

# The Effect of Peer Counselors on Breastfeeding Rates in the Neonatal Intensive Care Unit

## Results of a Randomized Controlled Trial

Anne Merewood, MPH, IBCLC; Laura Beth Chamberlain, BA, IBCLC; John T. Cook, PhD; Barbara L. Philipp, MD; Kirsten Malone, BA, IBCLC; Howard Bauchner, MD, MPH

**Objective:** To determine whether peer counselors impacted breastfeeding duration among premature infants in an urban population.

**Design:** This was a randomized controlled clinical trial.

**Setting:** The trial was conducted in the Newborn Intensive Care Unit at Boston Medical Center, an inner-city teaching hospital with approximately 2000 births per year.

**Participants:** One hundred eight mother-infant pairs were enrolled between 2001 and 2004. Pairs were eligible if the mother intended and was eligible to breast-feed per the 1997 guidelines from the American Academy of Pediatrics and if the infant was 26 to 37 weeks' gestational age and otherwise healthy.

**Intervention:** Subjects were randomized to either a peer counselor who saw the mother weekly for 6 weeks or to standard of care.

**Main Outcome Measure:** The main outcome measure was any breast-milk feeding at 12 weeks postpartum.

**Results:** Intervention and control groups were similar on all measured sociodemographic factors. The average gestational age of infants was 32 weeks (range, 26.3-37 weeks) with a mean birth weight of 1875 g (range, 682-3005 g). At 12 weeks postpartum, women with a peer counselor had odds of providing any amount of breast milk 181% greater than women without a peer counselor (odds ratio, 2.81 [95% confidence interval, 1.11-7.14];  $P=.01$ ).

**Conclusions:** Peer counselors increased breastfeeding duration among premature infants born in an inner-city hospital and admitted to the neonatal intensive care unit. Peer counseling programs can help to increase breastfeeding in this vulnerable population.

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**N**ATIONAL DATA FOR BREASTFEEDING rates among premature infants are not available, but regional data suggest these rates are low.

In Massachusetts, the breastfeeding initiation rate among term infants in 2002 was 76%, while the initiation rate among premature infants was 68%.<sup>1</sup> Moreover, infants with the lowest gestational ages had the lowest breastfeeding rates (56% initiation among infants born between 24 and 27 weeks compared with 69% among infants born at 36 weeks' gestational age).<sup>1</sup> Nationally, breastfeeding rates are lowest,<sup>2,3</sup> and rates of prematurity highest,<sup>4</sup> among African American infants, suggesting that breastfeeding rates nationally in premature infants will be lower than average.<sup>1</sup>

The health risks associated with formula feeding for premature infants include increased incidence of necrotizing enterocolitis,<sup>5</sup> delayed brainstem maturation,<sup>6</sup> decreased scoring on cognitive and devel-

opmental tests,<sup>7-10</sup> and decreased visual development.<sup>11,12</sup> Thus, human-milk feeding of premature infants is desirable, and effective strategies to increase breastfeeding rates in this population are needed. Peer counseling programs have successfully raised breastfeeding rates among term infants in low-income families in a range of settings.<sup>13-19</sup> The objective of this study was to determine whether peer counselors improve breastfeeding duration rates among premature infants admitted to the neonatal intensive care unit (NICU). Secondary objectives were to determine whether peer counselors increased the number of women providing mostly breast milk and whether peer counselors increased rates of exclusive breastfeeding.

## METHODS

This randomized controlled trial was conducted between 2002 and 2004 in the level III, 15-bed NICU at Boston Medical Center, an in-

**Author Affiliations:** Boston University School of Medicine (Ms Merewood and Drs Cook, Philipp, and Bauchner) and The Breastfeeding Center, Boston Medical Center (Mss Chamberlain and Malone), Boston, Mass.

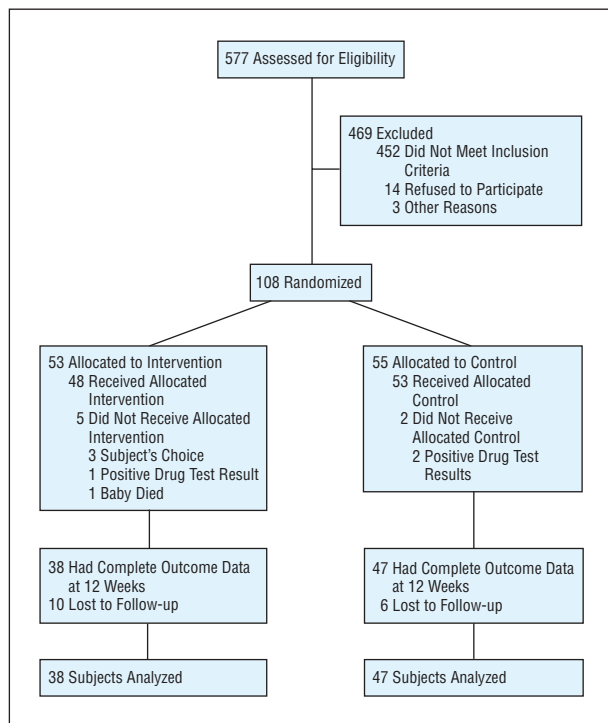


Figure. Design of randomized controlled trial.

ner-city teaching hospital and the only Baby-Friendly hospital in Massachusetts. Baby-Friendly status is awarded by the World Health Organization and the United Nations Children's Fund to hospitals that meet the Ten Steps to Successful Breastfeeding.<sup>20</sup> Women were enrolled between January 2001 and September 2004, and data analysis was completed in July 2005. Eligible women had an otherwise healthy premature infant (no congenital anomalies and no life-threatening condition in the immediate postpartum period) between 26 and 37 weeks' gestational age in the NICU; spoke English or Spanish; were eligible to breastfeed according to the 1997 guidelines from the American Academy of Pediatrics<sup>21</sup>; and chose to do so. Women were excluded when incapacitated by illness or birth complications preventing enrollment. Infants with gestational age younger than 26 weeks were excluded, because a relatively high percentage of infants in this age range die or experience severe medical complications. The study received approval from the Boston University Medical Center institutional review board.

Eligible women were approached about study participation within 72 hours postpartum and, if interested, provided consent. At the time of enrollment, consenting women were randomly assigned to receive peer support or standard of care (Figure). Randomization was performed using SAS (SAS Institute Inc, Cary, NC). The numbers 1 to 300 were randomized into 2 groups (intervention and control). Numbered envelopes were prepared by the primary investigator (A.M.) in groups of 50, containing either a red index card (intervention) or a green index card (control). After a research assistant enrolled the mother, she opened the sealed envelope to determine whether the subject would be in the intervention or control group. The research assistant then contacted the peer counselor for intervention group assignees; all initial peer counselor contacts with intervention mothers took place within the same 72-hour postpartum period. The reason for the 72-hour time frame was to ensure that the initial contact happened before the mother's hospital discharge. However, some flexibility within that 72 hours was necessary because these were generally high-risk deliveries and mothers were not always immediately avail-

able. Similarly, although a peer counselor was at the hospital every weekday morning, if the birth occurred on a weekend or at night, she was not immediately available.

Peer counselors were women with breastfeeding experience drawn from the local community. Over the course of the study, we used 2 US-born African American women; 1 non-US-born Mexican woman, 1 white US-born woman, and 1 white/Native American woman. Two of these women were also employed at the hospital as lay childbirth assistants, and 2 were former teenage mothers. Peer counselors were trained at a 5-day breastfeeding course (operated by The Center for Breastfeeding [http://www.healthychildren.cc/index4.htm]). They were also trained in the hospital about NICU procedures and breastfeeding techniques and at regular, mandatory breastfeeding training days for maternity staff throughout the course of their employment.<sup>22</sup>

After the initial face-to-face contact within 72 hours of the birth, the peer counselor was in contact with the mother thereafter on a weekly basis for 6 weeks. Control group women received standard of care treatment, which in our Baby-Friendly hospital includes referrals to the lactation consultant when needed, use of a pump in the hospital, access to 3 breastfeeding classes per week, staff who are highly trained in lactation management, and a free, high-grade electric breast pump for home use if the mother's insurance does not pay for a pump. The peer counseling model was based on published studies that demonstrate that, among peer counseling programs for low-income mothers of term infants, in-depth, in-person peer contacts are most effective.<sup>13,15</sup> Emphasis was thus placed on face-to-face contact, with meetings lasting at least 30 minutes. The program guidelines required peer counselors to meet in person with the mother, whenever possible, while the infant remained in the NICU. After the infant was discharged from the hospital, contact was by telephone unless the mother chose to come to the hospital to meet with the peer counselor. Peer counselors followed written guidelines (available on request) for each contact to establish consistency of care. The protocol required all peer counselors to maintain field records that could be reviewed to determine how completely the intervention was performed.

Infant feeding status was assessed by a research assistant unaware of the mother's group assignment at 2, 4, 8, and 12 weeks postpartum. Although data were gathered at 4 points, in part to ensure subject contact was maintained to the best of our ability, our analysis reports 12-week data because our focus was on duration. Data were obtained from the infant's medical records while the infant was hospitalized and by maternal recall by telephone after hospital discharge. The bedside feeding record was examined for the 48-hour period immediately preceding the date of the infant's 2-, 4-, 8-, and 12-week birthday. If an infant was not taking food at any observation point, the research assistant retraced the history in the infant's medical record and recorded data from the 48-hour period immediately prior to feeds being halted. In the case of telephone calls, mothers were called on the infant's 2-, 4-, 8-, and 12-week birthdays (or as soon as possible thereafter, if not reachable on the exact day) and asked to report the number of breast and/or formula feeds the infant had received in the previous 48 hours. On some occasions, mothers were not able to recall accurately the exact number of feeds in the previous 48 hours, in which case they were prompted to report categorically whether the baby received "only breast milk, mainly breast milk, mainly formula, or only formula."

#### DEFINITION OF BREASTFEEDING AND PRIMARY OUTCOME MEASURES

Nationally, any amount of breastfeeding is used as a definition of breastfeeding to assess breastfeeding rates.<sup>23</sup> In keeping with

this definition, we described breastfeeding as receiving any breast milk at 12 weeks as our primary outcome measure. However, this national definition is controversial. Thus, we collected more detailed data in the 4 categories listed earlier. Our final data are reported as any breast milk (combining the 3 categories of only breast milk, mostly breast milk, and mostly formula) and mostly and only breast milk, which adds useful and more detailed information. Mostly breast-milk feeders received equal to or greater than 50% of their feeds as breast milk; breast milk may have been received by gavage, bottle, or at the breast.

## DESCRIPTION OF ANALYSIS

Our sample-size calculation was based on a prestudy estimation that the proportion of infants breastfeeding would be 10% at 12 weeks with the intervention. We assumed that these proportions would rise to 40% at 12 weeks. Assuming an  $\alpha$  of .05 and a power of 80%, the sample size necessary at 12 weeks would be 78. To have 2 groups stratified by gestational age, we would need a final sample size of 156 infants. In fact, we enrolled a total of 108 mother-infant pairs, after assessing 577 pairs for eligibility during 2 years. Fewer pairs than anticipated met the prematurity eligibility requirement, and when the project funding expired, we ended enrollment. As a result, stratification by gestational age was not pursued.

We examined differences in feeding behavior between mothers with and without peer counselors using logistic regression models with 3 separate dichotomous (yes or no) feeding outcome variables (any breast milk, mostly breast milk, and all breast milk). After determining that the 2 groups were similar on all measured sociodemographic variables using  $\chi^2$  tests, data obtained at the 12-week follow-up observation point were analyzed. Because race is a factor in breastfeeding duration among term infants (39% of white US infants are breastfeeding at 6 months compared with 24% of African American infants<sup>3</sup>) and because of the high incidence of premature births among African American women, we performed a subgroup analysis on African American subjects.

We used Stata software version 8 (StataCorp, College Station, Tex) for all hypothesis tests, with a significance level of  $\alpha = .05$ .

## RESULTS

Overall, 577 mother-infant pairs were assessed for eligibility and 469 were excluded: 452 for not meeting inclusion criteria, 14 for refusing to participate, and 3 for other reasons (Figure). A total of 108 mother-infant pairs were enrolled and randomized; 53 were assigned to the intervention and 55 to the control groups. Of the 53 enrolled in the intervention group, 5 did not receive the allocated intervention; 3 subjects changed their mind after enrollment but before receiving the intervention, 1 mother had positive postpartum drug test results and was therefore not eligible to breastfeed, and 1 infant died, leaving a total of 48 women in the intervention group. Of the 55 women randomized to the control group, 2 were subsequently withdrawn from the study; both were found to have positive postpartum drug test results and were thus ineligible to breastfeed, leaving 53 in the control group. (Many women were not enrolled because of illicit drug use; those in whom drug use became apparent after enrollment had misled health care professionals regarding their drug use, which only became apparent through clinical symptoms afterward.) The 2 groups were similar on all measured char-

**Table 1. Baseline Characteristics of the Study Sample**

	Intervention Group (n = 48)	Control Group (n = 53)	P Value
<b>Infant characteristics</b>			
Birth weight, g, mean (range)	1914.4 (724-3320)	1840 (682-3005)	.51
Gestational age, wk			
Mean (range)	32.6 (26.3-37)	32.7 (26.4-36.3)	.75
$\geq 26$ to $< 32$ , No.	14	16	
$\geq 32$ to $\leq 37$ , No.	34	37	
<b>APGAR score</b>			
1 min, mean (range)	6.6 (0-9)	6.2 (0-9)	.36
5 min, mean (range)	8.0 (3-9)	7.8 (1-9)	.59
Male, No. (%)	25 (52)	30 (57)	.65
<b>Mother characteristics</b>			
<b>Insurance status, No. (%)</b>			
Medicaid	27 (56.3)	27 (50.9)	.33
Private/HMO	8 (16.7)	4 (7.5)	
Other	13 (27.1)	22 (41.5)	
<b>Race/ethnicity, No. (%)</b>			
African American non-Hispanic	35 (72.9)	35 (66.0)	.14
White non-Hispanic	3 (6.2)	2 (3.8)	.43
Hispanic	5 (10.4)	14 (26.4)	
Other	5 (10.4)	2 (3.8)	
US born	12 (25.0)	17 (32.1)	
Non-US born	36 (75.0)	36 (67.9)	

Abbreviations: APGAR, appearance (color), pulse (heart rate), grimace (reflex irritability), activity (muscle tone), and respiration (score reflecting condition of newborn); HMO, health maintenance organization.

acteristics, including maternal ethnicity, educational status, age, parity, breastfeeding history, and infant birth weight (intervention group, 1914.4 g; control group, 1840 g); gestational age; sex; and length of hospital stay (intervention group, mean 27.1 days [range, 2-81 days]; control group, mean 25.2 days [range, 1-104 days]) (**Table 1**). Most women (70 of 101; 69% of the total study population) were African American.

Field records from the peer counselors were available for 43 of the 48 pairs in the intervention group. At the initial contact, peer counselors discussed pumping techniques in 100% of documented cases; helped the mother pump in 72.1% of cases; accompanied the mother to the NICU in 72.1% of cases; and helped the mother to breastfeed, kangaroo care, or both in 30.2% of cases (kangaroo care is skin-to-skin holding that has been practiced effectively with premature infants in many NICUs and shown to improve infants' outcomes<sup>23-26</sup>). After the initial contact, peer counselors' field records also included the infants' location and whether the intervention was performed by telephone or in person. For example, after 4 weeks, 37.2% of infants remained in the NICU, and 81.3% of their mothers were seen in person by the peer counselor in the NICU.

At 12 weeks, women with peer counselors had odds of providing any amount of breast milk 181% greater than those without peer counselors (odds ratio, 2.81 [95% confidence interval, 1.11-7.14];  $P = .03$ ) (**Table 2**). In our subgroup analysis of African American infants, at 12 weeks, African American mothers with peer counselors

**Table 2. Odds of Mothers Giving Different Amounts of Breast Milk at 12 Weeks' Follow-up**

Breast Milk Category	Control Group (n = 47)	Intervention Group, OR (95% CI) (n = 38)	P Value
Any	1.00	2.81 (1.11-7.14)	.03
Mostly	1.00	2.49 (0.97-6.40)	.006
All	1.00	1.30 (0.30-5.65)	.72

Abbreviations: CI, confidence interval; OR, odds ratio.

**Table 3. Odds of African American Mothers Giving Different Amounts of Breast Milk at Each Observation Point at 12 Weeks' Follow-up**

Breast Milk Category	Control Group (n = 29)	Intervention Group, OR (95% CI) (n = 30)	P Value
Any	1.00	3.59 (1.16-11.03)	.03
Mostly	1.00	1.94 (0.64-5.86)	.24
All	1.00	0.23 (0.02-2.26)	.21

Abbreviations: CI, confidence interval; OR, odds ratio.

had odds of providing any breast milk 249% greater than those for African American mothers without peer counselors (odds ratio, 3.59 [95% confidence interval, 1.16-11.03];  $P = .03$ ) (**Table 3**).

#### COMMENT

In this randomized controlled trial, the use of peer counselors for breastfeeding mothers of premature infants increased breastfeeding duration, measured by the infants receiving any breast milk at 12 weeks. Because the benefits of breastfeeding are, in most studies, shown to be dose dependent, increasing the amount of breast milk consumed by premature infants, either through extending duration or increasing the number of breast vs formula feeds, is an important contribution to their short- and long-term health.

These results represent an important addition to the literature already describing the effectiveness of peer counseling programs at increasing breastfeeding rates.<sup>13,15,16,27</sup> Although operating a peer counseling program can be challenging,<sup>22</sup> it is manageable in a hospital setting. Not all peer counseling programs have equal success, and comparisons are difficult because peer counseling programs vary in their content and implementation. We believe that the effectiveness of this particular program was owing to a careful design incorporating elements shown to be most successful in previously published peer counseling studies. These elements included face-to-face contact, a checklist of goals for the peer counselors at their first meeting with mothers, carefully maintained field records, and close supervision of, and support for, the peer counselors. Peer counselors had immediate daily access to a lactation consultant working on the unit and to project managers. At the same time, the lactation consultant's and

the project managers' presence helped to ensure peer counselor consistency, accuracy of knowledge, and reliability. In light of current investment at the national level by the US Department of Agriculture in breastfeeding peer counseling as part of the Women, Infants, and Children program, we strongly suggest that peer counseling programs be established with clear guidelines and an evaluation component.

This study has a number of limitations. Although we focused on premature infants, the majority of infants in this study were between 32 and 37 weeks' gestational age and were otherwise healthy. Infants with congenital anomalies or with life-threatening complications in the immediate postpartum period were excluded from the study. The study was conducted in a Baby-Friendly hospital. Baseline breastfeeding rates among both intervention and control groups were very high compared with state and national rates in this population. How much the environment of a Baby-Friendly hospital influenced findings cannot be determined; however, both intervention and control groups were exposed to the Baby-Friendly environment. Because breastfeeding is a desirable outcome, when feeding data were collected from the mother rather than the medical record of hospitalized infants, there may have been a tendency to overreport breastfeeding. It is also possible that nondifferential reporting inaccuracy might be expected to bias the effect of the intervention, and the direction of this bias would be unclear. The main limitation of the study is that 16 of 108 women were lost to follow-up at 12 weeks, and loss to follow-up was higher in the intervention arm than in the control group (10 and 6, respectively), although, in a cross-tabulation of number of mothers in each study arm by follow-up period, there was no statistically significant difference in loss to follow-up between the 2 groups ( $P = .98$ ). Given the desirability of breastfeeding, it is possible that women in the intervention group felt more guilty about discontinuing breastfeeding than control women because of relationships developed with the peer counselor, and thus, they did not answer telephone calls when the research assistant called to ascertain feeding status. However, the peer counselor contact ended at week 6 and the majority of losses to follow-up occurred later than 6 weeks, and attempts to elaborate on reasons for loss to follow-up would be conjectural.

Many groups, including the American Academy of Pediatrics,<sup>28</sup> the American College of Obstetricians and Gynecologists,<sup>29</sup> the American Academy of Family Practice,<sup>30</sup> the US Department of Health and Human Services,<sup>31</sup> and the World Health Organization,<sup>32</sup> recognize the importance of prolonged breastfeeding. This is likely even more important in premature infants than in term infants because of the additional health risks they face. We found that NICU-based peer counselors increased breastfeeding duration among premature infants in an inner-city, Baby-Friendly hospital. Peer counseling programs can help to increase breastfeeding in this vulnerable population.

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Correspondence: Anne Merewood, MPH, IBCLC, Division of General Pediatrics, Maternity Building, 4th Floor,

91 E Concord St, Boston Medical Center, Boston, MA 02118 (anne.merewood@bmc.org).

**Author Contributions:** *Study concept and design:* Merewood, Philipp, and Bauchner. *Acquisition of data:* Merewood, Chamberlain, and Malone. *Analysis and interpretation of data:* Cook. *Drafting of the manuscript:* Merewood, Chamberlain, and Bauchner. *Critical revision of the manuscript for important intellectual content:* Merewood, Cook, and Philipp. *Statistical analysis:* Cook. *Obtained funding:* Merewood and Philipp. *Study supervision:* Merewood and Bauchner.

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## Correction

**Error in Byline.** In the letter "Dismissing Families: A Slippery Slope" published in the April issue of the ARCHIVES (2006;160:452), a coauthor was mistakenly listed in the byline. The sole author of the letter was Kathi J. Kemper, MD, MPH.