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Predicting Transition to the Supine Sleep Position in Preterm Infants

Sherri L. McMullen, PhD, RN, NNP-BC; Mary G. Carey, PhD, RN, CNS

The purpose of this secondary analysis was to determine what factors predict the transition of preterm infants to the supine sleep position prior to hospital discharge (N = 286). The supine position reduces the risk of sudden infant death syndrome. Factors found to predict a greater than 1-week transition to the supine sleep position were hospital policy ($P < .001$), gestational age ($P < .001$), and birth weight ($P < .01$). Transition to the supine position during hospitalization potentially reduces the risk of preterm infants being placed in nonsupine positions after hospitalization and, ultimately, the risk of untimely death by sudden infant death syndrome. **Key words:** *hospital discharge, infant, premature, sudden infant death syndrome, supine position*

BABIES continue to die of sudden infant death syndrome (SIDS) every day in the United States. Sudden infant death syndrome is “the sudden death of an infant less than one 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(p681)} Nurses play an essential role in both education and role modeling of supine sleep as the best sleep practice to reduce the risk of SIDS.

Author Affiliations: *College of Nursing, Upstate Medical University, Syracuse, New York (Dr McMullen); and Clinical Nursing Research Center, Strong Memorial Hospital, Rochester, New York (Drs McMullen and Carey).*

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Correspondence: *Sherri L. McMullen, PhD, RN, NNP-BC, College of Nursing, Upstate Medical University, 545 Cedar St, Syracuse, NY 13210 (McMulleS@Upstate.edu).*

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BACKGROUND AND SIGNIFICANCE

The incidence of SIDS has been greatly reduced since the “Back to Sleep” public health campaign was initiated in 1994, but 25% of infants continue to sleep in nonsupine positions after hospital discharge, placing them at risk for SIDS.^{2,3} The risk of SIDS is highest in full-term infants between 3 and 4 months of age and slightly longer in preterm infants.⁴ Diligence is necessary to obtain full compliance with the supine sleep position and save infants from untimely deaths within their first year of life.

Preterm infants are at a greater risk of SIDS; their risk is 4 times that of full-term infants.⁵ The risk of preterm infants dying of SIDS is 1.23 per 1000 for infants 33 weeks or younger at birth as compared with 0.788 per 1000 for infants 33 to 36 weeks’ gestational age and 0.37 per 1000 for infants born at 37 to 42 weeks’ gestation.⁴ Preterm infants remain at increased risk for SIDS, and special considerations to transition these infants to the supine position before hospital discharge should be a priority.

Placing the preterm infant in the supine position after discharge is an important intervention to reduce the risk of SIDS. Although

positioning preterm infants in a variety of positions while hospitalized can be important for both medical and developmental reasons, transition to the supine position while in the hospital is logical so that both the infant and parents are comfortable prior to discharge and use this position after discharge.⁶ Parents replicate practices they see in the hospital, so education and role modeling the correct position are essential. The supine sleep position for the infant should be reinforced as the exclusive sleep position subsequent to hospital discharge.

The American Academy of Pediatrics (AAP) recommends stable preterm infants sleep in the supine position by 32 weeks' postmenstrual age.^{7,8} However, nurses have a variety of opinions about when infants should begin to sleep supine. Some nurses believe that infants can sleep anytime in the supine position, and others believe that they should never sleep in the supine position while in the hospital.⁹ It was found that some nurses (7%) wait until the day of discharge to transition an infant, and others (6%) never transition neonatal intensive care patients.¹⁰ In one retrospective study, the clinical practice of transitioning premature infants to the supine position was compared between 2 neonatal intensive care units for the year 2010.¹¹ The mean gestational age that preterm infants were transitioned to the supine position was 36 weeks, which is 4 weeks after the recommendation of 32 weeks by the AAP.

This secondary analysis of dissertation research was conducted to determine predictors for when preterm infants are transitioned to the supine position greater than 1 week prior to hospital discharge. Knowing if there are predictors can improve the practice of a longer transition while the infant is still hospitalized, ultimately, increasing supine sleep in preterm infants postdischarge and reducing the risk of SIDS.

THEORETICAL FRAMEWORK

The theoretical framework for this study is guided by transition theory with a focus on the importance of smooth transitions and

maximizing health for the premature infant. In this case, there are 2 transitions occurring simultaneously, from illness to health and from the hospital environment to home.¹² To optimize both and promote health and well-being, appropriate role modeling should begin in the hospital environment.

By promoting a safe infant sleep hospital policy and enforcing a period of transition to the supine sleep position, a culture of safety is encouraged by role modeling to parents the safest sleep position for infants. The presence of a safe infant sleep policy would increase the chances that nurses would role model this best practice for parents. Being a role model for the safest infant sleep practices promotes a culture of safety both as an inpatient and postdischarge. A hospital policy promoting a period of transition to the supine position provides infants with an opportunity to become accustomed to this position prior to hospital discharge. Parents place infants in positions they feel are most comfortable for infants after discharge. If infants are not transitioned to the supine position or an inadequate transition occurs, the risk of placing the infant in a nonsupine position is increased and therefore the risk of SIDS is increased. Placing preterm infants (<37 weeks) or those who weigh less than 2500 g in the side-lying position has been found to increase the odds of dying from SIDS from 2.27 to 14.96.¹³ For infants placed in the prone position, the odds of dying from SIDS increases from 8.09 to 24.37.¹³ The simple practice of promoting supine sleep as a hospital policy prior to hospital discharge has the potential to save infants from succumbing to SIDS after discharge. Nurses must participate in hospital policy development to improve safety and patient outcomes.¹⁴ Having a policy on transitioning stable preterm infants to the supine sleep position is one way to promote the practice and improve the safety of preterm infants after discharge.

METHODS

Setting and sample

The retrospective medical record review included those preterm infants born at 2

Table 1. Operational Definitions of Study Variables

Variable Name	Operational Definition
Race	Race as documented on face sheet in medical record
Gender	Gender as documented on face sheet in medical record
Birth weight	Birth weight in grams as measured and recorded in discharge summary
Gestational age	Gestational age in weeks as documented in discharge summary and confirmed by the primary investigator
Was the infant transitioned to the supine position?	Was the infant placed on his or her back at least 88% of the time prior to hospital discharge?
If the infant was transitioned to the supine position, when did the transition occur?	What was the infant's postmenstrual age in weeks when the transition occurred?
What was the SNAP-II?	The SNAP-II is a 6-item acuity score with scores ranging from 0 to 115, with the higher score indicative of higher acuity.

Abbreviation: SNAP-II, Score of Neonatal Acute Physiology-II.

different upstate New York level III neonatal intensive care units; data from the years 2009, 2010, and 2011 were used for analysis. The institutional review board approved the original retrospective study as exempt at both hospitals. The description of the settings has been previously published.¹¹ Both hospitals were in urban settings and admitted infants born at their hospital as well as infants transported to their hospital. Hospital A had a policy to transition premature infants at 32 weeks' postmenstrual age, and hospital B had no safe sleep policy. The inclusion criteria were any infant younger than 37 weeks' gestational age, mother received prenatal care, and single gestation pregnancy. Exclusion criteria were a diagnosis of bronchopulmonary dysplasia, cleft lip and palate or isolated cleft palate, necrotizing enterocolitis, Pierre Robin syndrome, congenital heart defect, myelomeningocele or encephalocele, perinatal asphyxia or hypoxic ischemic encephalopathy, greater than grade 2 intraventricular hemorrhage or periventricular leukomalacia, chromosomal anomaly, transfer to another facility, or death.

Data collection procedures

Data were collected from the medical records by the primary investigator for preterm infants born in 2009, 2010, and

2011. These data were used for this secondary analysis to determine what factors predicted a longer than 1-week transition to the supine sleep position.¹¹ Data collected and used for this analysis were demographic information (race, gender, birth weight, gestational age confirmed by the primary investigator), if the infant was transitioned to the supine position and when transition occurred, and Score of Neonatal Acute Physiology (SNAP-II) (Table 1). The SNAP-II instrument is a 6-item neonatal illness acuity score system and has been found to be valid in the neonatal intensive care population.¹⁵ Transition was defined as being placed on the back for 7 of the 8 time periods (88%) when nursing care is provided to the infant (every 3 hours) as previously published.¹¹

Data analysis

Using SPSS, version 21, sample demographics were computed using frequencies (Table 2). Logistic regression was used to test what variables predicted the transition to the supine position. The categorical variables analyzed were the presence of a hospital policy, gender, and race, and the continuous variables analyzed were gestational age, birth weight, and SNAP-II (Tables 3 and Table 4).

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Table 2. Sample Demographics for All Infants at 2 Hospitals

Variable Name	Overall Sample (N = 286), %	Hospital A (n = 92) (Had No Safe Infant Sleep Policy), %	Hospital B (n = 194) (Had a Safe Infant Sleep Policy), %	P
Race (non-white)	19	36	13	.02 ^a
Gender (male)	56	61	53	.46
Infants transitioned at >1 wk	30	1	45	.00 ^b
	Mean (SD)			
Gestational age at birth, wk	33.5 (2.4)	33.3 (2.2)	33.6 (2.6)	.03 ^a
Birth weight, g	2154.9 (652)	2123.7 (724)	2169.7 (616.7)	.84
SNAP-II (range, 0-115)	3.0 (5.4)	3.8 (5.7)	2.6 (5.2)	.047 ^a
Postmenstrual age at transition, wk	35.7 (1.2)	36 (1.4)	35.5 (1.1)	.01 ^a
Postmenstrual age at discharge, wk	36.7 (1.3)	36.3 (1.4)	36.8 (1.3)	.01 ^a

Abbreviation: SNAP-II, Score of Neonatal Acute Physiology-II.

^aP < .05.

^bP < .001.

Table 3. Analysis of Categorical Variables (N = 286)^a

Variable	Yes, n (%)	No, n (%)	P
White	197 (70)	58 (20)	.28
Male	160 (56)	117 (41)	.37
Safe sleep policy to transition	194 (67.8)	92 (32.2)	.00 ^b

^aTotals will not sum to 100% due to missing data.

^bP < .001.

Table 4. Analysis of Continuous Variables (N = 286)

Continuous Variable	Mean (SD)	Minimum-Maximum	Range	P
Gestational age, wk	33.5 (2.4)	25.86-36.86	23-36.86	.00 ^a
Birth weight, g	2154.9 (652.3)	840-5250	NA	.00 ^a
SNAP-II	3 (5.4)	0-39	0-115	.63

Abbreviations: NA, not applicable; SNAP-II, Score of Neonatal Acute Physiology-II.

^aP < .00.

These 6 variables added were known to be the most relevant to explain the transition to the supine position. Factors found to be significant in predicting a greater than 1-week transition to the supine sleep position were hospital policy ($P < .001$), gestational age ($P < .001$), and birth weight ($P < .01$). Factors

that were found not to be significant were race, gender, and SNAP-II. This model fits 81% of the data correctly. The most concise model includes a safe sleep policy and birth weight; this model correctly fits 80.4% of the data. There was no multicollinearity found between gestational age and birth weight.

In this sample, the presence of a safe sleep policy increased the odds of transition to the supine sleep position 112 times (Table 5).

FINDINGS

The overall sample included 286 medical records from those infants who met inclusion criteria. The mean gestational age at birth for the sample was 33.5 (SD = 2.4) weeks, with a mean birth weight of 2155 (SD = 652) g. More than half of the sample (n = 160; 56%) comprised male infants. There were 58 infants (20%) of minority races (black, Hispanic, Asian, Burmese, Guatemalan, American Indian, Eskimo, and other). Of the sample, 30% of the sample (n = 87) was transitioned more than 1 week prior to discharge. The mean postmenstrual age of infants who were transitioned was 36 (SD = 1) weeks. There were no infants transitioned by 32 weeks' postmenstrual age, which is the timing recommended by the AAP.^{7,8} Four infants (1.3%) were transitioned at 32 weeks' postmenstrual age, and 37 (12.5%) were transitioned at or after 37 weeks' postmenstrual age. The postmenstrual age at discharge was just under 37 (SD = 1) weeks. Statistically, there was significance between the postmenstrual age at discharge (36.3 vs 36.8 weeks), but clinically this is not significant. The hospital without a policy had only one infant who was transitioned at greater than 1 week, and the hospital with a policy had 45% of infants transitioned at greater than 1 week.

IMPLICATIONS FOR NURSING PRACTICE AND FUTURE RESEARCH

The simple clinical practice of placing infants on their backs is a low-cost intervention that can save infant lives. Placing an infant in the supine sleep position is an easy intervention for the majority of premature infants, as there is no complicated equipment or procedure to learn. It seems logical that an infant would need an adjustment period to sleep exclusively in the supine position after being positioned in a variety of positions throughout the hospital stay. Nurses are in a unique setting to educate parents on the importance of using this position exclusively for sleep to reduce the risk of SIDS. Parents and preterm infants benefit from nurses role modeling the correct safe sleep position. In this sample, 30% of the infants were born at or less than 32 weeks' gestation, yet none of these infants were transitioned by 32 weeks' postmenstrual age as recommended by the AAP.^{7,8} Despite this recommendation from an expert source, it seems the practice is limited.

Twenty-four hours is not enough time for an infant to be transitioned, especially if the infant has spent considerable time sleeping in nonsupine positions. A preterm infant who is born at 28 weeks' gestation could potentially spend 2 months in the hospital and, if not transitioned to the supine position prior to discharge, may have difficulty sleeping in the supine sleep position at home. This increases the chance the infant will be placed in a nonsupine position to improve comfort. In this

Table 5. Variables that Predict Transition to the Supine Position

	95% Confidence Interval for Exp (B)			
	B (SE)	Exp (B)	Lower	Upper
Constant	5.03 (3.7)	153.32		
Presence of safe sleep policy	4.72 (1.1) ^a	112	14.00	891.71
Gestational age	-0.21 (0.13)	0.81	0.64	1.02
Birth weight	-0.001 (0.04) ^b	0.99	0.99	1.00

Abbreviations: B, beta; SE, standard error.

^aP < .001.

^bP < .05.

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secondary analysis, 30% of infants were transitioned to the supine position greater than 1 week prior to hospital discharge. While this is better than 24 hours, it is still a minimum duration. A longer transition is recommended by the AAP.^{7,8}

In this analysis, predictors of being transitioned for longer than 1 week were hospital policy, gestational age, and birth weight. Policy has been shown to improve the practice of transitioning infants to the supine sleep position.¹¹ Those infants who were born earlier and were smaller in weight were transitioned to the supine position earlier but not as early as recommended by the AAP.^{7,8} It is recommended that hospitals institute a safe sleep policy with administrative support to encourage nurses to initiate the transition to the supine sleep position while in the hospital and role model correct practice for parents to imitate after hospital discharge. Policy had a vast impact on positioning in this sample. It is difficult to generalize the odds ratio because of how skewed the data are and having only one infant transitioned at greater than 1 week in the hospital without a policy.

Transitioning the stable preterm infant to the supine position is a relatively new concept, and little research has been done in this area. Two important transitions occurring simultaneously for the preterm infant are improving from illness to health and transitioning from the hospital to the postdischarge environment. Research is necessary to optimize these transitions for the infant. Transitions theory is an ideal framework for this topic, and research is needed in this area. Future research is needed to determine the ideal time to transition infants to the supine sleep position and whether all infants, regardless

of gestational age at birth, require the same timing. Future research can be completed to determine the definition of a “stable” preterm infant who is ready to transition to the supine sleep position. Future research is also needed to determine the assessment nurses use to determine when an infant is ready to sleep in the supine position as well as how well the infant is tolerating the supine position. Additional research is needed to determine whether transitioning a premature infant earlier improves the supine sleep position between 2 and 4 months of age when the risk of SIDS is highest. A population study is needed to determine an accurate odds ratio. In this case, the numbers are too small to compute this statistic.

CONCLUSION

Preterm infants continue to sleep in non-supine positions after hospital discharge, which dramatically increases their risk for SIDS. Because preterm infants are a high-risk population and have been positioned in a variety of ways while in the neonatal intensive care unit, it is important to educate parents and provide an appropriate example of safe sleep before discharge. Transitioning preterm infants while they are hospitalized is an evidence-based practice to prepare infants and families for discharge. Measures to improve the supine sleep position, both within the hospital environment and after discharge, should continue until complete compliance is the standard. Until SIDS is a diagnosis of the past, nurses must be diligent in parent education, role modeling, and support for parents to use the supine position exclusively after discharge from the hospital to save these precious lives.

REFERENCES

1. Willinger M, James LS, Catz C. Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development. *Pediatr Pathol*. 1991;11(5):677-684.
2. American Academy of Pediatrics. The changing concept of sudden infant death syndrome: diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk. *Pediatrics*. 2005;116:1245-1255. doi:10.1542/peds.2005-1499.

3. National Infant Sleep Position Web site. The usual position in which mothers place their babies to sleep: data from the national NISP telephone survey for years 1992-2010. http://slone-web2.bu.edu/ChimeNisp/Tables.in_PDF/NISP%201992-2010%20The%20usual%20sleep%20position.pdf. Published 2010. Accessed April 26, 2014.
4. Malloy MH. Prematurity and sudden infant death syndrome: United States 2005-2007. *J Perinatol*. 2013;33:470-475. doi:10.1038/jp.2012.158.
5. Richardson HL, Horne RSC. Arousal from sleep pathways are affected by the prone sleeping position and preterm birth: preterm birth, prone sleeping and arousal from sleep. *Early Hum Dev*. 2012;89:705-711. doi:10.1016/j.earlhumdev.2013.05.001.
6. McMullen SL. Transitioning premature infants supine: state of the science. *MNV Am J Matern Child Nurs*. 2013;38(1):8-12. doi:10.1097/NMC.0b013e318263781e.
7. American Academy of Pediatrics. Hospital discharge of the high risk neonate. *Pediatrics*. 2008;122:1119-1126. doi:10.1542/peds.2008-2174.
8. Task Force on Infant Positioning and Sudden Infant Death Syndrome. SIDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleep environment. *Pediatrics*. 2011;128:e1341-1367. doi:10.1542/peds.2011-2285.
9. Aris C, Stevens TP, LeMura C, et al. NICU nurses' knowledge and discharge teaching related to infant sleep position and risk of SIDS. *Adv Neonatal Care*. 2006;6(5):281-284. doi:10.1016/j.adnc.2006.06.009.
10. Grazel R, Phalen AG, Polomano RC. Implementation of the American Academy of Pediatrics recommendations to reduce sudden infant death syndrome risk in the neonatal intensive care units. *Adv Neonatal Care*. 2010;10(6):332-342. doi:10.1097/ANC.0b013e3181f36ea0.
11. McMullen S, Wu YW, Austin-Ketch T, Carey MG. Transitioning the premature infant from nonsupine to supine position prior to hospital discharge. *Neonatal Netw*. 2014;33(4):194-198.
12. Meleis AI, Sawyer LM, Im E, Hilfinger Messias D, Schumacher K. Experiencing transitions: an emerging middle-range theory. *Adv Nurs Sci*. 2000;23(1):12-28.
13. Blair PS, Ward Platt M, Smith IJ, Fleming PJ, the CESDI SUDI Research Group. Sudden infant death syndrome and sleeping position in pre-term and low birth weight infants: an opportunity for targeted intervention. *Arch Dis in Child*. 2006;91:101-106. doi:10.1136/adc.2004.070391.
14. Kunaviktikul W. Moving towards the greater involvement of nurses in policy development. *Int Nurs Rev*. 2014;61(1):1-2. doi:10.1111/inr.12092.
15. Richardson DK, Corcoran JD, Escobar GJ, Lee SK. SNAP-II and SNAPPE-II: simplified newborn illness severity and mortality risk scores. *J Pediatr*. 2001;138(1):92-100.