Participation in a Quality Improvement Collaborative and Change in Maternity Care Practices

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ABSTRACT

Care immediately following birth affects breastfeeding outcomes. This analysis compared improvement in maternity care practices from 2011 to 2013 among hospitals participating in a quality improvement collaborative, Best Fed Beginnings (BFB), to hospitals that applied but were not selected (non–Best Fed Beginnings [non-BFB]), and other hospitals, using Centers of Disease Control and Prevention's Maternity Practices in Infant Nutrition and Care (mPINC) survey data to calculate total and subscores for 7 care domains. Analysis of covariance compared change in scores from 2011 to 2013 among BFB, non-BFB, and other hospitals. BFB hospitals had twice the increase in mPINC score compared to non-BFB and a 3-fold increase compared to other hospitals. Learning collaborative participation may have accelerated progress in hospitals implementing breastfeeding-supportive maternity care.

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INTRODUCTION

Breastfeeding has long been recognized for its health benefits to infants and women (Hauck, Thompson, Tanabe, Moon, & Vennemann, 2011; Ip et al., 2007; Schwarz et al., 2009). Care practices immediately following birth affect a mother's ability to

TABLE 1
The *Ten Steps to Successful Breastfeeding* (Baby-Friendly USA, n.d.)

1. Have a written breastfeeding policy that is routinely communicated to all health-care staff.
2. Train all health-care staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within 1 hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.
6. Give infants no food or drink other than breastmilk, unless medically indicated.
7. Practice rooming-in—allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no pacifiers or artificial nipples to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or birth center.

continue breastfeeding after she leaves the hospital (DiGirolamo, Grummer-Strawn, & Fein, 2008; Murray, Ricketts, & Dellaport, 2007). Given the importance of maternity care practices to breastfeeding outcomes, the World Health Organization (WHO, 2009) and United Nations Children's Fund (UNICEF, n.d.) established the Baby-Friendly Hospital Initiative (BFHI), which recognizes hospitals that implement the evidence-based *Ten Steps to Successful Breastfeeding* (Table 1; WHO, 1998) and adhere to the *International Code of Marketing of Breast-Milk Substitutes* (WHO, 1981).

Since 2003, the Centers for Disease Control and Prevention (CDC) has worked to support improvements in maternity care practices in U.S. hospitals (Grummer-Strawn et al., 2013). In 2011, the CDC awarded a cooperative agreement to the National Institute for Children's Health Quality to help U.S. hospitals make quality improvements in maternity care practices to optimally support breastfeeding with the goal of becoming Baby-Friendly designated. At the time of the award, the mean national composite practice quality score on CDC's Maternity Practices in Infant Nutrition and Care (mPINC) survey, which assesses birth facilities' policies and practices that support breastfeeding, was 70 points out of 100 (CDC, 2016), and less than 5% of U.S. infants were born at Baby-Friendly–designated hospitals (CDC, 2011). An overarching goal of the collaborative quality improvement program, named Best Fed Beginnings (BFB), was to accelerate improvements in maternity care practices that support breastfeeding. The purpose of this analysis was to evaluate the BFB project using CDC's mPINC data, an independent survey of maternity care practices.

METHODS

Overview of the Program

The collaborative quality improvement program sought to assist 90 U.S. hospitals to improve maternity care practices supportive of breastfeeding with the goal of achieving Baby-Friendly designation. Hospitals were recruited following a nationwide announcement about the program and a webinar that described the BFHI and the specifics of the BFB program. The application process was competitive; in addition to assessing the readiness and capacity of hospitals to implement quality improvements in maternity care, preference was given to hospitals with a large number of annual births; serving populations at highest risk for not breastfeeding, such as low income and African-American women; and located in geographic regions with low breastfeeding rates, particularly the Mid-Atlantic, Mountain Plains, Southeast, and Midwest states (CDC, n.d.-b).

The BFB program used the breakthrough series learning collaborative model developed by the Institute for Healthcare Improvement (IHI, 2003) as the structure for the intervention. This approach emphasizes shared learning across organizational teams that are taught a specific approach to making changes, the model for improvement (Langley, Nolan, Nolan, Norman, & Provost, 2009). Selected hospitals were enrolled in June of 2012, and the project period ended in March of 2015. Hospital teams included senior hospital leadership and maternity care staff and providers, stakeholders from the local community, and mothers who had recently given birth at the hospital. During the project period, hospital teams participated in three in-person learning sessions and action period activities between each of and following the third learning session (National Institute for Children's Health Quality, 2015).

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In-person learning sessions brought together the BFB hospital teams for topic-specific and quality improvement learning. Each learning session was 2 days in length, and participants were eligible to receive continuing medical or nursing education credit. At each learning session, the BFB teams learned how to use improvement approaches such as the plan-do-study-act cycle (The W. Edwards Deming Institute, n.d.), to make small tests of change in maternity care practices that support breastfeeding. During the learning sessions, there were opportunities for hospitals to share stories about how they used improvement approaches to test and implement changes in maternity care practices that support breastfeeding. The first learning session was held at the beginning of the BFB project in September 2012, the second in February 2013, and the third in October 2013 (National Institute for Children's Health Quality, 2015).

During the action periods, the hospital teams took part in monthly 1-hour webinars. Twenty-three action period webinars, cofacilitated by breastfeeding experts and quality improvement advisors, were held over the course of the BFB program. The content of these webinars alternated between topic-specific presentations and facilitated discussions among hospital teams to share progress and approaches to overcome specific challenges in implementing practice change (National Institute for Children's Health Quality, 2015).

During the final year of the project, full-day, on-site visits were conducted by breastfeeding experts and/or quality improvement advisors at 55 BFB hospitals, and virtual site visits were conducted with an additional 5 BFB hospitals. The on-site visits were structured to prepare hospitals for the Baby-Friendly USA on-site designation assessment (National Institute for Children's Health Quality, 2015).

Hospital teams were taught how to collect and review quality improvement information in a systematic manner. Throughout the project, hospital teams used quality improvement methods to track their progress. BFB hospitals conducted monthly audits including attestation by mothers, nurses, and physicians and chart audits to track process and outcome measures (National Institute for Children's Health Quality, 2015).

Centers for Disease Control and Prevention's Maternity Practices in Infant Nutrition and Care Survey

CDC's mPINC survey is a biennial census of all maternity facilities (hospitals and free-standing birth centers) in the United States and its territories (CDC, 2017). Each time that the mPINC survey is conducted, a standardized screening process is followed. The main line for the hospital is called, and the caller asks to be transferred to the mother/baby nurse manager. The caller explains that CDC is conducting a survey about routine maternity care and infant feeding practices and asks this individual to identify the best person to receive the mPINC survey (CDC, 2015). Because this standardized process is followed each time a new survey is conducted, the person who receives the survey one year is not necessarily the person who receives the survey in a later cycle. The cover letter accompanying the survey recognizes that no single person may be best able to answer all of the questions in the mPINC survey and encourages the person completing the survey to obtain input from other key personnel as needed. The name(s) of the individual(s) who completes the mPINC survey is not collected (CDC, 2015). The response rates for mPINC 2011 and 2013 were both greater than 80%.

Thirty-four items included in the mPINC survey are used to calculate scores ranging from 0 (lowest) to 100 (highest) for seven domains of maternity care: (a) labor and birth care (5 items), (b) postpartum feeding of breastfed infants (4 items), (c) breastfeeding assistance (7 items), (d) postpartum contact between mother and infant (5 items), (e) facility discharge care (2 items), (f) staff training (4 items), and (g) structural and organizational aspects of care delivery (7 items). The subscores for each domain are averaged to calculate an overall score for each hospital. Details of the items included in each of the seven domains and how these items are scored are available at http://www.cdc.gov/breastfeeding/data/mpinc/scoring. Higher scores denote maternity care practices and policies consistent with optimal evidence-based care to support breastfeeding (CDC, n.d.-a). Participation in the mPINC survey is voluntary and was not a requirement for BFB participation.

Analytic Sample

Ninety hospitals were enrolled in the BFB program, and 1 withdrew early in the project. Of the 89 BFB

hospitals, 74 completed the 2011 mPINC survey and 79 completed the 2013 survey. This analysis was limited to the 67 BFB hospitals that participated in both the 2011 and 2013 mPINC surveys; 2 hospitals were excluded from the analysis because insufficient data were provided to calculate all of the scores included in the analysis, so the final sample of BFB hospitals was 65. The mPINC scores were calculated for two comparison groups: (a) hospitals that applied to BFB and were not accepted, referred to as non-BFB, and (b) other U.S. hospitals that did not apply to BFB and were not designated Baby-Friendly as of 2011, referred to as other hospitals. Of 128 non-BFB hospitals, 92 had mPINC data for all scores for 2011 and 2013, and of 2,765 other hospitals, 1,722 had complete data for this analysis.

Statistical Analysis

CDC calculated the mean total score and domain-specific mPINC subscores for 2011 and 2013 for BFB, non-BFB, and other hospitals. To compare the change in mPINC scores by participation in BFB, CDC constructed separate models for the two comparison groups and conducted an analysis of covariance with 2013 score as the outcome, 2011 score as a covariate, and participation in the collaborative as a categorical variable, adjusting for hospital size (number of annual births: <1,000, 1,000–1,999, 2,000–4,999, ≥5,000), type (nonprofit, government, private, military), and region (Mid-Atlantic, Midwest, Mountain Plains, Northeast, Southeast, Southwest, West).

RESULTS

Consistent with the consideration given for selection in the BFB program, BFB hospitals were larger than non-BFB and other hospitals (66.2% vs. 21.8% and 18.3%, respectively, with ≥2,000 births per year) and more likely to be in the Southeast (32.3% vs. 16.3% and 15.5%, respectively) or Mid-Atlantic (16.9% vs. 14.1% and 8.9%, respectively) regions. Most BFB, non-BFB, and other hospitals were nonprofit (64.6%, 80.4%, and 67.0% respectively).

In 2011, the mean total scores were similar for BFB hospitals, non-BFB, and other hospitals (68, 72, and 70, respectively). Of the seven subscores, the BFB hospitals were, on average, 3–9 points lower than non-BFB hospitals on five domains of care and were equal to or 1 point higher on two domains (Table 2); the BFB hospitals were, on average, 1–10 points lower than other hospitals on four domains of care and were 2–6 points higher on three domains (see Table 2).

From 2011 to 2013, among BFB hospitals, the mean total score increased 18 points from 68 to 86. In comparison, among non-BFB hospitals, the mean total score increased 8 points from 72 to 80, and among other hospitals, the mean total score increased 5 points from 70 to 75. The improvement among BFB hospitals was significantly greater than improvement among non-BFB and other hospitals after adjustment for hospital size, type, and region ($p < .01$, $p < .01$, respectively; see Table 2). Although the subscores on each of the seven domains of care increased among BFB, non-BFB, and other hospitals, the BFB hospitals reported significantly greater improvement in four domains compared to non-BFB hospitals and in six domains compared to other hospitals. One domain, feeding of breastfed infants, did not improve among the three groups.

Among BFB hospitals, the quality scores increased by 15 or more points for labor and birth care (61–87), postpartum contact between mother and infant (66–86), facility discharge care (50–75), and staff training (63–93, see Table 2). Only one domain of care, feeding of breastfed infants, showed an improvement of less than 5 points. Among non-BFB hospitals, score improvement ranged from 1 to 19 points on each of the seven domains of care, and it was equal to or less than 5 points on four of these domains (see Table 2). Among other hospitals, score improvement ranged from 2 to 13 points on each of the seven domains of care, and it was equal to or less than 5 points on six of these domains (see Table 2).

DISCUSSION

Hospitals participating in BFB demonstrated more than twice the increase in their overall mPINC scores as did non-BFB hospitals during the 2011–2013 period and three times the increase in their overall mPINC scores as did other hospitals during the 2011–2013 period. The greatest improvements among the BFB hospitals relative to other domains of care were seen in labor and birth care, postpartum contact between

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TABLE 2
Maternity Practices in Infant Nutrition and Care (mPINC) Survey Mean Scores and Change in Mean Scores for Best Fed Beginnings (BFB), Non–Best Fed Beginnings, and Other Hospitals in 2011 and 2013

	BFB Hospitals ($n = 65$)			Non-BFB Hospitals ($n = 92$)				Other Hospitals ($n = 1,722$)			
mPINC Domain	2011 Mean	2013 Mean	Change in Mean	2011 Mean	2013 Mean	Change in Mean	*p* Value[a]	2011	2013	Change in Mean	*p* Value[b]
Total[c]	68	86	18	72	80	8	<.01	70	75	5	<.01
Labor and birth	61	87	26	70	84	14	.06	71	80	9	<.01
Feeding of breastfed infants	80	84	4	83	86	3	.4	82	85	3	.7
Breastfeeding assistance	84	92	8	87	88	1	.02	85	87	2	<.01
Postpartum contact	66	86	20	71	79	8	.02	73	78	5	<.01
Discharge	50	75	25	54	73	19	.2	48	61	13	<.01
Staff training	63	93	30	62	67	5	<.01	57	62	5	<.01
Structure and organization	77	88	11	77	82	5	.02	72	75	3	<.01

[a]*p* Values are from analysis of covariance and indicate a difference in change between the Best Fed Beginnings and non-Best Fed Beginnings hospitals, adjusted for hospital size, type, and region.
[b]*p* Values are from analysis of covariance and indicate a difference in change between the Best Fed Beginnings and other hospitals, adjusted for hospital size, type, and region.
[c]The total score is the average of the seven domains of care subscores (CDC, n.d.-a).

mother and infant, facility-discharge care, and staff training. The significant differences in quality scores between BFB, non-BFB, and other hospitals appear to reflect improvements in clinical care in specific domains, and it suggests that the BFB hospitals adopted and more consistently adhered to evidence-based maternity care practices in specific domains in comparison to the non-BFB and other hospitals.

Quality improvement interventions, such as BFB, combine elements of topic-specific training and technical assistance targeted to address specific barriers as a systematic approach to help hospital teams undertake practice change at the facility level. The BFB program provided hospital teams with targeted technical assistance from breastfeeding experts and quality improvement advisors and resources to assist them in making changes to many of the elements included in these four domains of maternity care. For example, staff at BFB hospitals received training and technical guidance from breastfeeding experts on strategies to improve immediate postpartum contact between mothers and infants. Staff were trained on the benefits of immediate skin-to-skin contact between mothers and infants, provided technical guidance on strategies to overcome barriers specific to their clinical setting in implementing immediate skin-to-skin contact after vaginal and cesarean births and were taught quality improvement approaches, such as the plan-do-study-act cycle, to test and evaluate these practice changes.

The collaborative learning aspect of the project also provided opportunities for hospitals to learn from one another about what approaches worked well in implementing evidence-based maternity care practices supportive of breastfeeding. BFB teams encountered similar challenges in changing provider and staff attitudes, establishing new roles, and adopting new approaches to established practices. For example, as hospitals implemented rooming-in (Step 7 of the 10 steps), staff and providers had to adopt new practices such as doing well-baby rounds and hearing screening in the mothers' room rather than in the well-baby nursery. Hospitals shared some of the approaches used to overcome these common challenges such as the use of rolling carts to hold the equipment needed to conduct well-baby examinations and hearing screening in the mothers' room (National Institute for Children's Health Quality, 2015).

Despite improvements in four and six domains, respectively among the BFB hospitals compared to non-BFB and other hospitals, there was minimal improvement in the domain of postpartum feeding of breastfed infants. The score for this domain is composed of categorical responses related to the content of the first feeding and supplementation for healthy breastfed infants and yes/no responses to types of non-breastmilk supplements given (CDC, n.d.-a). Despite technical assistance aimed at helping BFB hospitals reduce nonmedically indicated supplementation of healthy breastfed infants, BFB hospitals reported only nominal improvements in this domain, which occurred at the same rate as among non-BFB and other hospitals. Although there were nominal changes in subscores in this domain, it is anticipated that reductions in nonmedically indicated supplementation will follow because improved hospital policies, staff training, opportunities for early initiation of breastfeeding created through improvements in labor and birth care, and postpartum mother–infant contact are adopted and become standard practice in the BFB hospitals. The current findings are consistent with findings from previous mPINC surveys which indicate nominal yet steady improvement in this domain over time (CDC, 2016). This pattern may be reflected in the 2015 mPINC domain-specific subscore among the BFB hospitals.

Culture change among hospital staff, providers, and new mothers may be needed to make progress in reducing nonmedically indicated supplementation of healthy breastfed infants. In October 2013, despite having participated in the BFB project for more than a year, more than one BFB hospital noted that nonmedically indicated supplements were still being given inappropriately at their hospitals (National Institute for Children's Health Quality, 2015). To address this, one BFB hospital banned the distribution of discharge bags with free breastmilk substitutes, the unit culture then reached a tipping point, and this contributed, in part, to an improvement in their exclusive breastfeeding rates among breastfed infants (Hutter, 2013a). In another example, a BFB hospital reported that using a multipronged approach to educate mothers, staff, and physicians contributed to improvements in their exclusive breastfeeding rates (Hutter, 2013b). Future quality improvement interventions aimed at improving maternity care practices supportive of breastfeeding need to systematically test and evaluate the intervention elements necessary to reduce nonmedically indicated supplementation of healthy breastfed infants. This is important because hospital supplementation of breastfed infants has been associated with suboptimal breastfeeding

practices and early cessation of breastfeeding (Dewey, Nommsen-Rivers, Heinig, & Cohen, 2003; WHO, 1998). Pressure from external stakeholders may also contribute to improvements in the nonmedically indicated supplementation of healthy breastfed infants. For example, The Joint Commission's (TJC) mandatory public reporting of exclusive breastmilk feeding for TJC-accredited hospitals with 300 or more births per year (TJC, 2015) will provide hospital leadership with data to inform and monitor efforts aimed at reducing nonmedically indicated supplementation and improving exclusive breastfeeding.

Limitations of this analysis include that the mPINC survey is completed by a key informant and may not accurately represent all maternity care practices at that hospital. There may also be a social desirability bias because BFB hospitals provided self-reported information on a survey that is conducted on behalf of CDC, funder of the BFB program. However, BFB hospitals participated in the standardized mPINC data collection process, and BFB hospital team members may or may not have been involved in completing the mPINC survey. Data from 36 non-BFB and 1,043 other hospitals were excluded because of missing data on one or more scores from both the 2011 and 2013 surveys. However, when these excluded hospitals were included in the analysis for the scores they did have data for, the overall findings were consistent. Only 65 of the 89 BFB hospitals had complete data for both the 2011 and 2013 mPINC surveys and thus were included in the analysis; 74 BFB hospitals participated in 2011 and 79 participated in 2013. The total mean mPINC score for these larger samples was 69 in 2011 and 85 in 2013, similar to the mean scores for the hospitals that participated in both survey years. The analyses were also run on these cross-sectional samples, and the results were consistent with what was presented from the longitudinal analysis. Finally, because hospitals in BFB were selected based on their interest and demonstrated commitment as well as demographics, the analysis cannot distinguish between selection bias and intervention effects. Although the analyses controlled for the characteristics of hospital size, type, and region, these analyses did not take into account other factors that may have impacted the results. However, the magnitude of impact in a short time suggests that intent to improve practices together with participation in this quality improvement program had a substantial effect on maternity practices supportive of breastfeeding.

CONCLUSION

An evaluation of a national quality improvement learning collaborative found that participating hospitals had twice the increase in total mPINC score compared to nonparticipating hospitals and a threefold increase in total mPINC score compared to other hospitals. The BFB hospitals reported greater improvements in four domains of maternity care practices that support breastfeeding compared to nonparticipating hospitals and in six domains of care practices that support breastfeeding compared to other hospitals. Participation in the learning collaborative may have accelerated progress in implementing evidence-based maternity care practices supportive of breastfeeding.

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