

# Breastfeeding Continuation Among Late Preterm Infants: Barriers, Facilitators, and Any Association With NICU Admission?

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Late preterm birth (at 34–36 6/7 weeks' gestation) is a risk factor for early breastfeeding cessation. The objective of this study was to determine barriers to and facilitators of breastfeeding continuation among late preterm infants (LPI) and to compare the barriers faced by LPI admitted to the well nursery versus the NICU.

**METHODS:** The SAS Complex Survey was used to perform multivariable logistic regression analysis by using data from the Centers for Disease Control and Prevention's Pregnancy Risk Assessment Monitoring System. Data from 3 states (Illinois, Maine, and Vermont) for the years 2004 to 2008 were used.

**RESULTS:** A total of 2530 mothers of LPI were surveyed. Odds of breastfeeding initiation were similar among LPI admitted to the NICU versus the well nursery (adjusted odds ratio, 1.24 [95% confidence interval, 0.88–1.73];  $P = .209$ ). Odds of breastfeeding for  $\geq 10$  weeks were no different between LPI admitted to the NICU versus those admitted to the well-nursery (adjusted odds ratio, 1.02 [95% confidence interval, 0.73–1.43];  $P = .904$ ). Factors associated with increased odds of breastfeeding for  $\geq 10$  weeks among LPI were higher maternal education, mother being married, and normal maternal BMI. Regardless of NICU admission, the top reasons cited by mothers of LPI for early breastfeeding discontinuation were perceived inadequate milk supply and nursing difficulties.

**CONCLUSIONS:** Among LPIs, NICU admission was not associated with early breastfeeding cessation. Mothers of LPIs with lower odds of sustaining breastfeeding for at least 10 weeks were single mothers, those with a high school education only, and those who were obese. Breastfeeding support should be enhanced for LPIs and should address perceived maternal milk supply concerns and nursing difficulties.

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Breastfeeding is the ideal mode of infant feeding, and longer breastfeeding duration leads to a multitude of health benefits for both mother and infant.<sup>1</sup> Premature infants (ie, those born before 37 completed weeks' gestation) stand to benefit from breastfeeding even more than term infants. However, breastfeeding initiation rates and breastfeeding duration are lower among this population than among term infants.<sup>2-4</sup> Previous studies have shown that breastfeeding rates among late preterm infants (ie, those born at 34–36 6/7 weeks' gestation) are lower than rates among earlier preterm infants.<sup>5-8</sup> Very premature infants are at a higher risk of several morbidities, including necrotizing enterocolitis; it is thus possible that health care providers are more motivated to ensure early breast milk feeding for these infants. Some late preterm infants are otherwise healthy at birth and receive their newborn care in the well nursery, whereas others require neonatal intensive care due to hypothermia, hypoglycemia, respiratory support, infection, feeding difficulties, or other medical problems.<sup>2,9,10</sup> This heterogeneity suggests that barriers to establishing a robust milk supply and to ongoing breastfeeding could potentially differ among late preterm infants admitted to the well nursery versus those admitted to the NICU.

Previous studies have reported conflicting evidence regarding the association between NICU admission and breastfeeding outcomes among late preterm infants. One study using the Centers for Disease Control and Prevention (CDC) Pregnancy Risk Assessment Monitoring System (PRAMS) data published in 2003 found lower breastfeeding initiation rates among NICU-admitted infants.<sup>5</sup> Another PRAMS study published in 2008 found a positive effect of NICU admission on breastfeeding initiation and breastfeeding continuation beyond 4 weeks of age among preterm infants, even in multivariable models adjusting for gestational age.<sup>7</sup>

The goal of the present study was to compare, by using more recent PRAMS data, rates of breastfeeding initiation and continuation among late preterm infants

cared for in the NICU versus the well nursery, as well as the reasons why mothers of these 2 subpopulations of late preterm infants discontinue breastfeeding. We hypothesized that, with changes over time in hospital breastfeeding support practices and the increase in healthy newborn infants rooming-in with their mothers in well mother–infant units (“well nurseries”), NICU admission, compared with well nursery admission, would now be associated with decreased odds of initiating breastfeeding and of breastfeeding at 10 weeks (the longest breastfeeding duration that can be investigated with PRAMS data). We also hypothesized that mothers of late preterm infants admitted to the NICU would be more likely than those whose infants received care in the well-newborn nursery to report infant illness and maternal illness as barriers to breastfeeding continuation. In addition, we sought to identify the independent predictors of breastfeeding for at least 10 weeks among late preterm dyads by using multivariable logistic regression modeling.

## METHODS

### Study Design

A retrospective cohort study was conducted by using CDC PRAMS data from 3 states for the years 2004 to 2008. PRAMS is a collaborative surveillance project of the CDC and state health departments that collects state-specific, population-level data from mothers regarding their attitudes and experiences before, during, and shortly after pregnancy.

PRAMS provides data from a stratified, systematic sample of 100 to 250 new mothers per participating state each month, drawn from birth certificate registries. To ensure that certain small, high-risk subpopulations are included, each state has a slightly different stratification scheme; the survey results are weighted to account for this deliberate oversampling of certain populations as well as nonresponse and noncoverage. The survey instrument is administered to mothers by mail beginning at 2 to 4 months' postpartum, and 3 attempts are made to contact participants by mail before a study administrator contacts them by telephone. The PRAMS data set consists of

results from these questionnaires as well as deidentified, linked birth certificate data. Additional details about the PRAMS methods are available from the CDC PRAMS Web site.<sup>11</sup>

For the present retrospective cohort study, data were analyzed from mothers of late preterm infants from 3 states that administered an optional survey question about breastfeeding continuation barriers. The CDC only releases PRAMS data from states that meet a certain minimum response rate: for 2004 to 2005, this rate was >70%, and for 2005 to 2008, it was >65%.<sup>11</sup> The 3 states included in our data set were Illinois, Maine, and Vermont. Mothers from these states who reported that they had both initiated and discontinued breastfeeding were asked the following question:

“What were your reasons for stopping breastfeeding? Check all that apply:

- My baby had difficulty nursing
- Breast milk alone did not satisfy my baby
- I thought my baby was not gaining enough weight
- My baby got sick and could not breastfeed
- My nipples were sore, cracked, or bleeding
- I thought I was not producing enough milk
- I had too many other household duties
- I felt it was the right time to stop breastfeeding
- I got sick and could not breastfeed
- I went back to work or school
- I wanted or needed someone else to feed the baby
- My baby was jaundiced (yellowing of the skin or whites of the eyes)
- Other → please tell us.”

Breastfeeding was defined by a mother answering yes to the question: “Did you ever breastfeed or pump breast milk to feed your new baby after delivery?” Breastfeeding for 10 weeks is the longest duration that can be assessed by using CDC PRAMS data, given the timing of survey completion.

## Statistical Analysis

SAS Complex Survey version 9.3 (SAS Institute, Inc, Cary, NC) was used to perform weighted analyses to account for the complex PRAMS survey design. Univariate logistic regression and  $\chi^2$  analysis were performed to determine which demographic characteristics were associated with NICU admission among late preterm infants. Linear regression was used to compare the number of days postpartum at which mothers of NICU-admitted versus nursery-admitted late preterm infants completed the survey. Univariate logistic regression models were then developed to examine, among the subset of mothers who had discontinued breastfeeding, the relationship between the independent variable of infant admission to the NICU and the dependent variables of each of the breastfeeding continuation barriers. Multivariable logistic regression models were then built, adjusting for those demographic factors that were determined to be significantly associated with NICU admission among late preterm infants (including factors with  $P < .1$  in the univariate comparisons): primiparity, mode of delivery, and birth weight category. We next used univariate logistic regression and  $\chi^2$  analysis to determine which demographic characteristics were associated with breastfeeding for  $\geq 10$  weeks. A multivariable logistic regression model was built of breastfeeding for  $\geq 10$  weeks; the goal was to examine which of these demographic characteristics, in addition to mode of delivery and NICU admission (which we added to the models due to clinical relevance), were independently associated with breastfeeding for  $\geq 10$  weeks among late preterm dyads.

This study was reviewed by the University of Iowa Institutional Review Board and was determined to be exempt from review because the data were de-identified.

## RESULTS

Our entire PRAMS data set included 19 145 respondent mothers from 3 states, 2530 of whom delivered a late preterm infant (34–36 6/7 weeks' gestation). Approximately one-half of the infants were admitted to the well-newborn nursery and one-half to the NICU (1272 nursery,

1230 NICU, and 28 unknown). Of the 2530 mothers of late preterm infants, 1853 initiated breastfeeding, and 1001 of those who ever breastfed had discontinued breastfeeding before the time of survey completion. The median age of the infants at the time of survey completion was 104 days (interquartile range, 90–131 days). There was no significant difference in the timing of survey completion by mothers of infants admitted to the NICU versus well nursery ( $P = .092$ ).

Before comparing breastfeeding outcomes among infants admitted to the nursery versus the NICU, we sought to determine other variables associated with late preterm infant NICU admission so that we could control for these confounding variables. The association between maternal and infant demographic characteristics and infant admission to the NICU was examined by using logistic regression, and the results of these comparisons are shown in Table 1. Among mothers of late preterm infants, maternal age, education, race, marital status, state of residence, Medicaid insurance status, primiparity versus multiparity, and prepregnancy BMI category were not predictive of infant NICU admission. Mode of delivery was statistically significantly associated with infant NICU admission, with late preterm infants born via cesarean delivery having 1.88 times the odds of vaginally delivered infants of being admitted to the NICU. Infant birth weight, categorized as  $< 1500$  g, 1500 to 2499 g, and  $\geq 2500$  g, was significantly different among NICU-admitted infants versus infants admitted to the well nursery ( $P < .0001$ ). There was no significant difference in the incidence of breastfeeding initiation among infants admitted to the NICU versus infants admitted to the well nursery in univariate analysis (odds ratio [OR], 1.20 [95% confidence interval (CI), 0.87–1.67];  $P = .266$ ) nor in multivariable analysis, adjusting for the infant's birth weight category and mode of delivery (adjusted OR, 1.24 [95% CI, 0.88–1.73];  $P = .209$ ).

Among the 1001 mothers of late preterm infants who discontinued breastfeeding

before survey completion, the top reasons for stopping were inadequate milk supply, breastfeeding difficulties, and concerns that breast milk alone did not satisfy their infants (Table 2). In multivariable logistic regression analysis, adjusting for primiparity versus multiparity, mode of delivery, and infant birth weight (categorized), mothers of NICU-admitted infants, compared with nursery-admitted infants, had higher odds of discontinuing breastfeeding due to needing someone else to help feed their infant (Table 3). There were no statistically significant differences in odds of the other 11 breastfeeding continuation barriers between mothers of NICU-admitted infants and nursery-admitted infants in these adjusted models.

Odds of breastfeeding for  $\geq 10$  weeks did not differ between NICU-admitted versus well nursery-admitted late preterm infants according to univariate logistic regression analysis (unadjusted OR, 0.87 [95% CI, 0.65–1.18];  $P = .379$ ). When univariate logistic regression was performed to identify demographic characteristics associated with breastfeeding for  $\geq 10$  weeks among late preterm infants, older maternal age, maternal education  $> 12$  years, mother being married, non-Medicaid status, state of residence being Vermont versus Illinois or Maine, and normal maternal BMI were found to be statistically significantly associated with breastfeeding for  $\geq 10$  weeks (Table 4). Maternal race was significantly associated with breastfeeding for  $\geq 10$  weeks among respondents in Illinois and Maine but not in Vermont, although the categories of race/ethnicity are different for Vermont than for the other 2 states.

A multivariable logistic regression model was then built to identify independent predictors of breastfeeding for  $\geq 10$  weeks. Maternal education  $> 12$  years, married status, and residence in Vermont versus Illinois or Maine were found to predict higher odds of breastfeeding for  $\geq 10$  weeks (Table 4). Maternal obesity was predictive of lower odds of breastfeeding for  $\geq 10$  weeks compared with maternal normal weight or underweight.

**TABLE 1** Characteristics of Respondents and Association of Demographic Characteristics With Odds of Infant NICU Admission

Characteristic	N <sup>a</sup> (%) <sup>b</sup>	OR (95% CI)	P <sup>c</sup>
Maternal age, y			.392
≤ 19	236 (11.7)	1.19 (0.69–2.05)	
20–24	573 (18.4)	1.35 (0.84–2.18)	
25–29	719 (28.8)	0.94 (0.60–1.99)	
30–34	582 (24)	1.26 (0.80–1.99)	
≥ 35	420 (17)	1	
Maternal education, y			.278
< 12	321 (17)	0.83 (0.56–1.24)	
12	795 (26)	1.18 (0.85–1.64)	
> 12	1397 (57)	1	
Maternal race/ethnicity: Vermont			.075
White, non-Hispanic	591 (95)	1	
All other race/ethnicities	31 (5)	0.87 (0.36–2.08)	
Maternal race: Illinois and Maine			.803
White	1586 (73)	0.92 (0.48–1.74)	
Black	237 (21)	0.82 (0.40–1.67)	
Other	83 (5)	1	
Married			.278
Yes	1558 (61)	0.95 (0.71–1.27)	
Other	970 (39)	1	
Medical insurance			.704
Medicaid	1218 (47)	1.06 (0.80–1.41)	
Non-Medicaid	1309 (53)	1	
Parity			.075
Primiparous	1183 (41)	1	
Multiparous	1347 (59)	0.77 (0.58–1.03)	
Mode of delivery			<.0001
Vaginal	1423 (58)	1	
Cesarean delivery	1106 (42)	1.88 (1.41–2.51)	
Initiated breastfeeding			.266
Yes	1853 (71)	1	
No	607 (29)	0.83 (0.60–1.15)	
Birth weight category, g			<.0001
< 1500	33 (0.7)	17.93 (4.23–75.94)	
1500–2499	1933 (40.2)	2.94 (2.22–3.91)	
≥ 2500	564 (59)	1	
Maternal BMI category			.786
Underweight	162 (6)	1.08 (0.61–1.90)	
Normal	1285 (48)	1	
Overweight	577 (24)	0.93 (0.65–1.33)	
Obese	506 (22)	1.16 (0.80–1.68)	
State			0.746
Illinois	1008 (90)	0.91 (0.71–1.17)	
Maine	900 (7)	0.95 (0.72–1.26)	
Vermont	622 (3)	1	

<sup>a</sup> Number of women from unweighted sample distribution.

<sup>b</sup> Percentages were weighted to account for deliberate survey oversampling as well as nonresponse and noncoverage.

<sup>c</sup> P value is from the  $\chi^2$  test of independence between NICU admission category and the characteristics.

## DISCUSSION

Our study found no association between NICU admission and breastfeeding initiation or continuation for  $\geq 10$  weeks among late preterm infants. This finding contrasts with the results of a study published by Colaizy and Morriss that used 2000–2003 PRAMS data, in which they found NICU admission to be associated with increased odds of breastfeeding for  $> 4$  weeks.<sup>7</sup> Our results are also in contrast with the study of Ahluwalia et al<sup>5</sup> from 2003, which found that NICU admission was associated with decreased rates of breastfeeding initiation. It may be that the true effect of NICU hospitalization on breastfeeding initiation and continuation changes over time, or these differences may reflect regional differences in neonatal care practices in the states examined in these population studies. Some hospitals have policies that all late preterm infants go to the NICU, and a trend toward overuse of the NICU for some newborns over the last several years in the United States was recently described.<sup>12</sup>

To our knowledge, the present study is the first to look quantitatively at reasons for breastfeeding discontinuation among late preterm infants by using a large national data set. We found the most common reasons for breastfeeding discontinuation within the first few months postpartum among late preterm dyads to be the same for infants admitted to the well-newborn nursery and the NICU. The top 3 reasons reported by mothers of late preterm infants for breastfeeding discontinuation were as follows: maternal perceived inadequate milk supply, breastfeeding difficulties, and concerns that breast milk alone did not satisfy their infants. These findings are in agreement with the results of a systematic review of studies examining breastfeeding among preterm infants, published by Callen and Pinelli<sup>13</sup> in 2005, which found maternal milk supply concern to be the most common barrier noted across 6 studies. In addition, the barriers noted herein are in agreement with those described in 2 recent qualitative studies examining the breastfeeding experience of mothers of late preterm infants.<sup>14,15</sup> These 2 studies illustrated a common

**TABLE 2** Reasons for Early Breastfeeding Discontinuation Among Late Preterm Dyads

Reason	Total	Admitted to NICU	Admitted to Well Nursery
Not enough milk	438 (41)	239 (45)	197 (38)
Difficulty nursing	392 (37)	198 (39)	192 (35)
Breast milk did not satisfy	269 (23)	127 (23)	142 (23)
Nipple concerns	150 (16)	63 (13)	87 (18)
School/work	149 (16)	66 (12)	82 (20)
Household duties	146 (13)	74 (14)	72 (12)
Right time	114 (10)	57 (11)	57 (10)
Jaundice	103 (10)	40 (8)	62 (11)
Infant not gaining weight	117 (9)	58 (11)	59 (7)
Needed someone else to feed infant	113 (8)	51 (5)	62 (9)
Mom sick	80 (8)	43 (6)	36 (9)
Infant sick	37 (5)	23 (7)	13 (3)

Data are presented as the total number of mothers in each category who answered yes to the item (mothers could select any number of reasons) and the percentage of the total in each category, weighted for nonresponse, noncoverage, and deliberate oversampling.

are known to have lower rates of breastfeeding initiation and breastfeeding continuation; the reasons for these associations are likely multifactorial and may include delayed lactogenesis secondary to hormonal differences, physical and medical comorbidities, and differences in support provided for this population of mothers.<sup>18–22</sup> Higher maternal education has likewise been previously described as a predictor of a longer duration of breastfeeding.<sup>22,23</sup> Single mothers having lower rates of breastfeeding continuation has also been reported and may be due to lack of support, need for child care, or socioeconomic and/or racial confounding.<sup>23</sup>

Additional research is needed to provide recommendations for evidence-based newborn care for late preterm infants. It remains unclear what the optimal length of stay should be (whether the infant is in the NICU or well-infant nursery) to optimize the establishment of breastfeeding and prevent unnecessary readmissions.<sup>24,25</sup>

Our research provides evidence that single mothers, those with lower education, and those who are obese are high-risk subpopulations of mothers of late preterm infants who could benefit more from enhanced support, both in the hospital and after discharge. We also identified milk supply concerns and breastfeeding difficulties as the top reasons why mothers of late preterm infants discontinue breastfeeding. However, the barriers are broad, and future prospective research aimed at further characterizing these barriers among late preterm dyads could be helpful, as could trials testing specific interventions aimed at overcoming these barriers in this population of mother–infant dyads; such interventions could include nipple shields,<sup>26</sup> hand expression,<sup>27,28</sup> and short-term donor milk or formula supplementation.<sup>29,30</sup>

Our study benefited from the rigorous PRAMS methods and a sufficiently large sample size to allow for multivariable logistic regression modeling to take into account multiple confounding variables. We were limited by the fact that our participants were from 3 states (2 in the

phenomenon of maternal frustration with breastfeeding difficulties; that is, struggling to get the late preterm infant to latch and having to pump, which can lead mothers to think they failed for not being able to provide adequate milk for their infants.

When we compared mothers of infants admitted to the NICU versus those admitted to the well nursery, we found that the former group had higher odds of discontinuing breastfeeding due to the need for someone else to feed their infant. This finding seems intuitive, as a NICU stay often requires separation of infant and mother, while nursery-admitted infants are often allowed to

room-in with and are then discharged along with their mothers.

Single mothers, mothers with higher than a high school education, obese mothers, and mothers living in Illinois or Maine versus Vermont were identified as being at higher odds of breastfeeding discontinuation before 10 weeks. Higher hospital support has been shown to correlate with improved early breastfeeding outcomes among late preterm infants,<sup>16</sup> and Vermont consistently has higher hospital breastfeeding support than Illinois or Maine according to the CDC Maternity Practices in Infant Nutrition and Care survey.<sup>17</sup> Obese mothers

**TABLE 3** Reasons for Breastfeeding Discontinuation According to NICU Admission Status

Reason	Adjusted OR <sup>a</sup>	Admitted to NICU: 95% CI	P
Not enough milk	0.78	0.49–1.24	.285
Difficulty nursing	0.82	0.50–1.35	.437
Breast milk did not satisfy	1.04	0.60–1.82	.886
Nipple concerns	1.34	0.70–2.57	.383
School/work	1.81	1.00–3.31	.052
Household duties	0.84	0.42–1.67	.619
Right time	0.74	0.34–1.62	.451
Jaundice	1.32	0.57–3.05	.514
Infant not gaining weight	0.62	0.27–1.40	.248
Needed someone else to feed infant	1.82	1.02–3.23	.042
Mom sick	1.73	0.94–3.17	.076
Infant sick	0.31	0.09–1.02	.055

The referent group included infants admitted to the well-newborn nursery.

<sup>a</sup> Adjusted for primiparity versus multiparity, mode of delivery, and birth weight category.

**TABLE 4** Predictors of Breastfeeding for  $\geq 10$  Weeks Among Late Preterm Infants

Characteristic	Crude OR (95% CI)	P	Adjusted OR <sup>a</sup> (95% CI)	P
Maternal age, y		<.0001		.102
$\leq 19$	0.21 (0.11–0.43)		0.49 (0.20–1.21)	
20–24	0.28 (0.17–0.48)		0.52 (0.29–0.95)	
25–29	0.89 (0.57–1.39)		1.01 (0.63–1.62)	
30–34	0.94 (0.59–1.49)		1.02 (0.63–1.65)	
$\geq 35$	1		1	
Maternal education, y		<.0001		.0002
<12	0.39 (0.24–0.63)		0.91 (0.50–1.64)	
12	0.28 (0.19–0.41)		0.40 (0.26–0.62)	
>12	1		1	
Maternal race/ethnicity: Vermont		.805		—
White, non-Hispanic	1		—	
All other race/ethnicities	1.16 (0.47–2.63)		—	
Maternal race: Illinois and Maine		<.0001		—
White	0.59 (0.30–1.14)		—	
Black	0.15 (0.07–0.33)		—	
Other	1		—	
Married		<.0001		<.0001
Yes	1.24 (3.00–6.00)		3.28 (2.10–5.12)	
Other	1		1	
Medical insurance		<.0001		.630
Medicaid	0.40 (0.29–0.54)		1	
Non-Medicaid	1		0.90 (0.58–1.39)	
Parity		.014		.143
Primiparous	1		1	
Multiparous	1.46 (1.08–1.97)		1.31 (0.91–1.89)	
Mode of delivery		.300		.943
Vaginal	1		1	
Cesarean delivery	1.17 (0.89–1.58)		0.99 (0.70–1.40)	
NICU admission		.379		.904
No	1		1	
Yes	0.87 (0.65–1.18)		1.02 (0.73–1.43)	
Birth weight category, g		.006		.072
<1500	0.59 (0.20–1.70)		0.92 (0.24–3.55)	
1500–2499	0.65 (0.50–0.85)		0.70 (0.51–0.95)	
$\geq 2500$	1		1	
Maternal BMI category		.480		.0004
Underweight	1.29 (0.72–2.31)		2.01 (1.07–3.80)	
Normal	1		1	
Overweight	1.09 (0.75–1.59)		1.10 (0.74–1.65)	
Obese	0.62 (0.41–0.93)		0.49 (0.32–0.77)	
State		<.0001		<.0001
Illinois	0.54 (0.41–0.69)		0.43 (0.31–0.59)	
Maine	0.49 (0.36–0.65)		0.46 (0.33–0.65)	
Vermont	1		1	

<sup>a</sup> Adjusted ORs were generated from a model that included maternal age, maternal education, marital status, Medicaid insurance, parity, mode of delivery, NICU admission, infant birth weight category, maternal BMI category, and state of residence. (Maternal race was not included in the adjusted models because it was categorized differently for Vermont than for Illinois and Maine.)

Northeast and one in the Midwest) and might not be representative of mothers of late preterm infants across the United States. In addition, maternal report of breastfeeding outcomes may be influenced by recall bias and social desirability bias. Because we used data available from the PRAMS survey, we were unable to extract clinical data, such as the specific reasons why infants were admitted to the NICU, which might be influenced by policies at individual hospitals. Likewise, we did not have information on infants' length of hospital stay, which may have been different in the NICU and well-nursery populations and could confound the outcome of breastfeeding continuation. We were unable to separate the late preterm infants according to gestational age week because of incomplete data for the gestational age variable. Birth weight was used instead, but we acknowledge that this variable is not an exact substitution, as our sample likely includes small and large for gestational age infants.

The PRAMS questionnaire does not differentiate between feeding at breast and feeding breast milk by bottle. It is therefore possible that even though rates of breast milk feeding at 10 weeks are similar among late preterm infants admitted to the nursery and NICU, the mode of breast milk feeding that these infants are receiving may be different, which could be a predictor of longer term sustained breastfeeding. We also did not explore exclusive breastfeeding or percentage of feedings that are breast milk versus formula between these 2 groups of infants. These outcomes will be important to explore in future prospective studies.

## CONCLUSIONS

Late preterm infants admitted to the NICU initiated breastfeeding and sustained breastfeeding for 10 weeks at rates similar to infants admitted to the well-newborn nursery. The most common barriers to breastfeeding continuation cited by mothers of late preterm infants admitted to the NICU and well nursery were the same and were as follows: milk supply concerns, breastfeeding difficulties, and concerns that breast milk alone did not satisfy their

infants. Mothers of late preterm infants who are single versus married, obese versus normal weight, or had a high school education versus higher were at lower odds of breastfeeding for  $\geq 10$  weeks. Prospective research aimed at identifying strategies to improve breastfeeding duration among late preterm infants should take into account these maternal risk factors and should aim to alleviate milk supply concerns and breastfeeding difficulties.

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