



# Association between Neonatal Intensive Care Unit Admission and Supine Sleep Positioning, Breastfeeding, and Postnatal Smoking among Mothers of Late Preterm Infants

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**Objective** To evaluate the association between neonatal intensive care unit (NICU) admission and breastfeeding practices, infant supine sleep positioning, and postnatal smoking among mothers of late preterm infants.

**Study design** Data from 36 states using the 2000-2013 Pregnancy Risk Assessment Monitoring System were analyzed.  $\chi^2$  tests and 95% CI assessed infant and maternal characteristics and recommended care practices for late preterm infants based on NICU admission after birth. Adjusted prevalence ratios (APR) for breastfeeding initiation and continuation at 10 weeks, supine sleep position, and postnatal smoking were estimated using multivariable logistic regression models, controlling for infant and maternal characteristics. Analyses were weighted and SEs accounted for the complex survey design.

**Results** Our sample included 62 494 late preterm infants, representing a weighted population of 1 441 451 late preterm infants. In the adjusted analysis, mothers of late preterm infants admitted to a NICU were more likely to initiate breastfeeding (APR 1.07; 95% CI 1.05-1.09) and place their infants in supine sleep position (1.04; 95% CI 1.01-1.06) than mothers of late preterm infants not admitted to a NICU. There was no significant difference between groups for breastfeeding continuation or postnatal smoking.

**Conclusions** Mothers of late preterm infants admitted to a NICU were more likely to initiate breastfeeding and practice supine sleep position than mothers of late preterm infants not admitted to a NICU. Future work should seek to identify the drivers of these differences to develop effective strategies to engage mothers in these health promoting infant care practices. (*J Pediatr* 2020;227:114-20).

Late preterm infants, born at 34<sup>0/7</sup>-36<sup>6/7</sup> weeks, represent 70% of preterm births in the US and account for about one-third of all neonatal intensive care unit (NICU) admissions.<sup>1-3</sup> Late preterm infants are at risk for hospital readmission, adverse neurodevelopmental outcomes, sudden unexpected infant death (SUID), and other sleep-related deaths. Compared with full term infants, late preterm infants have 1.5-2 times the odds of SUID.<sup>1,4-7</sup> Recommendations to reduce the rates of sudden infant death syndrome (SIDS)/SUID are published by the American Academy of Pediatrics Task Force on SIDS.<sup>8</sup> Although these recommendations are aimed at all infants, late preterm infants require additional attention given their higher risk for SUID as well as comprising the majority of the preterm population in the US.

Care of late preterm infants during the birth hospitalization varies widely both across regions and across hospitals in the US, as some late preterm infants are admitted directly to a NICU and others receive routine care in a newborn nursery.<sup>9</sup> These variable admission practices may lead to differences in education about health promoting infant care practices provided to families during the birth hospitalization.

Prior studies have investigated adherence to recommended care practices of late preterm infants in general,<sup>10,11</sup> but no studies have looked at multiple care practices in late preterm infants who spent time in a NICU compared with those who received only routine postnatal care. We hypothesize that mothers of late preterm infants who spend time in a NICU are more likely to adhere to recommended care practices. Our objective in this study was to investigate the association of NICU admission of late preterm infants with home care practices including breastfeeding initiation and continuation, supine sleep position, and postnatal smoking among a large national sample of mothers.

APR	Adjusted prevalence ratio
BMI	Body mass index
NICU	Neonatal intensive care unit
SIDS	Sudden infant death syndrome
SUID	Sudden unexpected infant death
WIC	Women, Infant and Children
PRAMS	Pregnancy Risk Assessment Monitoring System

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## Methods

We conducted this analysis using the Pregnancy Risk Assessment Monitoring System (PRAMS) from 2000 to 2013. Data from 36 US states were included. PRAMS is on-going state-based surveillance system conducted by the Centers for Disease Control and Prevention's Division of Reproductive Health in collaboration with state health departments. Each state samples resident women who recently gave birth to a live-born infant, beginning at 2-4 postnatal months, with survey completion closing at 60-95 days after initial contact is made. All states follow a standard data collection protocol and use a mixed-mode (mail and telephone) system. Survey information is linked with birth certificate data and is weighted to adjust for survey design, noncoverage, and nonresponse. Detailed methodology about PRAMS has been described elsewhere.<sup>12,13</sup> Research was conducted in accord with prevailing ethical principles and institutional ethics approval was granted by the Centers for Disease Control and Prevention and participating PRAMS states and was deemed exempt from review by the institutional review board of the University of Colorado School of Medicine.

Mothers who delivered live-born infants at 34<sup>0/7</sup>-36<sup>6/7</sup> completed gestational weeks were included in this study. Exclusions were mothers with missing race/ethnicity, who indicated a location of birth other than a hospital (including birthing center, doctor office or clinic, residence, or other), who reported that infant was no longer alive or no longer living with them, or did not know if infant was admitted to a NICU after birth. Maternal selection is summarized in the [Figure](#).

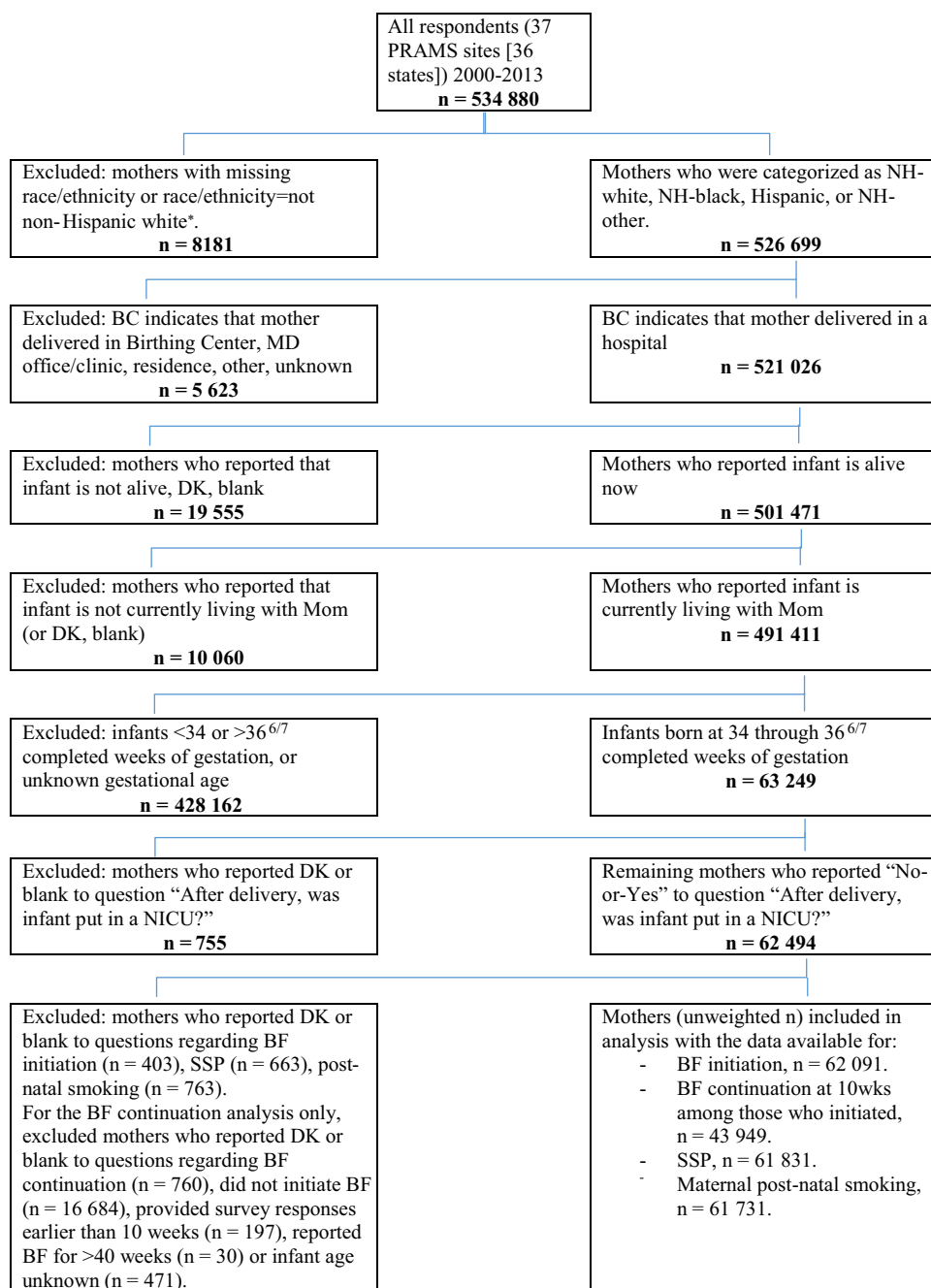
Information regarding NICU admission and outcomes was obtained using the specific PRAMS questions shown in [Table 1](#) (available at [www.jpeds.com](http://www.jpeds.com)). Outcomes examined included breastfeeding initiation, breastfeeding continuation at 10 weeks, supine sleep position, and maternal postnatal smoking status. Breastfeeding continuation was assessed using the 2 identified PRAMS questions in conjunction with the PRAMS analytical variable "age of the infant when the survey was completed." Mothers who provided survey responses at <10 weeks postpartum (n = 197) or mothers who reported breastfeeding for >40 weeks (n = 30) were excluded from this portion of the analysis because over 99% of surveys included in our cohort were completed after 10 weeks postpartum and the survey is designed for mothers to respond up to 40 weeks postpartum.

Our analysis used maternal and infant characteristics as covariables in our final models. Maternal demographic characteristics were obtained from the PRAMS survey and from linked birth certificate data. Data collected included maternal age (<20 years, 20-24 years, 25-34 years, ≥35 years), race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, and non-Hispanic other), education (0-8 years, 9-11 years, 12 years, 13-15 years, ≥16 years), marital status, history of previous live birth, insurance prior to pregnancy, prolonged maternal hospitalization (>3 days for vaginal birth, >5 days

for cesarean), prepregnancy body mass index (BMI, underweight: <18.5; normal: 18.5-24.9; overweight: 25.0-29.9; obese: ≥30), diabetes mellitus during pregnancy, any hypertension during pregnancy, prenatal care (beginning in the first trimester, beginning after the first trimester, or no prenatal care), method of delivery, and receipt of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) during pregnancy (yes/no). Smoking status during or after pregnancy was a covariable in the models with the outcome of breastfeeding and supine sleep position. Infant characteristics included sex, gestational age at birth, and birth weight (<2000 g, 2000-2499 g, 2500-2999 g, ≥3000 g).

For our univariate analysis, we calculated the population prevalence of late preterm infants cared for in the NICU and those not cared for in a NICU with 95% CIs. We also compared maternal and infant characteristics for the NICU late preterm infants and non-NICU late preterm infants groups. We calculated the prevalence of our outcomes of breastfeeding initiation, breastfeeding continuation at 10 weeks among those who initiated breastfeeding, supine sleep position, and maternal post-natal smoking. *P* values of <.05 were considered statistically significant.

We then used the average marginal prediction approach to logistic regression<sup>14</sup> to generate adjusted prevalence ratios (APRs) for breastfeeding initiation, breastfeeding continuation at 10 weeks (among those who reported initiating breastfeeding), supine sleep position, and maternal postnatal smoking. Our models for breastfeeding initiation and breastfeeding continuation at 10 weeks were adjusted for maternal age, race/Hispanic ethnicity, education, marital status, history of previous live birth, insurance before pregnancy, prepregnancy BMI, diabetes during pregnancy, first trimester prenatal care initiation, method of delivery, infant birth weight, use of WIC services during pregnancy, and smoking during or after pregnancy. Our model for maternal postnatal smoking was adjusted for maternal age, race/Hispanic ethnicity, education, marital status, history of previous live birth, insurance before pregnancy, first trimester prenatal care initiation, and on WIC during pregnancy. Our model for infant supine-sleep position was adjusted for the same variables as the model for postnatal smoking with the addition of smoking during or after pregnancy. Variables chosen for adjusted models were determined by clinical significance and documented associations in the literature.<sup>15-19</sup> Maternal health conditions including BMI and diabetes during pregnancy were included in our breastfeeding models as maternal health status can have a direct impact on ability to breastfeed. Likewise, maternal health conditions were excluded from supine sleep position and postnatal smoking models given these behaviors are not directly influenced by maternal health conditions. All analyses were conducted using SAS v 9.3 (SAS Institute, Cary, North Carolina) and SUDAAN v 11.0.1 (RTI International, Research Triangle Park, North Carolina), and accounted for the complex survey design of PRAMS.



**Figure.** Flow chart of maternal selection for the analysis for all outcomes. \*Vermont is the only PRAMS site that used this race/ethnicity category. BC: birth center, BF: breastfeeding, DK: do not know, SSP: supine sleep position.

## Results

During the study period from 2000 to 2013, 63 249 infants were born late preterm, representing a population estimate of 1 441 451 infants and comprising approximately 14.8% of all births. Among late preterm infants, 48.7% spent time in a NICU.

**Table II** displays the maternal and infant characteristics of the cohort. Mothers of late preterm infants hospitalized in

the NICU were more likely to be older, non-Hispanic white, more educated, have non-Medicaid insurance before pregnancy, have a prolonged maternal length of stay, have obesity before pregnancy, have diabetes during pregnancy, have hypertension during pregnancy, receive first trimester prenatal care, and deliver via cesarean. Infants were more likely to be male and have a lower birth weight.

**Table III** shows the unadjusted prevalence for each care practice by NICU status. APRs for each outcome are shown

**Table II. Selected maternal and infant characteristics for late preterm infants by NICU status**

Selected maternal and infant characteristics	Total cohort		No NICU hospitalization		NICU hospitalization		P value
	n	Weighted* % (95% CI)	n	Weighted* % (95% CI)	n	Weighted* % (95% CI)	
Total	62 494 <sup>†,‡</sup>		32 099 <sup>†,‡</sup>		30 395 <sup>†,‡</sup>		
Maternal age (y)							<.005
< 20		9.9 (9.4-10.4)		10.2 (9.6-10.9)		9.4 (8.8-10.0)	
20-24		23.4 (22.7-24.0)		24.2 (23.3-25.1)		22.1 (21.2-23.0)	
25-34		51.0 (50.2-51.8)		50.8 (49.7-51.9)		51.4 (50.3-52.5)	
≥ 35		15.7 (15.2-16.3)		14.8 (14.1-15.6)		17.1 (16.3-18.0)	
Race/Hispanic ethnicity							.006
White non-Hispanic		59.2 (58.4-59.9)		58.2 (57.1-59.3)		60.6 (59.5-61.7)	
Black non-Hispanic		19.2 (18.6-19.8)		19.5 (18.7-20.4)		18.6 (17.9-19.4)	
Hispanic		15.2 (14.5-15.8)		15.4 (14.6-16.3)		14.8 (13.9-15.7)	
Non-Hispanic other		6.5 (6.2-6.8)		6.8 (6.4-7.3)		6.0 (5.6-6.4)	
Maternal education (y)							<.005
0-8		4.0 (3.6-4.3)		4.3 (3.9-4.9)		3.4 (3.0-3.9)	
9-11		14.6 (14.0-15.2)		15.2 (14.4-16.1)		13.6 (12.8-14.3)	
12		29.3 (28.6-30.0)		29.5 (28.5-30.5)		29.0 (28.0-30.1)	
13-15		24.5 (23.9-25.2)		24.1 (23.2-25.1)		25.2 (24.2-26.1)	
≥16		27.6 (26.9-28.3)		26.8 (25.9-27.8)		28.8 (27.8-29.9)	
Marital status							.11
Married		60.0 (59.2-60.8)		59.5 (58.4-60.6)		60.8 (59.7-61.9)	
Other		40.0 (39.2-40.8)		40.5 (39.4-41.6)		39.2 (38.1-40.3)	
History of previous live birth							.08
No		40.3 (39.5-41.1)		39.8 (38.7-40.8)		41.1 (40.0-42.2)	
Yes		59.7 (58.9-60.5)		60.2 (59.2-61.3)		58.9 (57.8-60.0)	
Maternal insurance before pregnancy							<.005
No		25.1 (24.4-25.8)		26.3 (25.3-27.3)		23.3 (22.4-24.3)	
Yes (Medicaid)		18.3 (17.7-18.9)		18.2 (17.4-19.1)		18.3 (17.5-19.2)	
Yes (Non-Medicaid)		56.6 (55.8-57.4)		55.5 (54.4-56.6)		58.4 (57.2-59.5)	
Prolonged maternal length of stay <sup>§</sup>							<.005
No		75.2 (74.5-75.9)		79.8 (78.9-80.8)		67.9 (66.8-69.0)	
Yes		24.8 (24.1-25.5)		20.2 (19.3-21.1)		32.1 (31.0-33.2)	
Maternal prepregnancy BMI							<.005
Underweight (<18.5)		6.0 (5.6-6.4)		6.0 (5.5-6.6)		5.9 (5.4-6.5)	
Normal (18.5-24.9)		46.4 (45.6-47.3)		47.6 (46.5-48.7)		44.7 (43.6-45.9)	
Overweight (25.0-29.9)		26.4 (25.7-27.2)		26.5 (25.5-27.5)		26.3 (25.3-27.4)	
Obesity (30.0+)		21.2 (20.5-21.8)		19.9 (19.0-20.8)		23.0 (22.1-24.0)	
Maternal diabetes during pregnancy							<.005
No		87.0 (86.4-87.5)		88.0 (87.2-88.7)		85.6 (84.7-86.4)	
Yes		13.0 (12.5-13.6)		12.1 (11.3-12.8)		14.4 (13.6-15.3)	
Maternal hypertension during pregnancy							<.005
No		73.8 (73.0-74.5)		75.5 (74.5-76.5)		71.0 (70.0-72.1)	
Yes		26.3 (25.5-27.0)		24.5 (23.5-25.5)		29.0 (27.9-30.0)	
Prenatal care							<.005
First trimester		80.4 (79.8-81.1)		79.5 (78.6-80.4)		81.9 (81.0-82.7)	
After first trimester		18.4 (17.7-19.0)		19.0 (18.2-19.9)		17.3 (16.5-18.2)	
No prenatal care		1.2 (1.0-1.4)		1.5 (1.2-1.8)		0.8 (0.6-1.1)	
Method of delivery							<.005
Cesarean		39.1 (38.3-39.8)		33.4 (32.3-34.4)		47.6 (46.5-48.8)	
Vaginal		61.0 (60.2-61.7)		66.7 (65.6-67.7)		52.4 (51.2-53.5)	
Infant sex							<.005
Male		52.8 (52.0-53.6)		51.3 (50.2-52.4)		55.1 (53.9-56.2)	
Female		47.2 (46.4-48.0)		48.7 (47.6-49.8)		45.0 (43.8-46.1)	
Infant birth weight (g)							<.005
<2000		7.6 (7.4-7.9)		2.4 (2.2-2.5)		15.6 (15.0-16.2)	
2000-2499		31.4 (30.9-32.0)		26.1 (25.4-26.8)		39.4 (38.5-40.4)	
2500-2999		39.0 (38.2-39.9)		44.6 (43.5-45.7)		30.7 (29.4-31.9)	
≥3000		21.9 (21.2-22.7)		26.9 (25.9-28.0)		14.3 (13.4-15.3)	
On WIC during pregnancy							.02
No		53.4 (52.6-54.2)		52.6 (51.5-53.7)		54.5 (53.4-55.6)	
Yes		46.6 (45.8-47.4)		47.4 (46.3-48.5)		45.5 (44.4-46.6)	
Smoker during or after pregnancy							.02
No		79.9 (79.3-80.5)		79.3 (78.4-80.2)		80.7 (79.9-81.6)	
Yes		20.1 (19.5-20.8)		20.7 (19.8-21.6)		19.3 (18.4-20.1)	

\*Weighted column percent.

†Mothers who delivered a singleton, twin, or other multiple late preterm infants in hospital and reported that infant is alive and living with her at time of survey.

‡Unweighted sample size.

§Prolonged maternal length of stay defined as &gt;3 days for vaginal birth or &gt;5 days for cesarean delivery.

**Table III. Unadjusted prevalence for recommended care practices by NICU status**

	Breastfeeding initiation		Breastfeeding continuation*		Supine sleep position		Postnatal smoking	
	n†	Prevalence (95% CI)	n†	Prevalence (95% CI)	n†	Prevalence (95% CI)	n†	Prevalence (95% CI)
Overall	55 266		39 358		57 887		58 430	
NICU hospitalization	26 952	76.3 (75.2-77.5)	19 999	53.0 (51.5-54.4)	28 227	66.6 (65.6-67.7)	28 474	18.9 (18.1-19.7)
No NICU hospitalization	28 314	71.6 (70.6-72.5)	19 359	54.3 (53.0-55.6)	29 660	64.4 (63.3-65.6)	29 956	19.8 (18.9-20.6)

\*Defined as breastfeeding for  $\geq 10$  weeks after delivery among those who initiated breastfeeding.

†Exclude observations with missing/unknown values for either the dependent variable or for any of the control variables.

in **Table IV** (available at [www.jpeds.com](http://www.jpeds.com)). After controlling for maternal and infant characteristics, mothers of late preterm infants hospitalized in the NICU were more likely to initiate breastfeeding than were mothers of late preterm infants not hospitalized in the NICU (APR 1.07, 95% CI 1.05-1.09). Among those who initiated breastfeeding, mothers of late preterm infants cared for in the NICU and mothers of late preterm infants not cared for in the NICU were equally likely to continue breastfeeding at 10 weeks (APR 0.98, 95% CI 0.94-1.0).

After adjusting for maternal characteristics, we found that mothers of NICU late preterm infants were more likely to put their infant to sleep in a supine position (APR 1.04, 95% CI 1.01-1.06) compared with mothers of non-NICU late preterm infants. There was no difference between groups for postnatal smoking (APR 0.96, 95% CI 0.90-1.01).

## Discussion

In this population-based study, mothers of late preterm infants who were admitted to the NICU were slightly more likely to initiate breastfeeding and place their infant in supine sleep position after hospital discharge than mothers of late preterm infants who did not spend time in the NICU. There was no statistically significant difference between mothers of NICU and non-NICU late preterm infants in rates of breastfeeding continuation and maternal smoking postnatally. Although this study was unable to examine the drivers leading to these differences in breastfeeding initiation and supine sleep position, we hypothesize that a combination of unit-level and individual factors may influence maternal adherence to recommended infant care practices. Families of infants who spend time in the NICU may have more frequent and prolonged engagement with neonatal care providers and may also have access to additional resources and education provided in the NICU. As seen in **Table II**, mothers of late preterm infants who spent time in the NICU has a longer maternal length of stay, potentially providing increased opportunities for lactation support and other education. Individually, parental perceptions of a more “ill” infant because of time in an intensive care unit has been shown to contribute to more vigilance in attending to newborn care, and thus may influence adhering to recommended infant care practices.<sup>20</sup>

The American Academy of Pediatrics recommends that healthcare professionals, staff in newborn nurseries and

NICUs, and child care providers should endorse SUID risk-reduction recommendations from birth, including education about the benefits of breastmilk, safe sleep, and avoiding tobacco smoke exposure.<sup>8</sup> Although families’ decisions about care practices are complex and likely multifactorial, it has been shown that parents are influenced strongly by physicians in choosing the sleep position for their infants,<sup>21</sup> and we hypothesize that other practices follow a similar trend. This provides an opportunity for healthcare providers to provide the appropriate education and care for the newborn infant and his or her family. Assessing the appropriate level of care for late preterm infants can be difficult, with some requiring direct admission to a NICU and others receiving routine newborn care,<sup>22,23</sup> however, regardless of the place of admission, an opportunity exists for further family education. Because it has been shown that late preterm infants are less likely to be placed in supine sleep position than full term infants,<sup>10</sup> using the NICU as an opportunity for education may be particularly important. Previous studies have also shown that when mothers trust a doctor or nurse regarding advice for sleep position, they were more likely to place the infant in the supine position.<sup>24</sup> This highlights the role of healthcare providers in providing education and the value in establishing trust with patients prior to the education. Because late preterm infants admitted to the NICU have longer lengths of stay than those infants who are not admitted, targeted policies and educational interventions aimed at both short- and long-term initial hospitalizations are needed. NICU admission has been shown to decrease hospital readmission of late preterm infants, possibly because of the ability to identify and address issues such as hyperbilirubinemia and feeding difficulties prior to initial discharge,<sup>25</sup> and we hypothesize that this also creates an opportunity for further education around other recommended care practices.

Breastfeeding remains a focus in the late preterm infants population because these infants are at increased risk of breastfeeding failure related to both infant and maternal factors including maternal medications and medical conditions, delayed maternal lactogenesis, and poor infant suck-swallow pressures and coordination.<sup>4,26</sup> Despite these challenges, the advantages of breastfeeding in extremely preterm infants are well established and it is hypothesized that the benefits of the bioactive components in human milk also support the maturation of late preterm infants.<sup>11,22,27-31</sup> Previous work in the preterm population as a whole has shown that NICU admission was a positive predictor of breastfeeding at 4 weeks.<sup>32</sup>



However, it also has been shown that mothers of late preterm infants are less likely to initiate or continue breastfeeding.<sup>11</sup> When comparing late preterm infants who spent time in a NICU vs those who did not, a recent study in Colorado, showed that mothers of late preterm infants hospitalized in a NICU initiated breastfeeding at similar rates to those not admitted to a NICU, but that those admitted to the NICU were less likely to continue breastfeeding at 10 weeks.<sup>33</sup> Given that Colorado has one of the highest rates of breastfeeding in the country,<sup>34</sup> the results presented in this study using a more diverse, multistate population may better represent national trends regarding breastfeeding. Further research is needed to understand the barriers and facilitators faced by mothers of late preterm mothers, which may vary from those of term infants, in order to develop effective interventions at the hospital and community levels.

With respect to safe sleep practices, infants placed in prone position for sleep more than double the risk of SIDS compared with infants placed in a nonprone sleep position<sup>35</sup> and, thus, supine sleep position has been recommended for all infants.<sup>36</sup> A statewide study in Massachusetts showed that late preterm infants were less likely than term infants to be placed in a supine sleep position whereas preterm infants born at <34 weeks of gestation had rates of supine sleep similar to full term infants.<sup>10</sup> These findings were consistent with results of a nationwide study also showing that late preterm infants were less likely to be placed in supine sleep position.<sup>37</sup> Little is known about why mothers of late preterm infants have lower adherence to supine sleep positioning compared with those of term infants. We hypothesize that late preterm infants may be developmentally immature compared with their term counterparts and perhaps more difficult to console to achieve sleep. Population-based studies of mothers of predominantly term healthy infants have shown that choice of sleep position was predicted by concerns about comfort, choking, and receipt of advice.<sup>24,38</sup> In a subsequent study by this same research group, theory of planned behavior factors (attitudes, subjective norms, and perceived control) and receipt of advice from physicians about sleep positioning were associated with maternal choice.<sup>39</sup> Similar studies are needed for the late preterm population.

Exposure to cigarette smoke is one of the most prevalent and preventable causes of infant morbidity and mortality,<sup>40</sup> and the negative impact is greater on preterm infants than their term counterparts.<sup>18</sup> Despite this risk, past work has shown that mothers of late preterm infants are more likely to smoke postnatally than mothers of term infants.<sup>11</sup> Understanding the relationship between late preterm birth and maternal smoking in the postnatal period is complicated by the fact that prospective longitudinal cohort studies of maternal-infant dyads that account for the numerous factors associated with maternal smoking are lacking. This cross-sectional study was unable to assess prenatal smoking history or maternal mental health problems.<sup>41</sup> It is also possible that giving birth to and caring for late preterm infants is more challenging than for term infants and may serve as an added

stressor influencing a mother's decision to smoke postnatally. As is the case for breastfeeding and sleep positioning among late preterm infants, maternal smoking behavior in this population deserves additional research.

There are several limitations to this study. Given that the PRAMS study is a maternal self-report survey, as with retrospective data collection, it is inherently subject to recall or social desirability biases. We were limited by the questions asked on the survey and were unable to collect information on several variables that may have been useful to this study, such as infant illness severity, reason for admission to the NICU, and maternal prenatal smoking. This sample also included a higher proportion of late preterm infants compared with other national estimates,<sup>3</sup> which may indicate more limited generalizability of state data included to national trends. In addition, stratifying infants by NICU status was only possible using the question "did your infant spend any time in the NICU," which could be interpreted differently by mothers and does not specify if level II or "special care." We did not have the information about the length of NICU stay, therefore, some patients may have been admitted to the NICU for a only portion of their hospitalization. We were unable to assess differences in the level of NICU care and whether levels of NICU care are associated with differing practices to encourage specific types of parenting behaviors after discharge.

Despite these limitations, this study adds to existing data by providing a multistate representation of specific parenting practices for late preterm infants who do and do not spend time in a NICU. It highlights the need for further work to understand which in-hospital practices are effective in promoting recommended care practices and how to effectively apply these practices for all late preterm infants, regardless of birth hospitalization location. ■

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**Table I. PRAMS questions used to assess outcomes of interest**

Outcomes	PRAMS questions
Breastfeeding initiation	“Did you ever breastfeed or pump breast milk to feeds your new baby after delivery?”
Breastfeeding continuation	“Are you currently breastfeeding or feeding pumped milk to your new baby?” and “How many weeks or months did you breastfeed or pump milk to feed your baby?”
Supine sleep position	“In which one position do you most often lay your baby down to sleep now?”
Postnatal maternal smoking	“How many cigarettes do you smoke on an average day now?”

**Table IV. APR and 95% CI for the likelihood of breastfeeding initiation, breastfeeding continuation, supine sleep position, postnatal smoking by NICU status adjusted for maternal, and infant characteristics**

	Breastfeeding initiation*	Breastfeeding continuation* <sup>†</sup>	Supine sleep position <sup>‡</sup>	Postnatal smoking <sup>§</sup>
NICU hospitalization	1.07 (1.05-1.09)	0.98 (0.94-1.0)	1.04 (1.01-1.06)	0.96 (0.90-1.01)
No NICU hospitalization	ref	ref	ref	Ref

\*Adjusted for maternal age, race/Hispanic ethnicity, education, marital status, history of previous live birth, insurance before pregnancy, prepregnancy BMI, diabetes during pregnancy, first trimester prenatal care initiation, method of delivery, infant birth weight, on WIC during pregnancy, and smoking during or after pregnancy.

<sup>†</sup>Defined as breastfeeding for  $\geq 10$  weeks after delivery among those who initiated.

<sup>‡</sup>Adjusted for maternal age, race/Hispanic ethnicity, education, marital status, history of previous live birth, insurance before pregnancy, first trimester prenatal care initiation, on WIC during pregnancy, and smoking during or after pregnancy.

<sup>§</sup>Adjusted for maternal age, race/Hispanic ethnicity, education, marital status, history of previous live birth, insurance before pregnancy, first trimester prenatal care initiation, and on WIC during pregnancy.