

Breastfeeding Duration, Costs, and Benefits of a Support Program for Low-Income Breastfeeding Women

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ABSTRACT: Background: Breastfeeding can ameliorate some of the complex health issues faced by low-income families. Women who breastfeed and their infants have lower health care costs compared with those who formula feed. Increasing the duration of breastfeeding is recognized as a national priority, particularly for low-income women. This community-based randomized clinical trial involving low-income mothers compared usual care with an intervention comprising hospital and home visits, and telephone support by a community health nurse/peer counselor team for 6 months after delivery. **Methods:** Forty-one women were recruited after delivery of a full-term singleton infant and randomly assigned to intervention or usual care groups. **Results:** Women receiving the community health intervention breastfed longer than the women receiving usual care. The infants in the intervention group had fewer sick visits and reported use of fewer medications than infants in the usual care group. The intervention cost (\$301/mother) was partially offset by cost savings on formula and health care. **Conclusions:** Community health nurse and peer counselor support can increase breastfeeding duration in low-income women, and has the potential to reduce total costs including the cost of support. (BIRTH 29:2 June 2002)

The United States national health objectives, *Healthy People 2010*, includes the goal of increasing breastfeeding duration to 6 months for 50 percent of women who initiate breastfeeding (1). Other health organizations (American Academy of Pediatrics,

American Dietetic Association, UNICEF, UNAIDS, World Health Organization) have also recommended that women exclusively breastfeed for 6 months (2–5). The 2010 goals specifically focus on increasing breastfeeding among low-income women, a population in which breastfeeding duration continues to be low (1). In 2000 only 20.1 percent of low-income mothers breastfed for 6 months (6).

Increased duration of breastfeeding offers health benefits to mothers and infants (3,7,8), many of which are specific to low-income women. They may find that breastfeeding is empowering (9) and helps with pregnancy spacing (10). Furthermore, breastfeeding may also save the mother and society resources (11). Compared with formula feeding, breastfeeding is associated with lower formula and health care costs, and it may take less time (12; Frick, Racine, Pugh, Milligan, unpublished manuscript, 2002). The cost savings may even be sufficient to offset the costs of promoting breastfeeding.

Facilitating breastfeeding among low-income women includes comprehensive and culturally

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The National Institute of Nursing Research, Bethesda, Maryland, funded this study (R55 NR04958).

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relevant support in the hospital during the first week postpartum, and repeated and continual support in the mother's home (13–16). Nearly 35 percent of low-income women stop breastfeeding within 8 days of delivery (14,17), but with support this percentage can increase. For example, among African American low-income mothers, telephone support during this period was found to help stop early weaning (18).

Repeated contact with supportive persons, such as peer counselors and nurses, affects the duration and exclusivity of breastfeeding practice after the immediate postpartum period (15–17,19). Community health nurses can be an important source of breastfeeding support; for example, to promote positive outcomes, increase breastfeeding rates, increase maternal satisfaction, and decrease infant hospital readmission rates (20). Targeting women enrolled in the Women, Infants, and Children's supplemental nutrition program (WIC) indicated that peer counselor programs had a positive effect on promotion and sustaining breastfeeding among low-income women (16,21,22). The peer counselors were role models of successful breastfeeding and provided informational support and emotional encouragement (23). In a qualitative study, low-income mothers valued peer counselors for establishing supportive personal relationships, showing enthusiasm for breastfeeding, and facilitating breastfeeding through concrete actions (24). A randomized controlled trial reported that peer support significantly increased the proportion of mothers who breastfed for a duration of at least 3 months; however, the authors suggested that rigorous evaluation of this strategy was still needed for low-income, less educated women (25,26).

Combining community health nurses and peer counselors has been demonstrated as a strategy to increase the duration of breastfeeding among low-income women (27,28). In this approach, the community health nurse provides the mothers with professional knowledge, assessment skills, and educational support while simultaneously community-based peer counselors share their personal breastfeeding experiences, empathize with the women's situation, and serve as role models for successful breastfeeding. Increasing breastfeeding by means of this combined team has the potential to decrease costs to the mother and society (Frick, Racine, Pugh, Milligan, unpublished manuscript, 2002).

The primary aim of this study was to evaluate a community health nurse/peer counselor intervention (27,28) to increase the duration of breastfeeding among low-income, predominately minority women during the first 6 months of their infants' lives. The costs of the intervention, health care, and formula for the child were also evaluated to calculate the poten-

tial cost savings if a government agency were to fund such an intervention.

Methods

Study Sample and Procedure

This randomized clinical trial was conducted between April 1999 and February 2000 in a large academic medical center in the mid-Atlantic region of the United States. During postpartum hospitalization, a research assistant approached 41 low-income women (receiving financial medical assistance support). The study was thoroughly explained, and the women had an opportunity to question and discuss their involvement. After they signed an informed consent form, they responded to several questionnaires. They were then assigned randomly by a sealed envelope technique to either an intervention or a usual care group. Interviews were conducted in the client's hospital room or home. Infant data outcomes were collected in person at months 3 and 6, and by telephone at postpartum weeks 1, 2, 3, 4, and 6, and month 4.

Participants in both groups received usual breastfeeding support, which consisted of support from hospital nurses, assistance by means of a telephone "warm line," and one hospital visit by a lactation consultant if the participant delivered on a weekday. The intervention group received supplementary visits from the community health nurse/peer counselor team, including daily visits during hospitalization, and visits at home during weeks 1, 2, and 4, and at the team's discretion. Peer counselors provided telephone support twice weekly through week 8 and weekly through month 6 (even if the mother stopped breastfeeding).

Data Measurement

Each mother was contacted by telephone at least every 2 weeks to determine breastfeeding duration, which was calculated as number of weeks. The potential cost savings of the intervention related to breastfeeding duration were also assessed. Data were collected on the mother's occupation, employment, or student status; the amount of time the mother spent feeding (breast or bottle); formula quantity; health care provider, emergency room visits (including reason for visit); and infant hospitalizations.

Data Analysis

To assess the costs and benefits of the intervention, program records, survey data, and data from outside

sources were compiled. The cost of the program was calculated in two ways. One calculation was based on reported and attempted contacts between the community health nurse and the peer counselor and participants. Data included number of contacts, length of contacts, and number of attempted contacts, mileage, and driving times. Community health nurses' and peer counselors' salaries, as well as standard mileage estimates, were included. Calculating costs using these data may lead to underestimation of intervention costs, since staff training and in-service functions were not included in the calculation. This estimation was used to calculate the cost analysis in this study.

The second method for calculating program costs used project records of what staff members were paid. Paid time included time dedicated to training and in-service education. This approach overestimates the program costs, since training and in-service meeting frequency was increased for research purposes. This estimation was used for comparison purposes.

Effects of the program were measured in several ways. To determine the time necessary for feeding, all study participants were asked to report the average time they required for breastfeeding and the average time for bottle-feeding. To assign a monetary value to the time spent feeding the infant; all feeding time was included irrespective of who fed the infant; however, the cost of time was calculated at the mother's wage. The wages used to represent mothers' income were based on their reported occupations, using data from the National Compensation Survey (29). For mothers who were still in school or did not report an occupation, the data on average weekly earnings for individuals (Table 33 in [30]) by education level were divided by 35 hours per week to assign a monetary value per hour.

The second variable of interest was the quantity of formula used. Mothers were asked how many cans of concentrate and/or powder they used. Prices were obtained in November 1999 from a web site for a national drug store, one of the lowest priced stores. Prices of \$3.49 for a 13 oz. can of name brand concentrate and \$10.99 for a 14.1 oz can of name brand powder were multiplied by number of cans used to calculate a cost per mother.

Given the self-reported data collected, it is difficult to assign a price to the health care services that participants used. Numbers of visits, admissions, and prescriptions were enumerated in the intervention and usual care groups for comparative purposes. The specific categories of health care services that participants used were checkups, sick visits, prescriptions, immunizations, emergency department visits, and total hospitalizations.

Results

The intervention and usual care groups were not significantly different in major characteristics, including age, ethnicity, education, marital status, and breastfeeding goals. Table 1 shows the sample characteristics for the two groups of mothers.

Breastfeeding Duration

After week 1, more mothers in the intervention group were breastfeeding at all time periods. At 3 months, 45 percent ($n = 9$) in the intervention group were exclusively breastfeeding versus only 25 percent ($n = 5$) in the usual care group, and at 6 months, 30 percent ($n = 6$) versus only 15 percent ($n = 3$), respectively. At 6 months, 45 percent were still at least partially breastfeeding in the intervention group compared with 35 percent in the usual care group. Figure 1 shows the comparison of any level of breastfeeding (exclusive plus partial).

Costs and Benefits

The intervention group spent an average of 40 hours more feeding their infants than the usual care group and used a significantly lower amount of concentrated formula (34 cans fewer per participant). Other indices were similar in the two groups.

Table 2 shows a summary of costs and benefits. The intervention group spent less on formula, but the intervention cost \$301 per mother to implement (using contact time and mileage only). Thus, the savings did not offset the additional costs (i.e., formula and intervention). However, the intervention group expenditures on the intervention and formula combined were only \$54 more per mother than the usual care group's expenditures on formula. Indirect costs represent the value of maternal time spent feeding their infants. The intervention group spent more time feeding than the usual care group. It

Table 1. Sample Characteristics

<i>Characteristics</i>	<i>Intervention (n = 21)</i>	<i>Usual Care (n = 20)</i>
Mother's mean age in years (SD)	20.86 (3.58)	22.35 (4.98)
African American (%)	95.2	90.0
Education, ≥12 yr (%)	81.0	88.9
Single (%)	81.0	100.0
Infant's mean birthweight in grams (SD)	3089.6 (417.9)	3387.2 (424.4)
Breastfeeding goals in weeks (SD)	30.7 (17.2)	29.4 (17.8)

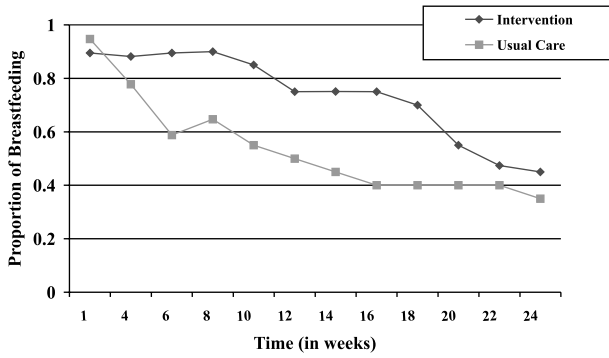


Fig. 1. Comparison of breastfeeding duration (exclusive plus partial) across time among intervention and usual care participants. Note: With this small sample size, differences in exclusive breastfeeding (most robust index) are not statistically significant ($\chi^2 = 1.29 - 1.75$, 1-tailed $p = 0.09 - 0.12$). This figure demonstrates the trend and consistency of increased breastfeeding in the intervention group across time.

should be noted that when the costs were calculated using actual wages paid (which would have included the training and supervision of the community health nurses and peer counselors), the intervention costs increased to \$795 per participant. This result may be artificially inflated due to the small sample size. In actual clinical practice, training costs would be distributed among many more than 41 women over time, since the effects of training last much longer than 6 months. The current project, even focusing on the most optimistic assumption that no training costs were incurred, did not lead to a positive net cost

benefit in the first 6 months. Nevertheless, the inclusion of the medical care cost savings (discussed below) or intangible and long-term benefits that were not measured in this study may lead to a positive net benefit that would grow over time.

Table 3 compares the average use of health care services per infant. The intervention group made fewer visits to the health care provider, including both checkups and sick visits, than the usual care group, with only 3 checkups in the first 6 months of the infant's life. The intervention group also had significantly fewer prescriptions ($p < 0.05$). Immunizations and total hospitalizations did not differ between groups, and the intervention group had, on average, 0.1 fewer emergency room visits.

Discussion and Conclusions

Overall, women receiving the community health intervention breastfed longer. The infants in the intervention group had fewer sick visits and reported using fewer medications than infants in the usual care group. It can be surmised that longer breastfeeding duration was one link in these positive outcomes. Furthermore, it could be speculated that some health care services costs were decreased due to home visits by the nurse, which might have replaced office visits. In addition to these documented benefits, other health benefits that are difficult to measure probably resulted from the nurse and peer counselor exposure. A favorable comparison of the cost of the intervention with the cost savings related to formula intake

Table 2. Average Costs and Benefits per Mother Calculated Using Contact Time and Travel

Group	Formula	Intervention	Direct Total	Indirect	Total Costs
Intervention	\$438 [77]	\$301 -	\$739 [77]	\$3,101 [173]	\$3,840 [202]
Usual care	\$685 [75]	- -	\$685 [75]	\$2,509 [188]	\$3,194 [149]
Difference	(\$247) [107]	\$301 -	\$54 [107]	\$592 [255]	\$646 [251]

Numbers in parentheses are negative. Numbers in brackets are standard errors. Since only one intervention was used, there is no standard error. The difference in direct total costs is not significant; the difference in total costs is significant ($p < 0.05$).

Table 3. Average Health Care Services Use per Infant

Group	Total Visits	Checkups	Sick Visits	Prescriptions	Immunizations	ER Visits	Total Hospitalizations
Intervention	3.6 [0.28]	3.15 [0.26]	0.45 [0.15]	0.25 [0.12]	2.35 [0.15]	0.6 [0.17]	0.15 [0.15]
Usual care	5 [0.53]	3.8 [0.36]	1.2 [0.33]	0.85 [0.27]	2.35 [0.29]	0.7 [0.23]	0.15 [0.11]
Difference	-1.4* [0.6]	-0.65 [0.45]	-0.75* [-0.36]	-0.6* [0.30]	0 [0.33]	-0.1 [0.28]	0 [0.18]

Numbers in brackets are standard errors. Note in this small sample, although few significant differences occurred, the direction and consistency of differences favor the intervention group. ER = emergency room. * $p < 0.05$.

and the cost savings related to use of maternal and infant health care services is essential to the acceptance or support of such an intervention in the broader health care delivery system. This study was limited by the small sample size, but this intervention is potentially cost effective and feasible, it changes breastfeeding duration, and it may be worthy of the attention of policy makers.

Although society experienced higher costs for each mother in the intervention group than in the usual care group, a consideration of the limitations of the calculation of direct and indirect costs in this study is important. By looking only at direct costs (those for which dollars are actually spent), the difference in use of health care services may offset the extra expenditures that were measured in Table 2. The addition of 1.4 pediatrician visits and 0.6 prescriptions on average may add to more than \$54. However, the costs of this difference in use of health care services are unlikely to offset the \$548 difference in direct costs using all wages paid. The per mother costs of training that are included in the larger difference would be reduced in actual clinical practice in which the effects of training last much longer than 6 months. Thus, more data are needed to draw a clear conclusion about cost savings.

Despite the much larger difference in total costs when considering the indirect costs, it is still possible that the benefits of the intervention will offset the costs at the societal level. Of course, it is also possible that the indirect costs of breastfeeding were underestimated, since we did not account for the time necessary for a mother who is breastfeeding while working to pump or to reach her infant and the fact that the mother's desire to pump or feed the infant at work may limit her outside employment opportunities. An improved measurement of variables describing all feeding practices will be necessary in the future to calculate precisely the total indirect costs of breastfeeding and formula feeding. For instance, time spent preparing formula, time spent pumping, and time spent caring for sick infants should all be measured as time costs that are related to breastfeeding behavior.

In addition, no consideration was given to the value that the mothers place on breastfeeding relative to formula feeding. Although a clear savings resulted in out-of-pocket expenses associated with breastfeeding, the mothers who breastfed might also have enjoyed the time spent with their infants more than the comparison group mothers. Not all mothers would place a value on the breastfeeding experience, but to the degree that some do, this factor will further offset a portion of the intervention costs. Furthermore, this study addressed the first 6 months of the

infant's life, but the investment in breastfeeding will continue to provide benefits throughout childhood and adulthood (31–33).

Increasing breastfeeding duration in low-income mothers should narrow the well-known gap between the health of this vulnerable population and that of mothers with greater resources. The strategy in this study, which provided support by a community health nurse and peer counselor, was effective in increasing the duration of breastfeeding in low-income women. This innovative intervention was developed to provide culturally relevant support for increasing the duration of low-income mothers' breastfeeding, which is an important goal in and of itself. Furthermore, if state and federal governments choose to support a program such as this, they may achieve a net benefit for cost savings to society and the public health care system. The process of successful breastfeeding may empower women, resulting in both an improvement in their health practices and an increase in their general productivity. A better understanding of the costs incurred to conduct this program and the economic valuation of benefits will help decision-makers in allocating resources to improve the health and quality of life for mothers and infants.

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