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EFFECTIVENESS OF A HOSPITAL-BASED BREASTFEEDING PROMOTION PROGRAM ON EXCLUSIVE BREASTFEEDING AMONG LOW-INCOME WOMEN IN BRAZIL

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ABSTRACT

In Santos, Brazil, a prospective design was used to compare prevalence and rates of exclusive breastfeeding at 30 and 90 days postpartum through home visits for two cohorts: 1) women who delivered at a hospital where a breastfeeding promotion program had been active for over twenty years (the program hospital, n=236); and, 2) women who delivered at a nearby hospital without such a program (the control hospital; n=206). Exposure to hospital-based breastfeeding promotion activities was assessed by maternal recall prior to discharge. Women in both hospitals were similar with respect to most demographic and biomedical characteristics, including previous breastfeeding history. Exposure to a breastfeeding promotion program was universally high at the program hospital and universally low at the control hospital. Delivery at the program hospital was strongly associated with exclusive breastfeeding: the median duration of exclusive breastfeeding was 53 days longer among women who delivered at the program hospital ($p<0.001$). Three plausible alternative explanations for the differences observed, including self-selection to the program hospital by women more likely to exclusively breastfeed, were rejected. The similarity between the two cohorts, coupled with the vast difference in exposure to breastfeeding promotion activities, suggests that the large difference in exclusive breastfeeding, nearly two months, is likely to be related to these activities.

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INTRODUCTION

Evidence of a strong protective effect of exclusive breastfeeding (defined as breastmilk as the sole source of infant food) on infant morbidity and mortality in the developing world (1-3) contrasts sharply with data showing the rarity of this practice (4-7). The observation that high rates of breastfeeding initiation and long durations of any breastfeeding coexist with short durations of exclusive breastfeeding highlights the importance of identifying programs successful in extending exclusive breastfeeding duration. This study examines the effectiveness of a comprehensive hospital-based breastfeeding promotion program on exclusive breastfeeding among low-income women in the city of Santos, Brazil. It is part of a larger study designed to assess the cost-effectiveness of breastfeeding promotion (8).

METHODS

A prospective design was used to compare prevalences of exclusive breastfeeding at 30 and 90 days postpartum for two cohorts: 1) women who delivered at a hospital with an active breastfeeding promotion program (the program hospital); and, 2) those who delivered at a nearby hospital without such a program (the control hospital). For twenty years the program hospital has had a comprehensive breastfeeding promotion program characterized by rooming-in, early initiation of breastfeeding, and breastfeeding assistance and talks during hospitalization. These talks include information on the importance of exclusive breastfeeding for the first six months of infancy, how to solve common breastfeeding problems, and where to find postpartum breastfeeding help. The control hospital has no breastfeeding program, though several reforms mandated by Brazilian law such as rooming-in and prohibition of free gifts of infant formula have been instituted. It was selected from seven possible control hospitals because of its similar maternity population.

All women delivering healthy, singleton infants with birthweights > 2000 g between June 1992 and March 1993 were enrolled. Data were collected from hospital records, and by interviewing women just prior to hospital discharge and at home at 30 and 90 days postpartum.

Prior to discharge, exposure to hospital breastfeeding practices and activities was assessed by maternal recall. Information was also collected on breastfeeding history and plans, prenatal exposure to breastfeeding information, demographic characteristics, and socioeconomic status. To control for potential selection bias in that women more likely to exclusively breastfeed would seek out a hospital supportive of breastfeeding, women were asked in an open-ended question why they chose the particular hospital.

Exclusive breastfeeding was assessed at each follow-up visit by 24-hour maternal recall using a list of infant liquids (including water) and foods. Infants were classified as exclusively breastfed only if the mother responded negatively to all items except breastmilk. If the mother was not exclusively breastfeeding at the time of the visit, she was asked the date when she first introduced other liquids and/or foods. This was used to determine the length of exclusive breastfeeding. If the mother was still exclusively breastfeeding, the age of the child was entered as the duration of exclusive breastfeeding and that value was censored in the survival model. Information was also collected on postpartum breastfeeding information received by the mother.

Two physicians, not associated with either of the hospitals, administered the hospital questionnaire and abstracted medical information from the records. Three social workers conducted household interviews and were blinded with respect to the study objectives and the hospital in which the mother gave birth.

Sample characteristics and exposure to program activities were compared using chi-square for categorical and Student's t-test for continuous variables. The Cox model, which takes into account censored data, was used to generate survival curves for the multivariate analysis (9).

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Table 1

Maternal Characteristics and Breastfeeding Motivation[1] by Hospital Santos, Brazil, 1992-93

	Program (n=236)	Control (n=206)	Significance[2]
Characteristic			
Maternal age (years, mean ± SD)	25.3 ± 6.5	24.6 ± 5.4	p = 0.22
Education (years, mean ± SD)	7.3 ± 3.4	7.2 ± 3.5	p = 0.13
Employed (%)	29.2	29.1	p = 0.98
Socioeconomic score[3] (mean ± SD)	3.6 ± 0.9	3.7 ± 0.7	p = 0.20
Living with father of infant (%)	81.3	82.4	p = 0.88
Parity (mean ± SD)	2.2 ± 1.6	2.0 ± 1.3	p = 0.15
Primiparae (%)	43.2	43.2	p = 0.99
Received prenatal care (%)	93.6	95.6	p = 0.36
Male infants (%)	53.0	45.6	p = 0.12
Birthweight (g, mean ± SD)	3227 ± 467	3386 ± 499	p<0.001
Cesarean section (%)	23.4	49.0	p<0.001
Motivation			
Breastfeeding duration of previous child[4] (months, mean ± SD)	10.9 ± 11.8	13.0 ± 5.7	p = 0.30
Received breastfeeding information in prenatal care (%)	37.1	26.4	p<0.05
Planned duration of exclusive breastfeeding[5] (months, mean ± SD)	4.5 ± 2.3	2.8 ± 2.3	p<0.05
Received breastfeeding information, first follow-up visit[6] (%)	96.8	70.1	p<0.001
Received breastfeeding information, second follow-up visit[7] (%)	52.6	47.4	p = 0.82

[1]As assessed by maternal recall.
[2]Significance of differences in means and proportions are tested by Student's t-test and Chi-square, respectively.
[3]Composite indicator of the following household possessions: radio, television, telephone, refrigerator, and car.
[4]Multiparae only.
[5]As proxied by the infant age at which the mother planned to introduce non milk liquids.
[6]Receipt of breastfeeding information between hospital discharge and first follow-up visit.
[7]Receipt of breastfeeding information between the first and second follow-up visits.

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RESULTS

A total of 236 and 206 women were interviewed at the program and control hospitals, respectively. Complete data for both follow-up visits are available for nearly 80% of the original sample. No difference in attrition was found between hospitals. With one exception (older women were followed at the program hospital), there were no differences between women followed and lost to follow-up.

Women in the two hospitals were similar with respect to all demographic, medical, and infant variables except infant birthweight and incidence of cesarean section (both were higher in the control hospital) (Table 1). Maternal motivation to breastfeed, assessed by length of time the previous child was breastfed (multiparae only), did not differ between hospitals. Women in the program hospital were more likely to have received breastfeeding information during prenatal care, and postpartum prior to the first follow-up visit, though not between the first and the second visit. As expected, planned duration of exclusive breastfeeding was longer at the program hospital. Differences between hospitals were found for all but one indicator of program exposure (Table 2). Exposure at the program hospital was universally high while exposure at the control hospital was universally low.

Table 2

Exposure to Hospital-based Breastfeeding Promotion[1] by Hospital
Santos, Brazil, 1992-93

	Program (n=236)	Control (n=206)	Significance
Breastfed infant in delivery room (%)	65.3	2.2	$p<0.001$
No separations of > 15 min (%)	93.2	68.7	$p<0.001$
No prelacteals[2] (%)	91.5	56.8	$p<0.001$
No formula/glucose water[2] (%)	99.6	90.3	$p<0.001$
No gifts of formula/glucose water/bottles (%)	100	100	
Talk (%)	87.3	18.0	$p<0.001$
Brochure (%)	63.6	40.3	$p<0.001$
Help to breastfeed the first time (%)	72.0	33.7	$p<0.001$
Demonstration on breastmilk expression (%)	68.2	5.4	$p<0.001$
Received information on:			
Engorgement (%)	76.3	2.4	$p<0.001$
Sore nipples (%)	68.2	2.9	$p<0.001$
Knowing if infant receives enough breastmilk (%)	49.2	3.9	$p<0.001$
Increasing breastmilk supply (%)	61.0	5.3	$p<0.001$
Where to get postpartum breastfeeding help (%)	72.5	21.1	$p<0.001$
Time to introduce liquids (%)	32.6	2.9	$p<0.001$
Time to introduce solids (%)	31.8	1.5	$p<0.001$

[1]As assessed by maternal recall just prior to hospital discharge.
[2]7.2% and 40.3% of women in the program and control hospitals, respectively, responded "don't know" to this question.
[3]0.4% and 8.1% of women in the program and control hospitals, respectively, responded "don't know" to this question.

Delivery in the program hospital was associated with exclusive breastfeeding: the median duration was 75 days among women in the program hospital compared to 22 days among women in the control hospital for a difference of 53 days (Figure 1; Table 3). At month one, the probability of exclusive breastfeeding was 0.64 in the program hospital compared to 0.39 in the control hospital: this translated to 250 additional women per thousand that would be exclusively breastfeeding if they had delivered in the program rather than the control hospital. Controlling for potential confounding variables (birthweight, cesarean section, pre- and post-natal breastfeeding information) did not change these results.

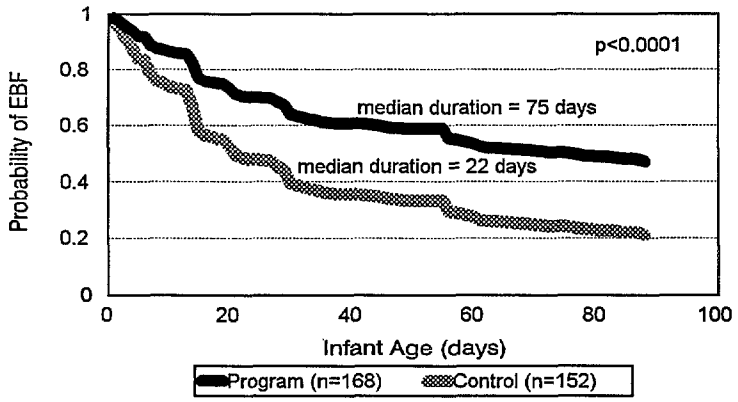
Table 3

Estimates of the Effectiveness of the Breastfeeding Promotion Program on Exclusive Breastfeeding Santos, Brazil, 1992-93

	B estimate (SE)	p value	Median (days)	Benefit (days)[1]	Probability of exclusive breastfeeding		Benefit (per 1000 women)[2]	
					1 mo	3 mo	1 mo	3 mo
Model 1[3]								
Hospital	-0.368 (0.068)	<0.01						
program			75	+53	0.64	0.46	250	260
control			22		0.39	0.20		
Model 2[4]								
Exclusive BF	-0.342 (0.078)	<0.01						
program			75	+54	0.64	0.46	250	260
control			21		0.39	0.20		
Birth weight	0.035 (0.073)	0.63						
Type of birth	0.0002 (0.0001)	0.27						
Prenatal BF information	-0.020 (0.07)	0.78						
Postpartum BF information	0.10 (0.10)	0.31						

[1]Increase in the median duration of breastfeeding (program versus control).
[2]Number of additional women that would exclusively breastfeed per thousand women if exposed to the program. Calculated at one month as follows: (.64 - .39)(1000) = 250.
[3]Survival analysis (Cox model), n=341.
[4]Multivariate survival analysis (Cox model) controlling for birthweight, type of birth (cesarean section versus vaginal), breastfeeding information in prenatal care (yes versus no) and breastfeeding information between discharge and the first follow-up visit (yes versus no), n=320.

Figure 1
Probability of Exclusive Breastfeeding
Survival Curves by Hospital, Santos, Brazil, 1992-93



DISCUSSION

Despite the vast literature on the protective effects of exclusive breastfeeding on morbidity and mortality few studies report an increase in exclusive breastfeeding as a result of breastfeeding promotion. An increase in exclusive breastfeeding among middle-income married Chilean women who used the lactational amenorrhea method (LAM) for contraception and were exposed to an intensive postpartum counseling program was reported (10). The pre-post breastfeeding intervention was not part of an ongoing program but specifically designed to test contraceptive efficacy. Given the highly select and motivated group of women the inferences that can be drawn from this study are limited. An increase in exclusive breastfeeding was also documented among low-income Chilean women exposed to a breastfeeding program, which included postpartum home visits (11). However, because most health budgets do not permit home visits, this program is not easily replicated.

The inferences that can be drawn from this observational study of two hospitals depend on the degree to which the assumption — that women delivering in the two hospitals were similar in all respects except for exposure to the program — is satisfied (12-13). To the extent that any non-program variable is associated with both the program and the duration of exclusive breastfeeding, differences observed between the two groups could be the result of confounding. Establishing the plausibility that the difference in exclusive breastfeeding between the two hospitals resulted from program exposure thus depends on the extent to which the following alternative explanations can be rejected: 1) differences in maternal and/or biomedical characteristics; 2) differences in exposure to breastfeeding information during prenatal care and/or postpartum; and 3) self-selection.

1. Women delivering in the two hospitals were similar with respect to all characteristics examined except infant birthweight and incidence of cesarean section (Table 1), neither of which had any within hospital bi-variate relationship with exclusive breastfeeding nor changed the regression equation when entered (Table 3). The fact that type of delivery did not affect exclusive breastfeeding in either bi-variate or multivariate models is consistent with other studies that also failed to show an association (14-23). Differences in birthweight may be indicative of unmeasured differences in socioeconomic status. Recent studies from Brazil show the greatest

improvements in breastfeeding to have occurred among women of higher socioeconomic status (6). Thus, it cannot be automatically concluded that differences in socioeconomic status, if they exist, would explain the association found as it cannot be assumed that women of lower socioeconomic status would be more likely to exclusively breastfeed.

2. Although women in the program hospital were more likely to have received breastfeeding information in prenatal care (Table 1), such information was not associated with exclusive breastfeeding. Receipt of postpartum breastfeeding information between discharge and the first follow-up visit was associated with both program exposure and exclusive breastfeeding at the first follow-up visit. Although the inclusion of this variable in the regression model did not change the results, this is likely because of the small number of women (n=6) who did not receive such information. Because such information was received in the postpartum breastfeeding clinic, the effect of this clinic independent of maternal motivation to attend the clinic cannot be ascertained. Therefore, because difference in postpartum exposure cannot be disentangled from those program activities delivered during hospitalization, program activities need to be defined as those delivered during hospitalization and postpartum.

3. Self-selection of women more motivated to practice optimal breastfeeding behaviors into the program hospital was addressed by asking in an open-ended question the reason for hospital choice. Not a single women reported "breastfeeding" as a basis for choice, however, 24 women at the control hospital reported that the "program hospital" was full; another fifteen reported that an "other" unspecified hospital was full. The prevalence of exclusive breastfeeding at either follow-up visit for these two groups of women did not differ from those who gave other reasons at the control hospital (data not shown). Furthermore, previous duration of breastfeeding did not differ between the two hospitals (Table 1) nor did the results of the regression equation change when this variable was entered into the model.

The results of this study are based on quantitative measures of exposure to specific program activities. Such "exposure" is a necessary condition for changes in infant feeding behaviors, however, it may not be a sufficient condition. Although not readily quantified, the philosophical underpinnings of this program may be equally important. These include the importance of providing emotional (as well as technical) support to breastfeeding women; and the recognition that this can only be accomplished by creating a respectful, positive, and supportive environment for mothers (24). To make the information mothers are receiving from health professionals more acceptable, the program is implemented to provide mothers with time to interchange ideas and experiences among themselves. Mothers show one another directly how to breastfeed or how to solve breastfeeding problems and, thus, learn to trust their own judgement, as well as that of other mothers.

In conclusion, the similarity between the populations delivering in the two hospitals coupled with the vast difference in exposure to breastfeeding promotion activities suggests that the difference of nearly two months in median exclusive breastfeeding duration is likely to be related to hospital-based breastfeeding promotion. Replication of this model in other settings, however, should be predicated on the fact that necessary and sufficient conditions for extending the duration of exclusive breastfeeding include both "exposure" to specific program activities and emotional support and positive reinforcement to women during and after hospitalization for childbirth.

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Wellstart International is a private, nonprofit organization dedicated to the promotion of healthy families through the global promotion of breastfeeding. With a tradition of building on existing resources, Wellstart works cooperatively with individuals, institutions, and governments to expand and support the expertise necessary for establishing and sustaining optimal infant feeding practices worldwide.

Wellstart has been involved in numerous global breastfeeding initiatives including the Innocenti Declaration, the World Summit for Children, and the Baby Friendly Hospital Initiative. Programs are carried out both internationally and within the United States.

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Wellstart International is a designated World Health Organization Collaborating Center on Breastfeeding Promotion and Protection, with Particular Emphasis on Lactation Management Education.

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