respondents identified prone position as the best general sleep position for preterm infants (65%) followed by either prone or side-lying (12%). The nurses' assessment of the infants' readiness for supine sleep position at the time of NICU discharge varied. Most nurses responded that preterm infants were ready to sleep supine anytime (29%), close to discharge (13%), when maintaining their body temperature in an open crib (25%), between 34 to 36 weeks postmenstrual age (PMA) (15%), after 37 weeks PMA (13%), and when the infant's respiratory status was stable (6%). Typical sleep positions chosen for full-term infants in the NICU were supine (40%), side or supine (30%), all positions (18%), side (8%), prone or side (3%), and prone (1%). Frequently cited reasons to place full-term infants to sleep prone were: reflux (45%), upper airway anomalies (40%), respiratory distress (29%), inconsolability (29%), and to promote development (17%). At NICU discharge, 52% of nurses instructed parents to place their infants in the supine position for sleep. The most common nonsupine sleep positions recommended by nurses at discharge were either supine or side (38%), and exclusive side positioning (9%).

Conclusions- Nearly 95% of respondents identified a nonsupine sleep position as optimal for hospitalized preterm infants. Further, only 52% of neonatal nurses routinely provide discharge instructions that promote supine sleep positions at home. This study suggests that nursing self-reports of discharge teaching practices are inconsistent, and in some cases in direct conflict with the national “Back to Sleep” recommendations, which emphasize that the supine position is the safest position for healthy full-term and preterm infants after hospital discharge.

Article:

Sudden infant death syndrome (SIDS) is defined as “the sudden death of an infant <1 year of age, which remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history.”¹ In the late 1980s, prone sleep was recognized as a potentially modifiable risk factor for SIDS.² The 1992 American Academy of Pediatrics (AAP) Task Force on Infant Positioning and SIDS made recommendations aimed at SIDS reduction in the United States. In 1994, the AAP began the “Back to Sleep” campaign, to promote the supine sleep position for healthy full-term infants. In the United States between 1994 and 1998 infant prone sleeping declined from 43% to 12% and supine sleep increased from 17% to 51%.¹ Since that time, the rate of infant prone sleeping position has plateaued.³ As a result of the “Back to Sleep” efforts, the SIDS rate decreased by 50% since 1992.⁴ However, SIDS remains the leading cause of infant mortality outside the neonatal period.³

In 2005, the AAP Task Force on SIDS issued updated guidelines for healthy sleep practices for newborn infants that include several new or re-emphasized recommendations (Table 1).⁴ In the updated guidelines, positioning infants on their side for sleep is no longer an accepted alternative to supine sleeping. Pacifier use is also strongly associated with a reduced risk for SIDS. Further, to reduce the prevalence of positional plagiocephaly, the guidelines call for “tummy time” and upright “cuddle time” and advise against excessive time in infant car seats and “bouncers.”

Table 1: Key Recommendations for Healthy Sleep Practices of Preterm and Full-term Infants

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1. All infants should be placed supine every time they are put to sleep.
 2. Use a firm sleep surface.
 3. Keep soft materials or objects out of the crib.
 4. Do not smoke during pregnancy.
 5. A separate but proximate sleeping environment is recommended; bedsharing, as practiced in the United States, is a greater hazard than sleeping separately; sleeping in the same room as the mother is best.
 6. Consider offering a pacifier at nap time and bedtime. For breastfed infants, delay pacifier introduction until 1 month of age.
 7. Avoid overheating; infant should be lightly clothed to sleep.
 8. Avoid commercial devices marketed to reduce the risk of SIDS.
 9. Do not use home monitors as a strategy to reduce the risk of SIDS.
 10. Avoid positional plagiocephaly by encouraging “tummy time” and “cuddle time.”
 11. Continue the “Back to Sleep” campaign.
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*Summary of the American Academy of Pediatrics Policy Statement 2005.

Although the original AAP guidelines in 1992 did not specifically include preterm infants, subsequent statements extended recommendations for supine sleep to preterm infants. In 2005 the AAP reaffirmed the recommendation to place all healthy preterm infants to sleep in the supine position.⁴ Current evidence suggests that the association between prone sleep and the

increased risk of SIDS in preterm infants is stronger than infants born at full-term, further emphasizing the importance of supine sleep in this population.⁵

Parental practices regarding infant sleep position are strongly influenced by their observation of the sleep position of their infant in the hospital, perceived infant preference, and by advice from healthcare professionals.⁶⁻⁸ Teaching parents to place their infant in a supine position to sleep begins with healthcare professionals modeling safe sleep practices in the hospital. However, because critically ill infants cared for in an intensive care setting may be best cared for in a prone position during the acute phase of their illness, the sleep model seen by parents in the NICU may be inconsistent with best sleep practices for healthy preterm infants.

Known barriers to nurses' acceptance of positioning full-term infants supine in normal newborn nurseries include fear of aspiration and poor quality of sleep.^{9,10} Although not yet studied, perceived harmful effects in preterm infants such as aspiration, apnea, and poor sleep quality may make NICU nurses reluctant to place infants supine for sleep in the hospital and to teach parents "Back to Sleep" practices for use at home.

REVIEW OF THE LITERATURE

Incidence of SIDS in Infants Discharged From the NICU

Although the etiology of SIDS is unknown, factors associated with an increased risk of SIDS include:

- Low socioeconomic status (SES);
- Prematurity (<37 weeks gestation);
- Low birthweight (LBW; <2500 grams);
- Side and prone positioning;
- Overheating;
- Prenatal and postnatal smoke exposure;
- Cobedding with infants; and
- Soft or loose bedding.⁴

In the full-term population (≥ 37 weeks), the risk for SIDS is greater among infants that required NICU care. Compared to infants not requiring intensive care, full-term infants discharged from the NICU have a 2-fold greater risk for SIDS.¹¹ The increased risk of SIDS among full-term infants leaving the NICU may in part be related to the presence of additional risk factors for SIDS, such as late prenatal care, young maternal age, and high parity.^{5,12}

Further, the risk of SIDS for preterm and LBW infants is greater than that for full-term infants, especially when preterm infants are placed in non-supine sleep positions. Estimates of the risk vary. The Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) study, conducted in England between 1993 and 1996, compared sleep practices of 325 SIDS deaths with 1300 controls matched for age, date, and locality. A number of articles have been published based on data from this 3-year population-based, case-control study. When compared to healthy full-term infants, infants <37 weeks gestation had a 4 times greater risk of SIDS and infants <34 weeks gestation had a 10 times greater risk.^{11,13} However, the risk of SIDS for preterm infants sleeping prone was 85 times greater than that of full-term infants.¹¹ In this study of infants born "small at

birth” (<37 weeks’ or <2500 grams) side position was the most common position used for infants who died of SIDS compared to all other positions. Supine position was most common for controls and full-term infants.

Up to 42% of deaths attributed to SIDS in LBW and preterm infants have been associated with the nonsupine sleep position at home.¹³ A 3-year case-control study was conducted in Denmark, Norway, and Sweden between September 1992 and August 1995, recruiting all cases (244) of infants dying suddenly and unexpectedly between 1 week and 1 year of age. The cause of death was confirmed by a standard protocol and interviews with parents were completed. Information about sleep environment, perinatal complications, and demographic conditions was also collected. There were 869 controls matched for age, gender, and place of birth. This study confirmed an increased risk of SIDS among LBW and preterm infants sleeping in non-supine positions showing an 83 and 37 times greater risk for LBW infants sleeping prone and side-lying respectively. For preterm infants, the risk of SIDS was 49 times greater for prone infants and over 40 times greater for side sleeping infants.⁵

Benefits of Prone and Side-Lying Positioning in Hospitalized Neonates

The physiologic effects of prone positioning on ill newborn infants, especially those with lung disease, have been well documented in the literature. Preterm infants recovering from respiratory illness consistently had improved oxygenation and thoracoabdominal synchrony when cared for in the prone position. These findings were attributed to higher lung volumes,^{14,15} enhanced ventilation/perfusion ratios, improved chest wall mechanics¹⁵⁻¹⁸ and respiratory muscle tone,¹⁸ increased time sleeping,¹⁹ and decreased energy expenditure.²⁰ It is important to note that in convalescing infants, oxygenation and functional residual capacity are improved in oxygen-dependent infants positioned prone; however, these parameters were not improved in infants of similar postmenstrual ages (PMA) who did not need supplemental oxygen.²¹

Developmental Care

Providing soft bedding, boundaries for containment, and prone positioning are developmentally supportive strategies commonly used in the NICU. These interventions are appropriate for preterm infants who need to maintain better postural flexion to optimize developing muscle tone and organizational skills. However, these interventions contradict the AAP recommendations for positioning healthy preterm infants after discharge.^{22,23} The controversy following the 1996 revision by the AAP, recommending supine positioning for preterm infants, inspired new research on the combined physiologic effects of body position and sleep states in older preterm infants. Several recent studies show maturational trends in the physiology of prone sleep that may be hazardous as preterm infants mature.²⁴⁻²⁶

Despite widespread use, cobedding multiples in the NICU to promote bonding has not been carefully evaluated for either safety or efficacy. Pre-existing risk factors for SIDS including prematurity, LBW, and intrauterine growth restriction are associated with multiple gestations. Cobedded infants are often placed in nonsupine sleep positions, such as side-lying and facing each other, raising concerns regarding additional known risk factors for SIDS, such as impaired thermoregulation or overheating, and the potential for the cobedded sibling to rebreathe exhaled air if cobedding is practiced at home.²⁷

Positioning and Gastroesophageal Reflux

Gastroesophageal reflux (GER), the flow of gastric contents into the esophagus,²⁸ is a normal physiologic event occurring in most full-term and preterm infants.^{29,30} Gastroesophageal reflux is significantly decreased in the prone and left lateral position.³¹ However, for physiologic and anatomic reasons, the infant's ability to protect the airway is significantly superior supine.³²

Gastroesophageal reflux disease (GERD) can be problematic for a small minority of infants when reflux produces symptoms such as vomiting, poor weight gain, dysphagia, esophagitis, abdominal or substernal pain, or respiratory disorders. Because prone positioning is strongly associated with higher rates of SIDS, it is no longer recommended for the management of GERD except in rare cases where the risk of death from GERD is greater than the risk of SIDS.²⁸

Although reflux and cardiorespiratory events are common in preterm infants, there is little evidence to suggest that they are causally related.^{29,30} Countries that typically place preterm infants to sleep supine have not reported increased problems related to GER or GERD, reports of aspiration, or other respiratory problems.³³ The body of evidence supports the AAP recommendations for supine sleep in healthy preterm infants to reduce the risk for SIDS.

Infant Sleep Characteristics

Perceived improvements in quality of sleep in the prone position have been used as a rationale by parents and healthcare providers for placing infants prone.¹ However, this is not supported by the data. Overall percentages of sleep and total sleep are unaffected by body position.^{25,26} In supine sleep, the threshold for arousal is decreased in all sleep states resulting in more frequent awakenings, a potentially protective mechanism against SIDS.²⁶ In preterm and LBW infants, less frequent awakenings during quiet sleep in the prone versus supine position have been found.⁷ In healthy preterm infants, arousal from sleep is significantly decreased in the prone position during quiet sleep through the peak age for SIDS.³⁴ Moreover with maturity, periods of quiet sleep increase during sleep state development.³⁵ In addition to fewer sleep transitions, preterm infants, when placed prone for sleep, at 1 month corrected age have prolonged QT intervals, and reduced heart rate variability, potentially increasing their vulnerability for SIDS.²⁵ Despite concerns about the potential vulnerability of respiratory control in preterm infants sleeping supine, significant differences have not been found in the incidence or severity of apnea, bradycardia, or desaturations related to positioning before discharge or at 1 and 3 months post-discharge.³⁶

Nursing Practices and Beliefs About Sleep Position

Nurses remain reluctant to routinely place infants in the supine position for sleep and may not always recognize the strong impact of their own behavior on subsequent parent behaviors. The rationale for their concerns, specifically the risk for aspiration, is unfounded.^{8,9} Outdated hospital policies on infant sleep position or lack of awareness by nursing staff may contribute to variability in practice.⁹ Studies of mothers after hospital discharge indicate that nurses did the majority of teaching before discharge; however, parents often reverted to nonsupine sleep positions for infants over time, peaking at 3 months, which coincides with the peak incidence of SIDS.^{7,24,37} Further, mothers of very low-birthweight infants were more likely to use nonsupine positions, citing advice from medical professionals and nursery practices as primary influences.⁷

Clearly, more attention needs to be paid to effective teaching of safe sleep practices in this vulnerable population.

Little is known about the knowledge and practice of NICU nurses in relation to infant sleep position and SIDS. Inconsistencies in practice and parent education regarding the best sleep position for infants who initially required intensive care may potentially place full-term and preterm infants discharged from the NICU at an increased risk for SIDS.

PURPOSE OF THE STUDY

The purpose of this study was to explore and describe NICU nurses' self-reported knowledge, practices, and parent teaching regarding infant sleep position. The specific research questions were:

1. How are infants positioned for sleep (in the NICU)?
2. What is the rationale for this practice?
3. How are parents advised to position infants for sleep after hospital discharge?
4. What are the reasons for this advice?

METHODS

This survey was conducted in 2 phases. Phase I consisted of the development of the survey questionnaire items, item revision, survey administration, content analysis of responses, further item refinement, and expert review. Phase II was the completion of the revised questionnaire by a new sample of NICU nurses. Institutional Review Board approval was obtained for both phases of this project. All responses were anonymous.

Phase I: Instrument Development and Initial Testing

Instrument development was the first step in this study. No reliable and valid tools were found that addressed the topics of nurses' knowledge of and their practices regarding sleep positioning options, preferences, and rationales. Nine open-ended questions were written by the investigators based on "Back to Sleep" guidelines and experience on the topics of sleep position options for full-term and preterm infants. Questions also addressed the caregiver's rationale for the choice of position, practices related to co-sleeping of multiples, and instructions to parents before hospital discharge of their infants. The tenth and final question probed nurses' interest in learning more about all of these topics (Table 2).

The Phase I questionnaire was sent to a convenience sample of Level III and IV NICUs located in varying geographic locations in upstate New York. Questionnaire distribution and return was facilitated by practitioners at all sites. Registered nurses (RNs) working in these facilities' NICUs completed the questionnaire on a voluntary basis.

The content of the responses was analyzed using reported content analysis steps.³⁸ Three investigators, all advance practice nurses (APNs), worked independently to categorize the responses; thereafter, categorization was compared and found to have >99% agreement. The remaining minor disagreements were reconciled by the principal investigator.

Table 2: Phase I Survey Questionnaire on Infant Sleep Position

1. Which sleep position is best for preterm infants?
Supine _____
Prone _____
Side-lying _____
Why?
2. When should preterm infants begin to sleep supine?
3. How are preterm infants typically positioned during sleep in your hospital's nursery?
4. Are twins and triplets in your nursery coved? Yes _____ No _____
5. Do you have a policy on covedding? Yes _____ No _____
6. What are your thoughts about covedding twins and triplets?
7. Should full-term infants be positioned prone in certain cases? Why?
8. How are full-term infants typically positioned in your nursery?
9. How do you instruct parents to position their infant at home?
10. Would you be interested in learning more about any of these issues?
11. If yes, which ones?

The original 10 questions were revised and expanded using the analyzed data to improve clarity, precision, and to develop comprehensive response sets. Categories of responses identified during analysis became the response choices for the resulting multiple-choice questions. For example, the Phase I question, "Which sleep position is best for preterm infants? Why?" became 3 questions in the final survey. Question 1, "Please select the best sleep position for preterm infants" was followed by 6 possible position choices identified from completed questionnaires. Question 2 asked for the caregivers' rationale for choosing the prone position, and was followed by 7 specific rationales (developed from the initial questionnaire testing) and an open response of "other." Question 3 asked for the rationale for positioning an infant in a position other than prone, with an open format option for the response.

The revised items were sent to a panel of clinical and SIDS experts including 3 neonatologists, 3 APNs, 3 neonatal RNs, and a sociologist with SIDS expertise for assessment of face validity, readability, accuracy, completeness, and ease of completion. Minor revisions were then made based on their feedback, including the need for baseline demographics (level of nurse education and experience) that were incorporated into the final survey. Phase I was completed in 2003.

Phase II: Final Survey Sampling Design

The final 18-item questionnaire (Table 3) was distributed by mail to neonatal nurses at 4 NICUs that were not involved in the Phase I testing; 2 in New York and 2 in additional states. These institutions were identified through the American Association of SIDS Prevention Physicians (AASPP) contacts and met the same inclusion criteria as Phase I. The cover letter stipulated that the survey was voluntary and anonymous. Data collection occurred from November 2003 through April 2004. Surveys were returned to the principal investigator in bulk from each site.

Table 3: Phase II Questionnaire on Infant Sleep Position

1. Please select the best sleep position for **premature** infants
 - a. Prone
 - b. Supine
 - c. Side or supine
 - d. Side
 - e. All positions
 - f. Prone or side
2. If you selected prone, please select any of the following reasons (may choose more than 1)
 - a. Improved oxygenation
 - b. Feeding tolerance
 - c. Comfort of breathing
 - d. Developmental (upper body tone, comfort, organization, sleep better)
 - e. Less apnea and bradycardia
 - f. Improved respiratory mechanics (chest/lung expansion, thoracoabdominal synchrony)
 - g. Airway patency
 - h. Other _____
3. If you selected a position other than prone, please give rationale _____
4. Typical sleep position(s) of **premature** infants in the NICU
 - a. Prone e. Supine or side
 - b. Supine f. Prone until close to discharge
 - c. Side g. Prone or side
 - d. All positions
5. When should **premature** infants begin to sleep supine? (may choose more than one)
 - a. Anytime with proper positioning
 - b. Never
 - c. Between 34 to 36 weeks
 - d. After 37 weeks
 - e. When placed in open crib, maintaining temperature
 - f. When good head control is developed
 - g. When weight reaches 1800 grams
 - h. Other _____
6. Is cobedding of multiples practiced in your NICU?
 - a. Yes
 - b. No
7. Does your NICU have a written policy on cobedding multiples?
 - a. Yes
 - b. No
 - c. Don't know
8. What is your opinion on cobedding multiples in the NICU.
 - a. Approve
 - b. Disapprove
 - c. No opinion/neutral
9. If you approve of cobedding, select any of the following list of reasons:
 - a. Parents like to see their infants together
 - b. Calming/comforting for infants
 - c. Less episodes of apnea and bradycardia
 - d. Beneficial for infants (growth, temperature maintenance)
 - e. Most parents will cobed infants at home
 - f. Other _____

10. If you disapprove of cobedding multiples, select any of the following reasons:
- Overstimulating for infants
 - Difficult to provide care
 - Increases risk for SIDS, inconsistent message for parents
 - Increased risk for infection
 - Identification errors (medication, equipment, feeding)
 - Most parents choose not to cobed infants at home
 - Other _____
11. Typical sleep position of **term** infants in NICU
- Prone until stable d. Side
 - Supine or side e. Prone or side
 - All positions f. Supine
12. Should **term** infants be placed prone for sleep in certain cases?
- Yes
 - No
13. If answered yes to question 12, choose any of the following reasons:
- Reflux
 - Upper airway anomalies that cause obstruction in prone position
 - Irritability/inconsolability
 - Neurologic impairment (e.g., hypotonia)
 - Respiratory distress
 - Spinal defects
 - While awake and observed for developmental purposes
 - Other _____
14. Which of the following most closely resemble the instructions that you give to parents about infant sleep position after discharge?
- Always place infant to sleep on back
 - Back or side for sleep
 - Whatever position the infant is most comfortable sleeping is best
 - Side with positioning rolls
 - Please list any other instructions regarding infant positioning or sleep environment not listed above:
15. Does your unit have a policy on infant sleep positioning?
- Yes
 - No
 - Don't know
16. Do you use written discharge instructions that include instructions for infant sleep positioning on your unit?
- Yes
 - No
- If answered yes, do they include specific instructions for sleep positioning of **premature** infants?
- Yes
 - No
17. Would you be interested in learning more about any of the topics mentioned in this survey?
- Yes
 - No
 - Don't know

18. If answered yes please select from the following list of topics:

- a. Indications for positioning term infants prone
- b. Recommendations for elevating head of bed
- c. Cobedding research/issues
- d. Recommendations for positioning of premature infants
- e. SIDS statistics since "Back to Sleep" campaign
- f. Developmental effects of positioning
- g. Specific problems related to prone positioning
- h. When to place premature infants supine for sleep
- i. Physiologic effects of prone positioning in neonates
- j. Premature versus term positioning
- k. Current recommendations for sleep positioning of infants
- l. Current findings supporting the current recommendations
- m. All topics mentioned on questionnaire
- n. Other _____

19. Nursing Education/Degree(s):

- a. Associates
- b. Bachelors
- c. Doctorate
- d. Diploma
- e. Masters
- f. Other _____

20. Years of nursing experience

Years of NICU nursing experience _____

Postscript for phase II survey: This questionnaire was developed at St. Joseph's Hospital for phase II of this study. This instrument has since undergone further development for use in part 2 of an ongoing research project, which will measure effectiveness of an educational program on SIDS, developed by the researchers and targeting NICU nurses. This project is in collaboration with the Georgia SIDS Project and funded by the AAP CATCH committee. Special thanks to Kathi Peeke MS, RCN, Dr. Rachel Moon, Dr. Eve Colson, and Cynthia Squillace, CSW for their contributions in questionnaire development.

Sample Size Calculation

To determine the sample size necessary to detect a significant difference in the reported rate of correct advice given in practice (actual advice given) compared to the postulated rate of correct advice given (assumed to be 90%) a power analysis was calculated. The postulated rate of correct advice given (90%) conservatively allows for the possibility that the nonsupine sleep position was indicated and correctly advised in up to 10% of infants, reasons for which may include GER or airway anomalies. A 10% absolute risk difference (80% vs. 90%) was considered clinically significant and used in the sample size calculation. For 80% power, $\alpha < 0.05$ and 10% absolute risk difference, a sample of 219 respondents was needed. Sample size was increased to allow for <100% response rate. Follow-up rates in this self-administered questionnaire, distributed without incentive for completion (monetary or otherwise), were anticipated to be between 45% and 65%, raising the number of questionnaires needed to 487 to 336, respectively.

Data Analysis

Statistical analyses were performed using STATA version 8.0 (StataCorp LP, College Station, Tex). Data fields were screened for obviously erroneous entries and missing data points. Bivariate analyses were performed using the χ^2 test for categorical variables. The Fisher's exact test was used where the expected value of any cell was <5. Results were considered significant at a 2-sided, $P < 0.05$. Logistic regression was used to identify factors independently associated

with advising supine sleep position at NICU discharge. In the logistic regression model, the presence of a unit policy on sleep position and years of nursing experience (>6 years) were analyzed as dichotomous variables; nursing degree was analyzed as a categorical variable. Logistic regression results are presented as an odds ratio (OR), the relative odds of advising supine sleep position at NICU discharge.

RESULTS

In Phase I, 157 of a possible 318 nurses completed the questionnaire, yielding a 49% response rate. Phase II completion and return rate was 48% (n = 95) of a possible 196 nurses on staff. Thus, from the 9 participating centers, 252 (49%) of the 514 nurses completed questionnaires. This response rate is consistent with other surveys on infant sleep position.^{9,39} Data from Phase I and Phase II were combined for final analyses. Phase I responses were codified to facilitate analysis and added to Phase II data because the instruments varied between Phase I and Phase II. Demographics, nursing education, and experience represent Phase II respondents only.

Nurses' Perception of "Best" Sleep Position for Preterm Infants

Supine position was identified as the best sleep position for preterm infants in 5.1% of respondents (13/251), a response that did not vary by center, years of NICU experience, years of general nursing experience, or nursing degree. Among the 95% of respondents choosing a non-supine sleep position, neonatal nurses identified the best sleep position as prone (65%), prone or side (12%), all positions (10%), supine (5%), and side (3%).

The nurses identified the following rationale for readiness for supine sleep by preterm infants: anytime with proper positioning (29%), when maintaining body temperature in an open crib (25%), at 34 to 36 weeks PMA (15%), after 37 weeks PMA (13%), close to discharge (11%), when respiratory status is stable (6%), within 2 weeks of discharge (2%), when weight reaches 1800 grams (2%), when good head control is developed (2%), when tolerating feedings (2%), and never (1%) (Table 4).

Table 4: Neonatal Nurses' Response to Question, "When Should Premature Infants Begin to Sleep Supine?"

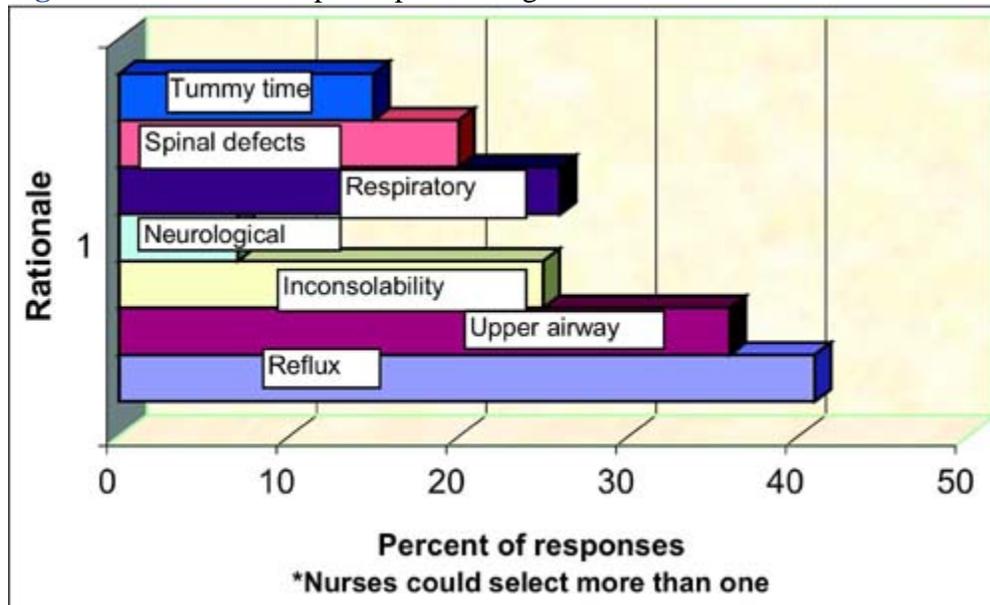
Response*	(n)	(%)
Anytime/proper position	78	29
Open crib, maintaining temp	65	25
Between 34 to 36 weeks	38	15
After 37 weeks	33	13
Close to discharge	31	11
Stable respiratory status	18	6
Within 2 weeks of discharge	7	2
1800 grams	6	2
Good head control	6	2
Tolerating feedings	5	2
Never	4	1

*Nurses could select more than 1 response.

Typical sleep positions chosen for preterm infants in the NICU were all positions (35%), prone (22%), prone or side (23%), prone until close to discharge (10%), side (1%), supine (5%), and supine or side (4%). Typical sleep positions chosen for full-term infants in the NICU were supine (40%), side or supine (30%), all positions (18%), and side (8%). Reflux was cited as the

most common reason to place a full-term infant prone (45%), followed by upper airway anomalies (40%), respiratory distress (29%), inconsolability (28%), and tummy time (17%) (Fig 1).

Figure 1: Rationale for prone positioning of full-term infants



Cobedding was practiced by 53% of the respondents. A majority of nurses in the 6 units that practiced cobedding approved of it, compared to a minority of nurses in the 5 units that did not practice cobedding. Approval of cobedding was greater among nurses with >5 years experience compared to less experienced nurses (75% vs. 51%, $\chi^2 = 12.6$; $P = 0.05$). There was no association between the highest nursing degree held by the respondent and his or her approval of cobedding.

Nurses' Self-Report of Discharge Teaching Content

Only 52% of the respondents advised parents to place their infant(s) exclusively supine after NICU discharge. Among respondents, 38% reported teaching parents that either side or supine was acceptable. An additional 9% instructed parents to place their infant exclusively in the side position, and 1% answered any position the infant preferred (Fig 2). Among 239 nurses responding that supine sleep position was not optimal for premature infants, 122 (51%), recommended supine position only after hospital discharge. There was significant variation in the proportion of respondents recommending supine sleep position at discharge by center (range, 0% to 96.5%, $\chi^2 = 137.1$; $P < 0.0001$) (Fig 3) and by nursing degree (masters degree, 57%; bachelors degree, 30%; associates degree, 63%; and diploma, 33%; $\chi^2 = 7.8$; $P < 0.05$) (Table 5). Controlling for differences in nursing degree and years of nursing experience, respondents working in centers that have a written policy on sleep position were more likely to advise parents to place their infants supine for sleep at NICU discharge (adjusted OR, 4.3; 95% confidence interval [CI], 1.7 to 11.2).

Figure 2: Discharge instructions given to parents.

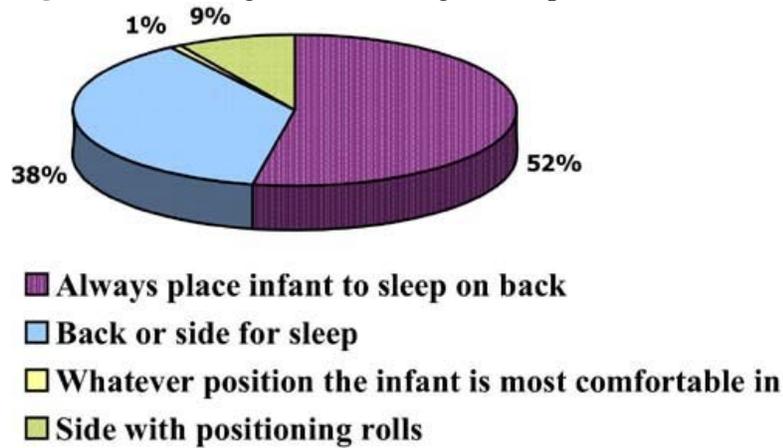


Figure 3: Nurses' self-report of discharge instructions given to parents.

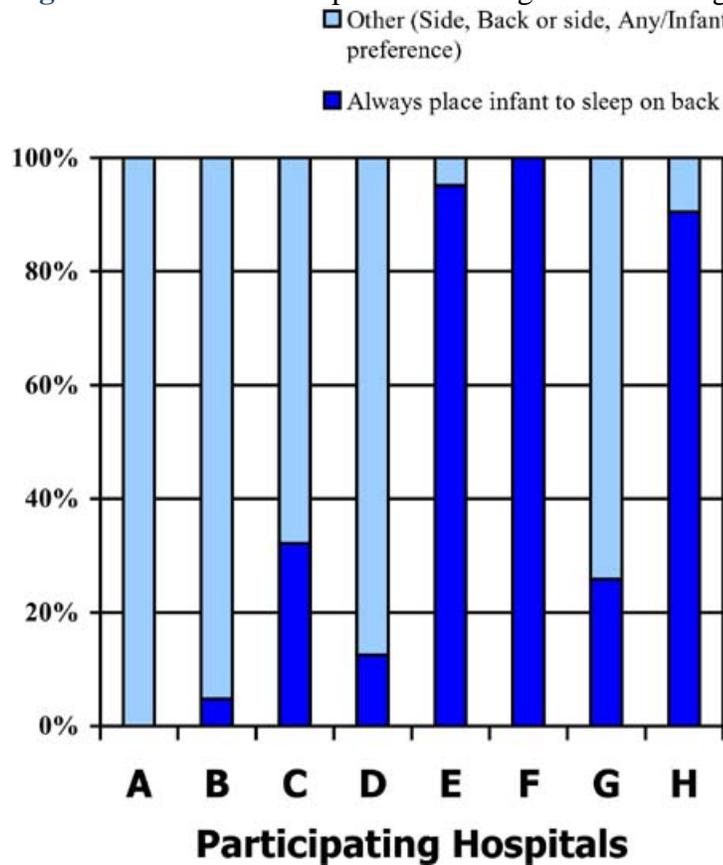


Table 5: Results of Logistic Regression Examining Effect of Education, Experience, and Presence of Unit Policy on Advice Regarding Infant Sleep Position

	Odds Ratio	95% Confidence Interval
Highest Educational Degree		
Associate	Referent	—
Bachelors	0.3	0.1 to 0.8
Diploma	0.4	0.1 to 1.7
Masters	0.7	0.1 to 4.2
Years NICU Nurse Experience	1.6	0.5 to 5.4
Presence of Unit Policy	4.3	1.7 to 11.2

A small minority of nurses in this study mentioned secondary AAP recommendations including tummy time, avoiding soft surfaces, or loose bedding. However, none of the nurses mentioned protecting infants from exposure to cigarette smoke, overheating, or bed sharing.

Of the nurses surveyed, 59% had a definite interest in receiving continuing education on safe sleep positioning for infants, whereas 41% were either uncertain or disinterested. Interest in continuing education on sleep position was inversely related to years of nursing experience. Nurses with ≤ 5 years experience, compared to more experienced nurses, were most likely to request further education on safe sleep positioning (79.2% vs. 50.6%, respectively, $P < 0.001$). Topics requested most frequently included cobedding multiples, readiness for preterm infants sleeping supine, indications for full-term infants sleeping prone, and all topics mentioned on questionnaire.

DISCUSSION

In this survey, 95% of NICU nurses identified a nonsupine sleep position as optimal for full-term and preterm infants by using a rationale that is consistent with recognized physiologic benefits of prone or side positioning for NICU infants during the acute stage of their illness. These rationales have the potential to be generalized and misapplied to well convalescent infants, in whom the supine position is the safest option.

Continued prone or side-lying placement after discharge is a significant modifiable risk for SIDS in these vulnerable infants. However, only 52% of neonatal nurses advised parents to place their infant supine for sleep after NICU discharge, a finding that is inconsistent with AAP guidelines. Those nurses who encouraged supine sleep at the time of discharge did not practice this consistently. Nurses' hesitancy to embrace the AAP recommendations is consistent with the findings of others.^{9,10,39}

Findings regarding the typical positioning of preterm and full-term infants in the NICU show that there are a variety of positions used by the nurses surveyed. The rationale for each position was not requested, limiting the interpretation of this survey. However, it is alarming that the use of supine alone (the position currently recommended as safest) was reported by only 5% of nurses caring for preterm infants. In full-term infants, nurses reported that only 40% are typically positioned supine and that the side-lying position is quite prevalent (>30%).

When asked when preterm infants could sleep supine, most nurses stated at 34 to 36 weeks PMA, within a few weeks of discharge, when tolerating feeds, or able to maintain body

temperature in an open crib. Until national guidelines regarding the timing and safety of supine position for healthy preterm infants are developed, nursing practice regarding transitioning infants from prone to supine position is likely to remain inconsistent.

Despite recommendations by the SIDS Global Strategy Task Force in 1995, our findings are consistent with those of others who have reported that in the NICU infants have not consistently been positioned supine as early as possible, nor has sufficient emphasis been placed on supine positioning in the hospital before discharge home.³³ Until specific criteria for assessing readiness for supine positioning are established, AAP guidelines reinforce the call for healthcare professionals in NICUs to implement recommendations for supine sleep well before an anticipated hospital discharge.⁴

A major knowledge deficit that emerged from the study regarding infant sleep positioning involved indications for placing infants in the prone position. Recent recommendations do not advise prone sleep for infants with GER or GERD, unless the risks of reflux outweigh the increased risk for SIDS.²⁸ Despite this recommendation, “reflux” was the most frequent rationale given for prone positioning. Recommended exceptions for supine positioning such as upper airway anomalies resulting in obstruction in the supine position, and “tummy time” used to reduce morbidity from overuse of supine positioning, were rarely mentioned by respondents.^{3,22}

The recommendations given to parents regarding best sleep position for infants after NICU discharge varied widely, a finding that replicates results of others.^{24,40} Nursing policy was mentioned frequently as a rationale for hospital sleep position and respondents working in a NICU with written guidelines on sleep position were more likely to advise supine positioning for sleep at home.

Although policy plays an important role in compliance, conflicting messages may be given to parents if nurses are not convinced of the rationale.²³ We speculate that nursing attitudes may be amenable to education and could result in practice changes. This may be a good first step in reorienting families away from prone position in the NICU and toward supine sleep positioning at home.

In 2000 the National Association of Neonatal Nurses (NANN) cautioned against the practice of cobedding multiples until further research was available and advised units choosing to cobed multiples to do so under a research protocol.²⁷ The prevalence of cobedding multiples is troublesome because multiple births are becoming more frequent and are often associated with prematurity and LBW, factors that are known to increase the risk for SIDS.⁴¹ No data exist that support the benefits of cobedding. Despite this, the majority of nurses in each of the 6 units that practiced cobedding approved of the practice.

Consistent with the findings of others,³⁹ this survey documented that the unstable side-lying sleep position is used exclusively or in combination with the supine position and was recommended frequently by nurses to parents for use after NICU discharge. This is especially alarming, given the escalated risk of SIDS in side-sleeping LBW and preterm infants.^{5,13}

STRENGTHS AND LIMITATIONS

The questionnaire was carefully and systematically developed with input from both content experts and practicing nurses, leading to item responses that reflected current practices. This study broadens our understanding of sleep preferences by encouraging nurses to respond openly to a wide variety of sleep position issues. Their responses provide a clear and coherent description of NICU nursing knowledge and self reports of practice. In addition to an adequate sample size, the representation of NICU nurses from a broad geographic area in several states and demographic populations increases the ability to generalize these findings.

The survey nature of the research, reliance on nurses' self-report, and the low response rate (49%) (although consistent with the response rate achieved in other surveys on infant sleep position) are limitations of this study. A low response rate has the potential to introduce selection bias.^{9,39} If respondents differed significantly from non-respondents the ability to generalize study findings to all neonatal nurses in the United States would be limited. Self-report instruments, such as the survey used in this study, may introduce reporting bias if respondents answered the survey questions on some basis other than what the items were designed to measure. Response bias could be further reduced if direct observation of nursing practice and parent education had been carried out. The convenience sample also limits the ability to generalize study findings.

The survey instrument could be improved by specifying gestational age, stage of illness, and describing the severity of GER or GERD. Exceptions to sleeping supine could have included preterm infants. Post-hoc analysis of reliability and validity was not done. Despite these limitations, which warrant further research, the information generated by this study adds to the knowledge of these topics.

IMPLICATIONS FOR PRACTICE AND RESEARCH

This study reveals inconsistencies in the self-reported practices of NICU nurses with current national guidelines published by the AAP and NANN. Neonatal nurses have a powerful opportunity to educate families about the risks for SIDS. Nurses also have a responsibility to model evidence-based strategies to reduce those risks.

Clear policies regarding infant sleep practices must be written and enforced. Parent education needs to be an integral part of the policy. Role modeling sleep practices in the hospital and instructions regarding safe bedding materials must also be included.²³ Educational interventions emphasizing the importance of safe sleep practices for NICU infants and the potential impact that role modeling in the hospital and discharge education have on parent practices at home requires further study to enhance understanding of these phenomena.

Neonatal nurses routinely care for critically ill infants in prone position and must assess readiness for transition to supine positioning. The appropriate timing for this transition requires additional study. The physiologic benefits of prone positioning for critically ill infants are often observed by NICU nurses, and may contribute to a lack of appreciation for emphasizing precautions to prevent SIDS after discharge, which are intangible.

Recent estimates suggest that formerly preterm infants comprise 25% of the population-attributable risk for SIDS.⁴¹ If this estimate is accurate and one assumes that based on the results

of this study 48% of formerly preterm infants are placed to sleep in a nonsupine position, then it is estimated that up to 310 SIDS deaths every year could potentially be prevented by effectively teaching caregivers to place infants supine for sleep during the convalescent stage of illness in and after discharge from the NICU.⁴¹ Assumptions used in calculation of population-attributable risk of SIDS for nonsupine sleep position compared to supine position include: 4,091,063 births of which 7.9% were LBW⁴¹; United States SIDS rate of 0.57 per 1000 infants⁴¹; a 5 times greater risk (OR) of SIDS among LBW versus normal birthweight infant¹²; and a 2.6 times greater risk (OR) of SIDS among nonsupine versus supine infants sleeping.¹²

Neonatal nurses recognize nonsupine positioning as optimal for infants requiring intensive care during the acute stage of their illness. However, after recovery from this illness nurses continue to give advice that is inconsistent with the national recommendations. This finding is alarming, given that the “Back to Sleep” campaign was 10 years old at the time these data were collected. If nurses model back to sleep practices in the NICU and educate parents about the hazards of nonsupine sleep before hospital discharge, a reduction in the incidence of SIDS among former NICU patients may be possible. Although former preterm and LBW infants now comprise a growing proportion of all infants dying of SIDS, with appropriate education, nurses in the NICU will be better equipped to teach parents safe sleep practices. SIDS rates among this vulnerable population could parallel the reduction seen after the original “Back to Sleep” campaign.

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