

Hospital Practices that Increase Breastfeeding Duration: Results from a Population-Based Study

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ABSTRACT: Background: A high percentage (83%) of mothers in Colorado initiate breastfeeding; but in keeping with national breastfeeding trends, many of them discontinue breastfeeding within the first few months. The objective of this study was to determine the effects of hospital practices on breastfeeding duration and whether the effects differed based on maternal socioeconomic status. **Methods:** Pregnancy Risk Assessment Monitoring System data were used to calculate breastfeeding duration rates for all Colorado mothers in 2002 to 2003. Breastfeeding duration rates were determined for recipients of each of nine hospital practices included in the survey compared with rates for nonrecipients. Practices that significantly increased breastfeeding duration rates were combined and then stratified by socioeconomic status. **Results:** Breastfeeding duration was significantly improved when mothers experienced all five specific hospital practices: breastfeeding within the first hour, breastmilk only, infant rooming-in, no pacifier use, and receipt of a telephone number for use after discharge. Two-thirds (68%; 95% CI: 61–75) of mothers who experienced all five successful practices were still breastfeeding at 16 weeks compared with one-half (53%; 95% CI: 49–56) of those who did not. Breastfeeding duration was improved independent of maternal socioeconomic status. Only one in five mothers (18.7%) experienced all five supportive hospital practices. Mothers who experienced the five supportive hospital practices were significantly less likely to stop breastfeeding due to any of the top reasons given for stopping ($p < 0.001$). **Conclusions:** Implementation of the five hospital practices supportive of breastfeeding significantly increased breastfeeding duration rates regardless of maternal socioeconomic status. (BIRTH 34:3 September 2007)

Key words: breastfeeding, breastfeeding duration, Baby-Friendly Hospital Initiative, hospital practices

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Breastmilk and breastfeeding are widely recognized to be the ideal forms of nutrition and feeding for infants. The American Academy of Pediatrics recommends that mothers exclusively breastfeed for the first 6 months of life, stating “Breastfeeding ensures the best possible health as well as the best developmental and psychosocial outcomes for the infant” (1). In 2003, 71 percent of mothers in the United States initiated breastfeeding (2). By 6 months of age, the percentage of infants breastfeeding dropped to 36, with 14 percent exclusively breastfeeding. The Healthy People 2010 goals for breastfeeding are for 75 percent of mothers to breastfeed their infants in the early postpartum period, for 50 percent to still breastfeed at 6 months, and for 25 percent to continue to breastfeed 1 year after birth (3).

Colorado had one of the highest breastfeeding initiation rates in the country in 2003, with an estimated 83 percent of mothers initiating breastfeeding according to National Immunization Survey data (2). In keeping with national breastfeeding trends, however, a large percentage of Colorado mothers discontinued breastfeeding during the first few months. Less than one-half (46%) of mothers still breastfed at 6 months, and only 15 percent exclusively breastfed at 6 months (2). Successful approaches are needed to accomplish the Healthy People goal of increasing breastfeeding duration and exclusivity throughout the first year of life.

The Baby-Friendly Hospital Initiative (BFHI) is recognized as an effective approach for the successful establishment of breastfeeding (4,5). It is a global program sponsored by the World Health Organization and the United Nations Children's Fund to strengthen lactation promotion and to support and recognize hospitals and birthing centers that offer an optimal level of care for lactation. The BFHI defines guidelines that effectively increase breastfeeding initiation (6–9) and duration (10–16). Hospitals and birthing centers that achieve the BFHI criteria are given the designation "Baby-Friendly Hospital"; worldwide, more than 18,000 maternity facilities are so designated. In the United States, only 56 hospitals and birthing centers have been designated, and no Colorado hospital received the designation until 2006, when one hospital was given this credential (17).

The paucity of hospitals with the BFHI designation reveals the need for physicians and hospital administrators to understand the critical role hospitals play in establishing successful breastfeeding. To our knowledge, no study has examined the effect of hospital practices on breastfeeding duration among mothers who delivered at non-BFHI hospitals using a population-based study design. Existing studies on breastfeeding duration and hospital practices are hindered by nonrepresentative samples of mothers or by study designs limited to infants born at BFHI hospitals compared with those born at non-BFHI hospitals. A population-based study is needed to investigate the effects of hospital practices based on the BFHI guidelines on breastfeeding duration and to determine if the hospital practices increase breastfeeding duration for mothers independent of socioeconomic status.

This study examined, first, the effects of hospital practices on breastfeeding duration and, second, whether the effects differed based on maternal socioeconomic status. The study used a population-based cohort of Colorado mothers who delivered at hospitals without the BFHI designation.

Methods

This study used data from the Colorado Pregnancy Risk Assessment Monitoring System (PRAMS), which is an ongoing, statewide, population-based surveillance system designed to identify and monitor behaviors and experiences of women before, during, and after pregnancy. Colorado is currently one of 29 states participating in the PRAMS project, which is funded through the federal Centers for Disease Control and Prevention.

PRAMS Survey Procedure

The PRAMS questionnaire was mailed to a stratified random sample of Colorado resident mothers each month. Participants completed the surveys 2 to 4 months after giving birth and returned PRAMS questionnaires to the state health department. PRAMS used a combination of two data collection approaches: statewide mailings and telephone follow-up with women who did not return the survey questionnaire. The written questionnaires and telephone interviews were completed in Spanish when necessary. Mothers who delivered a low-birthweight infant or lived in a rural area were oversampled.

Approximately 3,000 women in Colorado received the survey each year, with a response rate of at least 70 percent. Birth certificate data were added to the overall PRAMS data set. Results from the complete data set were weighted to accurately reflect the experience of all Colorado mothers whose pregnancies resulted in a live birth.

Study Procedure

This study used combined data for 2002 and 2003. Surveys were completed for 4,544 mothers, representing a total of 137,724 births statewide in the 2 years. The survey response rate was 75 percent for 2002 and 76 percent for 2003. Kaplan-Meier survival analysis was used to determine breastfeeding duration rates for all mothers in Colorado; survival analysis provided the analytical tool to examine the long-term outcomes (breastfeeding duration) for a subgroup of mothers for as long as data were available. Cumulative probability estimates for mothers who continued breastfeeding (censored events) were determined and are listed as the percentage of mothers breastfeeding for a given point in time. Confidence intervals for the probability estimates that do not overlap were used to determine statistical significance.

Breastfeeding duration rates were examined for mothers of healthy infants who breastfed, comparing mothers who experienced each of the hospital practices listed in the survey with those who did not. Mothers of infants with one or more of the following conditions were determined to have lower breastfeeding duration rates and were thus excluded from the analyses: low-birthweight infants (≤ 5 lb 8 oz), premature infants (< 37 wk gestation), infants admitted to the neonatal intensive care unit at birth, and multiple births. A total of 606 mothers were excluded because they did not answer one or more questions about the abovementioned “at-risk” conditions listed or did not respond to breastfeeding status and thus could not be included in the analyses.

All nonbreastfeeding and at-risk infants ($n = 1,766$) were excluded because the study population consisted of breastfeeding mothers and the lowered breastfeeding duration rates from at-risk infants may have been due to other issues unrelated to hospital practices and could have confounded the results. Therefore, breastfeeding mothers of “healthy” infants were used in the analyses of hospital breastfeeding practices ($n = 2,172$).

Data Collection and Analysis

Data on hospital practices were collected from a series of PRAMS questions based on the BFHI’s “Ten Steps to Successful Breastfeeding,” which were added to the Colorado survey in 2002. Mothers who delivered at a hospital reported on their breastfeeding experiences in the hospital with “Yes” or “No” answers or by leaving the question blank.

The series of hospital practice questions focused on knowledge (“Hospital staff gave me information about breastfeeding” and “Hospital staff told me to breastfeed whenever my baby wanted”); assistance with breastfeeding (“Hospital staff helped me learn how to breastfeed”); timing of breastfeeding (“I breastfed my baby in the first hour after my baby was born” and “I breastfed my baby in the hospital”); and exclusivity (“My baby was fed only breastmilk at the hospital”). In addition, mothers responded to the statements, “My baby stayed in the same room with me in the hospital” and “The hospital gave me a telephone number to call for help with breastfeeding.” Affirmative responses to the abovementioned questions indicated that the mother had experienced appropriate hospital practices. Negative answers to two other questions (“My baby used a pacifier in the hospital” and “The hospital gave me a gift pack with formula”) indicated additional appropriate practices.

Breastfeeding duration rates were calculated for all breastfeeding mothers, for each of the hospital practices, to determine if significant differences occurred between mothers who experienced each practice and those who did not. Mothers who experienced hospital practices that showed a significant increase in breastfeeding duration were grouped and compared with all other breastfeeding mothers.

Mothers were then stratified by socioeconomic status to determine whether the combined hospital practices made a difference in duration rates independent of socioeconomic status. We used two markers of socioeconomic status: Medicaid status (Medicaid is the major public financing program for providing health care coverage to the low-income population of the United States) and federal poverty guidelines, which were available from the data set. In addition, we created a variable defining elevated socioeconomic status as a measure of mothers most likely to breastfeed—mothers whose incomes were above 185 percent of the federal poverty guideline, who had more than 12 years of education, and who were aged 25 years and above. The top reasons for mothers to stop breastfeeding were also examined for those who experienced the combined hospital practices compared with those who did not.

SAS-Callable SUDAAN, release 9.0, was used to run the Kaplan-Meier survival analyses (18). Tests of statistical significance were determined using 95 percent confidence intervals, calculated from the standard errors for the Kaplan probability estimates of breastfeeding duration. Chi-square tests of significance were used to determine differences where p values are reported. All percentages reported, and their confidence intervals or p values, were weighted to describe the PRAMS-eligible population in Colorado.

Results

Demographic Characteristics and Risk Factors

Among all mothers in 2002 to 2003, 85 percent initiated breastfeeding and 48 percent were still breastfeeding at 3 months after delivery. As Table 1 shows, mothers with the highest breastfeeding initiation and duration at 13 weeks were generally white, non-Hispanic, and older, with more than a high school education. Mothers significantly less likely to continue breastfeeding were black, younger, and had less than a high school education. Others significantly less likely to continue breastfeeding were mothers who smoked during the last 3 months of pregnancy and those with lower incomes, including those on Medicaid and/or those participating in the special

supplemental nutrition program for Women, Infants, and Children (WIC). The method of delivery, cesarean versus vaginal, did not significantly influence breastfeeding initiation or duration.

Infants considered at risk included low-birthweight and premature infants, those admitted to the neonatal intensive care unit at birth, and multiple births. Mothers of this group of at-risk infants had a significantly lower breastfeeding rate at 13 weeks, with 42 percent breastfeeding compared with 49 percent of mothers of healthy infants.

Hospital Practices and Breastfeeding Duration

Breastfeeding duration rates at 8 weeks postpartum for each of the nine hospital practices studied are shown in Table 2 for breastfeeding mothers of healthy

infants. Of the nine practices, five were found to have a significant effect on breastfeeding continuation. These five hospital practices (bold entries in Table 2) that resulted in higher breastfeeding duration were breastfeeding in the first hour after birth, feeding the infant only breastmilk in the hospital, infant rooming-in, not using a pacifier in the hospital, and the hospital providing a telephone number to call for breastfeeding help after discharge. For each of these five hospital practices, the percentage of mothers continuing to breastfeed remained higher throughout the postpartum period compared with the percentage of mothers who did not experience each hospital practice. The range of weeks that significant differences occurred between the duration rates varied for each of the five hospital practices, with significance determined as early as 1 week postpartum and maintained as long as 16 weeks.

Table 1. Initiation and Duration of Breastfeeding among Mothers According to Demographic and Other Risk Factors, Colorado Pregnancy Risk Assessment Monitoring System, 2002–2003

<i>Demographic Characteristics and Risk Factors</i>	<i>No.</i>	<i>Breastfeeding Initiation %^a (95% CI)</i>	<i>Breastfeeding Duration at 3 Months (13 Weeks) %^a (95% CI)</i>
All mothers	4,295	85 (84–87)	48 (45–50)
Race/ethnicity	4,295		
White, non-Hispanic	2,922	87 (85–88)	51 (48–54)
Hispanic	1,071	84 (81–87)	43 (39–48)
Black	148	71 (59–80)	21 (12–32)
Other	154	78 (67–85)	47 (35–57)
Maternal age (yr)	4,295		
15–19	429	80 (75–85)	26 (20–33)
20–24	1,052	81 (77–83)	37 (32–41)
25–29	1,098	86 (83–88)	50 (45–54)
30+	1,716	89 (87–91)	60 (55–64)
Maternal education	4,260		
< High school	816	80 (76–83)	37 (32–42)
High school	1,229	80 (76–82)	35 (31–40)
> High school	2,215	91 (82–92)	61 (57–64)
Medicaid	4,295		
No	2,895	89 (87–90)	54 (51–58)
Yes	1,400	78 (75–81)	33 (30–37)
WIC participation	4,270		
No	2,852	88 (86–69)	55 (51–58)
Yes	1,418	80 (77–83)	34 (30–38)
Maternal smoking for the last 3 mo of pregnancy	4,229		
No	3,173	87 (86–89)	51 (49–54)
Yes	516	69 (63–74)	19 (13–26)
Method of delivery	4,295		
Vaginal	3,178	85 (83–87)	49 (46–51)
Cesarean	1,117	86 (82–88)	45 (40–50)
At-risk infants ^b	4,251		
No	2,513	85 (84–87)	49 (47–52)
Yes	1,738	84 (81–87)	42 (37–46)

^aAll percentages and associated confidence intervals are based on weighted data. ^bInfants were members of one or more of these subgroups: low birthweight (≤ 5 lb 8 oz), premature (<37 completed wk gestation), placed in neonatal intensive care unit after delivery, and/or multiple gestation. WIC = Women, Infants, and Children's special supplemental nutrition program.

Table 2 also shows that four hospital practices did not result in a significant difference in breastfeeding duration: hospital staff giving mothers information about breastfeeding, hospital staff helping mothers learn to breastfeed, hospital staff telling mothers to breastfeed whenever the infant wanted, and hospital providing a gift pack with formula. Nearly all breastfeeding mothers (94%) received some kind of information on breastfeeding from hospital staff. The type of information, however, was not known. Breastfeeding mothers who reported that they did not receive help in learning to breastfeed were almost entirely women (87%) who had a previous child, whereas women who reported that they did receive help were composed equally of mothers with older children and first-time mothers.

Eighty-two percent of breastfeeding mothers reported that hospital staff told them to breastfeed whenever the infant wanted. Duration rates were higher for these women, although not significantly different. The vast majority of mothers (92%) received a gift pack with formula. Among the few mothers who did not receive the formula, breastfeeding rates were slightly higher, although not significantly different.

Successful Hospital Practices

The percentage of mothers who breastfed throughout the postpartum period was higher among those who reported all five successful practices than for any of

the successful hospital practices examined individually. Of mothers who experienced all five successful hospital practices, 89 percent were breastfeeding at 4 weeks (1 mo), 80 percent at 9 weeks (2 mo), 70 percent at 13 weeks (3 mo), and 63 percent at 17 weeks (4 mo) after birth. Breastfeeding duration rates among all mothers who experienced all five successful hospital practices compared with those who experienced fewer than five are shown in Fig. 1. At 16 weeks, two-thirds (68%; 95% CI: 61–75) of mothers who experienced all five successful practices were still breastfeeding. This finding was significantly different from just over one-half (53%; 95% CI: 49–56) of mothers who did not experience all five practices.

Successful Hospital Practices and Maternal Socioeconomic Characteristics

Breastfeeding duration was stratified by three indicators of maternal socioeconomic status: enrollment in Medicaid, federal poverty level, and a measure of elevated socioeconomic status. Figures 2 and 3 show that mothers experienced significant improvements in breastfeeding duration regardless of Medicaid status or elevated socioeconomic status.

Mothers receiving Medicaid who experienced all five successful practices had consistently higher breastfeeding duration rates compared with those receiving Medicaid who did not report all successful practices (Fig. 2). These differences were significant at several points in time after delivery (1–3 and 8–11 wk),

Table 2. Hospital Practices and Breastfeeding Duration for Breastfeeding Mothers of Healthy Breastfed Infants, Colorado Pregnancy Risk Assessment Monitoring System, 2002–2003

<i>Hospital Practice</i>	<i>Mothers Reporting Specific Practice (Total No. 2,172^a)</i>		<i>Breastfeeding Rate at 8 Weeks</i>	
	<i>Practice Yes No.</i>	<i>Practice No No.</i>	<i>Practice Yes % (95% CI)^b</i>	<i>Practice No % (95% CI)^b</i>
Baby breastfed in 1st hour after birth	1,534	561	77 (74–79)	66 (61–70)
Baby fed only breastmilk in hospital	1,246	890	81 (78–83)	65 (61–68)
Baby stayed in same room with mother	1,951	143	74 (72–76)	62 (51–71)
Baby did not use pacifier in hospital	1,007	1,086	78 (75–81)	69 (66–72)
Hospital gave mother phone number to call for breastfeeding help	1,768	325	75 (73–77)	64 (57–70)
Hospital gave mother information about breastfeeding	1,981	119	74 (71–76)	70 (58–79)
Hospital staff helped mother learn how to breastfeed	1,662	434	72 (70–75)	78 (72–82)
Hospital staff told mother to breastfeed whenever baby needed	1,725	357	74 (71–76)	71 (65–76)
Hospital did not give gift pack with formula	202	1,901	79 (71–84)	73 (70–75)

^aSample sizes for specific hospital practices may not add to total because of nonresponse. ^bConfidence intervals that do not overlap show statistically significant differences between mothers who reported the practice (Practice Yes) and those who did not (Practice No).



Fig. 1. Breastfeeding duration rates among all mothers of healthy breastfed infants by experience with five successful hospital breastfeeding practices, Colorado Pregnancy Risk Assessment Monitoring System, 2002 to 2003.

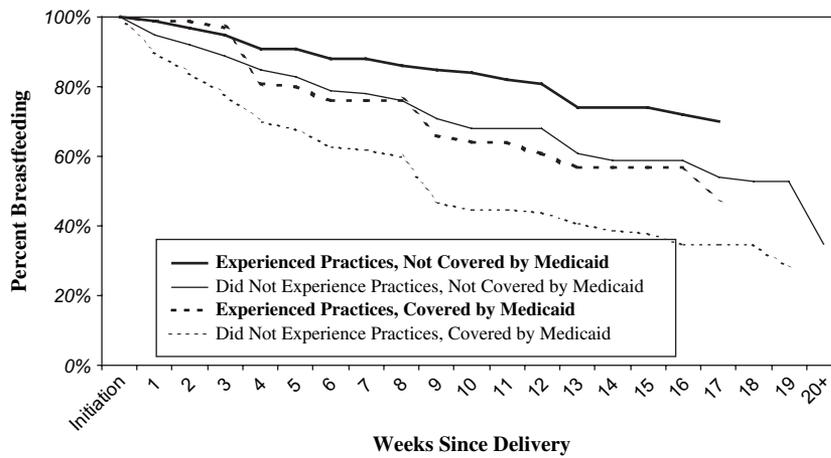


Fig. 2. Breastfeeding duration rates among mothers of healthy breastfed infants by Medicaid status by experience with five successful hospital breastfeeding practices, Colorado Pregnancy Risk Assessment Monitoring System, 2002 to 2003.

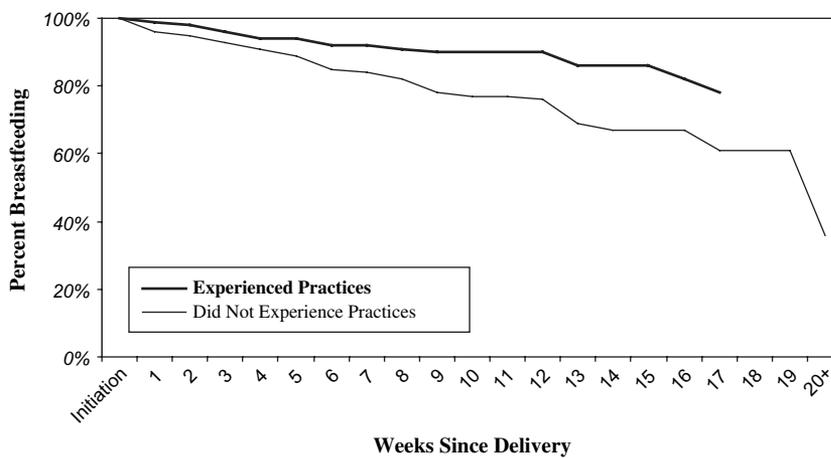


Fig. 3. Breastfeeding duration rates among mothers of healthy breastfed infants with elevated socioeconomic status by experience with five successful hospital breastfeeding practices, Colorado Pregnancy Risk Assessment Monitoring System, 2002 to 2003.

with 64 percent (95% CI: 52–73) of those who experienced all five successful hospital practices still breastfeeding at 11 weeks compared with 45 percent (95% CI: 40–50) of those who did not.

Medicaid covered an estimated 29 percent of mothers of healthy breastfed infants during pregnancy in 2002 and 2003. For mothers who were not covered by Medicaid, the breastfeeding rate was again consistently higher when they experienced all five successful hospital practices. The breastfeeding duration rates were significantly different at several points in time (2, 3, and 6–12 wk), with 81 percent (95% CI: 75–86) of mothers at 12 weeks who experienced all successful practices still breastfeeding compared with 68 percent (95% CI: 64–71) of those who did not.

A second measure of socioeconomic status divided the mothers almost equally. About one-half (47%) of

mothers had incomes at or below 185 percent of the federal poverty level during 2002 and 2003 (approximately \$28,000 for a family of three) and one-half had higher incomes.

For mothers whose incomes were at or below 185 percent of the poverty level, or above 185 percent of poverty, breastfeeding duration rates were consistently higher with all five successful hospital practices compared with those who did not experience all successful practices (data not shown). For mothers at or below 185 percent of poverty, this difference in breastfeeding duration was significant at every week from 1 to 14 weeks, when 65 percent (95% CI: 55–74) were still breastfeeding among those who experienced all successful practices compared with 46 percent (95% CI: 41–51) among those who did not experience all five practices. For mothers living above 185 percent of poverty, the difference was statistically significant at

Table 3. Maternal Experience with All Five Successful Hospital Breastfeeding Practices by Maternal Socioeconomic Characteristics, Colorado Pregnancy Risk Assessment Monitoring System, 2002–2003

Characteristic	Experienced All Five Successful Practices ^a	Did Not Experience All Five Successful Practices ^b	Total No.
	No. (%) ^c	No. (%) ^c	
All mothers ^d	460 (18.7)	1,712 (81.3)	2,172
Mothers receiving Medicaid during pregnancy	127 (18.2)	505 (81.8)	632
Mothers not receiving Medicaid during pregnancy	333 (18.9)	1,207 (81.1)	1,540
Mothers at or below 185% poverty	200 (18.7)	742 (81.3)	942
Mothers above 185% poverty	230 (19.2)	828 (81.8)	1,058
Mothers with elevated socioeconomic status ^e	173 (20.3)	583 (79.7)	756

^aMothers who experienced all five successful hospital breastfeeding practices during their hospital stay (i.e., breastfed baby in first hour after birth, baby was fed only breastmilk, baby stayed in the same room with mother, baby did not use a pacifier, and hospital gave mother a telephone number to call for help with breastfeeding). ^bMothers who did not experience all 5 successful hospital breastfeeding practices. Mothers experienced none, 1, 2, 3, or 4 of the 5 successful practices. ^cPercentages are based on weighted estimates. ^dAll mothers listed in the table are mothers of healthy infants who initiated breastfeeding. ^eDefined as greater than or equal to 25 years of age, with more than 12 years of education, and with incomes above 185 percent of the federal poverty guidelines.

Table 4. Percentage of Mothers Citing Top Reasons for Stopping Breastfeeding by Maternal Experience with All Five Successful Hospital Breastfeeding Practices, Colorado Pregnancy Risk Assessment Monitoring System (PRAMS), 2002–2003

Percentage of Mothers Citing Top Reasons for Stopping Breastfeeding ^a	Experienced All Five Successful Practices ^b (Total No. 141)	Did Not Experience All Five Successful Practices ^c (Total No. 1,349)	p ^d
	No. (%) ^e	No. (%) ^e	
Not producing enough milk	47 (31)	588 (44)	< 0.001
Milk did not satisfy	48 (36)	501 (41)	< 0.001
Difficulty nursing	25 (15)	440 (30)	< 0.001
Stopped breastfeeding for any one of the top reasons	83 (57)	949 (70)	< 0.001

^aA total of 12 reasons for stopping breastfeeding were listed on the Colorado PRAMS survey. Among mothers who stopped breastfeeding, the reasons listed were the three most selected. ^bMothers who experienced all five successful hospital breastfeeding practices during their hospital stay (i.e., breastfed baby in the first hour after birth, baby was fed only breastmilk, baby stayed in the same room with mother, baby did not use a pacifier, and hospital gave mother a telephone number to call for help with breastfeeding). ^cMothers experienced none, one, two, three, or four of the five successful practices. ^dp values are based on weighted data. ^ePercentages are based on weighted estimates.

9 to 12 weeks, when the rate at 12 weeks was 82 percent (95% CI: 75–88) versus 70 percent (95% CI: 66–74).

Mothers with elevated socioeconomic status had incomes above 185 percent of the federal poverty guideline, had more than 12 years of education, and were aged 25 years or above. They comprised 35 percent of all mothers of healthy breastfed infants. Figure 3 shows that these mothers experienced increased breastfeeding duration rates when they reported all five successful practices, with significant differences observed from 9 to 12 weeks, when the rate was 90 percent (95% CI: 83–94) compared with 76 percent (95% CI: 71–80).

Table 3 shows that one in five mothers (18.7%) of healthy breastfed infants experienced all five successful hospital practices. Mothers receiving Medicaid or not, mothers at or below 185 percent of poverty or above 185 percent of poverty, and mothers with elevated socioeconomic status were all equally unlikely to experience the successful hospital practices. Furthermore, among mothers who did not experience all five successful practices, the average number of practices reported was 2.8 and the median 2.2. The successful practices most often reported were provision of a telephone number for help after discharge (94%) and rooming-in (93%). A total of 73 percent of mothers reported breastfeeding in the first hour after birth, 58 percent reported that their infant was fed only breastmilk in the hospital, and 48 percent reported that their infant did not use a pacifier in the hospital.

Reasons for Stopping Breastfeeding

The top reasons for all breastfeeding mothers to stop breastfeeding were related to their ability to establish successful breastfeeding. Among the 12 reasons listed for stopping breastfeeding, the top 3 were “not producing enough milk,” cited by 43 percent of all mothers who stopped; “did not satisfy baby,” cited by 40 percent; and “had difficulty nursing,” cited by 28 percent. Among mothers of healthy infants who stopped breastfeeding, those who experienced all successful practices were significantly less likely to stop due to any of the top reasons compared with those who did not experience the five successful practices (Table 4).

Discussion

Using a population-based design, this study examined breastfeeding duration by specific events that occurred in the hospital setting. It may be the first population-based study conducted in the United States that evaluates breastfeeding duration based on hospital

practices. Two studies (12,13) have investigated breastfeeding duration by BFHI guidelines on a national level; but neither is considered population-based because each lacked a representative sample of the overall population determined through weighting or other methods. Another unique feature of the study is that no hospital in which mothers delivered met the BFHI’s “Baby-Friendly” criteria.

The five hospital breastfeeding practices shown to increase breastfeeding duration significantly were effective independent of maternal socioeconomic status. As Table 1 shows, breastfeeding duration was influenced by the demographic and socioeconomic characteristics of the mother. However, when mothers experienced all five successful hospital breastfeeding practices, their ability to continue to breastfeed improved significantly, irrespective of Medicaid status or poverty level. Even mothers with the highest breastfeeding duration rates—educated, older mothers with higher incomes—had significantly higher breastfeeding duration rates when they experienced all five successful hospital practices. For mothers above 185 percent of poverty or with elevated socioeconomic status, the successful practices resulted in significantly higher duration rates, starting later in the postpartum period. By contrast, among mothers below 185 percent of poverty, the successful practices significantly increased duration rates, starting early in the postpartum period. Thus, the practices helped to keep higher income women breastfeeding longer, and for lower income women, they were helpful from the beginning.

This study showed that the strength of the five hospital practices is in their combined effect, and taken together, these specific practices provided the greatest increase in breastfeeding duration. These findings are supported by another study that investigated breastfeeding duration by individual hospital practices (19). In addition, the top reasons why mothers stopped breastfeeding have to do with feeding issues (20), that is, perceived or actual inadequate milk supply. The combined five successful practices significantly reduced the likelihood of stopping breastfeeding presumably because they promoted and encouraged establishing successful breastfeeding practices from the start, resulting in the development of a good milk supply.

A fairly small proportion, only one in five women in Colorado, experienced all hospital practices that were shown to increase breastfeeding duration significantly. Among mothers who did not experience all five successful practices, the median number of practices reported was 2.2 (primarily rooming-in and provision of telephone number for breastfeeding support). The small proportion of women reporting all five of the practices found to be successful in this study demonstrates the widespread failure of hospitals to adopt all

policies and practices that result in successful breastfeeding.

Several study limitations relate to the use of secondary survey data. First is the reliance on maternal self-report about experiences in the hospital and breastfeeding initiation and duration. Second, some questions that were asked in the survey about hospital practices were not sufficiently specific. Of the four hospital practices found to not significantly affect breastfeeding duration rates (Table 2), two (“Hospital staff gave mother information about breastfeeding” and “Hospital staff helped mother learn to breastfeed”) do not address the quality of services provided and may be interpreted differently by respondents. Third, the short time frame for data collection within PRAMS provides little information beyond 4 months. Nonetheless, the same PRAMS survey questions can be used by other states to collect information on hospital practices, which may enable expansion of this study to include data from multiple states participating in PRAMS.

Another limitation to this study is that Kaplan-Meier statistical software used with sample survey data does not have the capability to control for individual maternal covariates such as age, education, or income level. Instead, we stratified the grouped successful practices by markers of socioeconomic status (Medicaid status; income level; and a combined measure of maternal age, education, and poverty status).

Implications for Practice

To influence breastfeeding duration significantly, many hospitals must change their current patterns of practice. Although low adherence to hospital practices that increase breastfeeding duration has been demonstrated (21), effective training has been shown to have an effect on hospital practices, resulting in higher breastfeeding rates at discharge and up to 6 months after delivery (10). Health systems support, including a home visit after discharge to assess breastfeeding, has been associated with successful breastfeeding (22). To increase breastfeeding duration, physicians and hospital administrators must increase their efforts to establish and maintain a breastfeeding culture that promotes hospital practices supportive of breastfeeding within their institutions.

Conclusions

Significant improvements are observed in breastfeeding duration when mothers experience the five specific hospital practices in combination after delivery: breast-

feeding in the first hour after birth, infant fed only breastmilk in the hospital, infant rooming-in, no pacifier use in the hospital, and the provision of a telephone number for breastfeeding support. The five successful hospital breastfeeding practices improve breastfeeding duration regardless of the mother’s Medicaid status, poverty level, or elevated socioeconomic status. The successful hospital practices significantly reduce the likelihood of women stopping breastfeeding due to problems with breastfeeding. Widespread implementation of such successful practices should have a positive effect on breastfeeding duration rates.

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