The New Hampshire Ten Steps to Successful Breastfeeding Collaborative: A Statewide QI Initiative

abstract

BACKGROUND AND OBJECTIVE: Despite national recognition for their breastfeeding-friendly practices, many New Hampshire hospitals are still not achieving the Ten Steps to Successful Breastfeeding. To increase achievement of the Ten Steps in New Hampshire's birthing hospitals, facilitate Baby-Friendly Hospital Initiative (BFHI) designation for interested hospitals, and improve rates of in-hospital any and exclusive breastfeeding.

METHODS: After a 2010 needs assessment, we conducted 2 statewide workshops targeting 6 of the Ten Steps found to be most deficient among New Hampshire birthing hospitals. Eighteen of 20 hospitals attended at least 1 workshop, and 6 participated in an intensive collaborative. In 2013, we analyzed interval Ten Step achievement and in-hospital breastfeeding trends.

RESULTS: Staff education showed the greatest improvement, increasing step 2 achievement from 1 to 6 hospitals (P = .05). Although the number of hospitals implementing step 6 (breast milk only) and step 9 (no artificial nipples) increased, differences were not statistically significant. Intensive collaborative hospitals achieved an average of 1.5 new steps, whereas non–Baby Friendly hospitals lost 0.7 steps (P = .05). In-hospital breastfeeding rates increased in intensive collaborative hospitals and were significantly higher than those in non–Baby Friendly hospitals by the end of the study (any breastfeeding, 89% vs 73%, P = .03; exclusive breastfeeding, 84% vs 61%, P < .001).

CONCLUSIONS: A statewide improvement collaborative facilitated increases in Ten Step achievement and in-hospital breastfeeding for hospitals participating in an intensive collaborative. Active work in Ten Step implementation, including staff education, appears to be more effective in increasing in-hospital breastfeeding than does BFHI designation alone.

It is widely accepted that breastfeeding, particularly exclusive breastfeeding for the first 6 months, is associated with important maternal-child health benefits. It is therefore recommended by all major maternal-child health organizations.1-5 The Baby-Friendly Hospital Initiative (BFHI) is a global effort to improve perinatal practices that promote and support breastfeeding.6 The BFHI is based on the Ten Steps to Successful Breastfeeding, a set of best practices developed by the World Health Organization and the United Nations Children's Fund, that increase breastfeeding initiation, duration, and exclusivity when applied comprehensively (Table 1).7-9 They can also improve these rates in an additive manner when applied individually.10-12

In January 2011, the US Surgeon General issued a Call to Action on Breastfeeding that included increasing the numbers of BFHI-designated hospitals to facilitate improved maternal-child health outcomes.13 At that time, rates of breastfeeding initiation,
TABLE 1 Overview of Ten Steps With Study Criteria and Baseline Study Findings

<table>
<thead>
<tr>
<th>Step Definition</th>
<th>Study Criteria</th>
<th>Areas Hospitals Doing Well in at Start of Project</th>
<th>Most Commonly Reported Barriers to Meeting Step/Quality Gaps Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have a written breastfeeding policy that is routinely communicated to all health care staff.</td>
<td>Hospital had written breastfeeding policy that was communicated to all staff.</td>
<td>All hospitals had written breastfeeding policy in place.</td>
<td>Not all hospitals routinely communicated the policy to their staff, and policies were often inadequate in addressing the 10 model steps.</td>
</tr>
<tr>
<td>2. Train all health care staff in skills necessary to implement this policy.</td>
<td>Eighty percent of all health care staff had received the recommended amount of breastfeeding education: nurses, 20 h; physicians, 3 h.</td>
<td>Thirteen hospitals had ≥80% nursing staff trained. One hospital developed evening session for physicians with &gt;90% attendance.</td>
<td>Physician education remained a significant obstacle in most hospitals (including those already BFHI certified) and nursing staff education in 7 hospitals.</td>
</tr>
<tr>
<td>3. Inform all pregnant women about the benefits and management of breastfeeding.</td>
<td>All mothers were informed of the benefits and management of breastfeeding.</td>
<td>Prenatal education classes often included breastfeeding education.</td>
<td>Despite presence of prenatal education classes, almost all hospitals reported ≤25% mothers attended. Most hospitals did not have system in place for ensuring all women were informed.</td>
</tr>
<tr>
<td>4. Help all mothers initiate breastfeeding within 1 h of birth and encourage skin-to-skin contact in the first half hour.</td>
<td>All babies were placed skin-to-skin within 30 min after delivery and allowed to stay there for at least 1 hour until first breastfeed occurred.</td>
<td>Most hospitals provided prompt and consistent skin-to-skin contact after delivery.</td>
<td>Skin-to-skin after cesarian delivery was limited at most hospitals.</td>
</tr>
<tr>
<td>5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.</td>
<td>All mothers are shown how to breastfeed and maintain lactation even if separated from their infant. Pumping begins within 6 h of separation.</td>
<td>Almost all hospitals achieved this step.</td>
<td>Some nurses delayed initiating pumping &gt;6 h in cases of mother-baby separation.</td>
</tr>
<tr>
<td>6. Give infants no food or drink other than breast milk unless medically indicated.</td>
<td>No routine supplementation of breastfed infants with formula, and mothers are educated on potential negative consequences of using formula without medical indication. Hospital must buy its own formula, and no formula advertising should be present in care settings.</td>
<td>Some hospitals had physician orders for formula. One had a written consent form for supplementation.</td>
<td>Nonmedically indicated supplementation with formula was widespread, occurring most often at mother’s request. Many hospitals were not purchasing own formula, and 25% were still handing out formula discharge packs.</td>
</tr>
<tr>
<td>7. Practice “rooming in”: allow mothers and infants to remain together 24 h a day.</td>
<td>Babies are kept with their mothers 24 h a day with exception of 1 h for medical procedures. Mothers are educated on rationale for rooming-in when asking for babies to be taken to the nursery.</td>
<td>Some hospitals promoted naptime to encourage daytime rest. One hospital used written instructions and parental signature when removing infant from room.</td>
<td>Many hospitals reported difficulty implementing this step, primarily at night.</td>
</tr>
<tr>
<td>8. Encourage unrestricted breastfeeding.</td>
<td>Mothers are encouraged to breastfeed without limits on time and taught to feed on cue.</td>
<td>Almost all hospitals reported achieving this step.</td>
<td>Medical charting included feeding time duration.</td>
</tr>
<tr>
<td>9. Give no pacifiers or artificial nipples to breastfeeding infants.</td>
<td>Standard bottle and nipple is not first or second choice for supplementing. Mothers educated on potential negative consequences of artificial nipple use.</td>
<td>All hospitals reported that pacifiers were not routinely given to breastfeeding infants.</td>
<td>More than half of hospitals provided pacifiers when requested by mother and/or reported that bottle feeding was first or second choice for supplementing.</td>
</tr>
<tr>
<td>10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge.</td>
<td>Mothers are routinely offered breastfeeding support after discharge.</td>
<td>Many hospitals had regular mother-support groups on hospital unit.</td>
<td>Extent of outpatient breastfeeding support varied, with some very limited.</td>
</tr>
</tbody>
</table>

continuation, and exclusivity in New Hampshire were above national averages but below national goals, and only 3 of New Hampshire’s 20 birthing hospitals were BFHI designated.14–17 Additionally, pilot work for the New Hampshire Ten Steps project identified that certain components of the Ten Steps were not widely practiced in New Hampshire.
Multihospital improvement collaboratives have been shown to achieve and sustain important health outcomes. The primary aims of this project were to work with established maternal-child health and hospital networks to (1) improve achievement of the Ten Steps in all New Hampshire birthing hospitals, (2) facilitate BFHI designation for interested hospitals via an improvement collaborative model, and (3) improve rates of breastfeeding initiation (“any breastfeeding”) and exclusive breastfeeding in New Hampshire birthing hospitals.

**METHODS**

**Setting**

There are ~12,500 births per year in New Hampshire’s 20 birthing hospitals that occur in 16 level I (95–720 births/hospital), 3 level II (963–1320 births/hospital), and 3 level III (1300–1784 births/hospital) nurseries (personal communication with David LaFlamme, PhD, MPH, New Hampshire’s state epidemiologist, and Patricia M. Tilley, MS, Ed, Chief of Bureau of Population Health and Community Services, New Hampshire Division of Public Health Services, Department of Health and Human Services; September–November 2014). Low birth weight and late preterm infants are cared for in hospitals with level II capability. More than half of deliveries occur in rural or semirural hospitals, 7 of which are designated as Critical Access, with 11 hospitals delivering <500 newborns annually. Because of New Hampshire’s small geographic size, these facilities are located in such a way that they can meet the needs of the state’s population. Newborns are cared for by family physicians, pediatricians, and neonatologists depending on location and level of nursery. There is strong maternal-child health collaboration through organizations including the Dartmouth-Hitchcock Perinatal Education Outreach Program, New Hampshire Breastfeeding Task Force, New Hampshire Hospital Association, and Northern New England Perinatal Quality Improvement Network. At study outset, New Hampshire had 1 of the highest Centers for Disease Control and Prevention Maternity Practices in Infant Nutrition and Care (mPINC) scores in the United States, and had breastfeeding initiation rates exceeding 78%.14

**Ethical Concerns**

The Committee for Protection of Human Subjects at Dartmouth approved the study before participant enrollment; institutional review board approval was maintained throughout the course of the study. Patient and hospital level data were deidentified before analysis.

**Planning the Intervention**

At project outset, there was no state-organized BFHI quality improvement (QI) effort. Study authors BW and AH envisioned the New Hampshire Ten Steps to Successful Breastfeeding Collaborative as a QI program to help New Hampshire birthing hospitals achieve BFHI designation or, if they were not interested in designation, to increase achievement of the Ten Steps and improve rates of any and exclusive in-hospital breastfeeding.

In 2010, all 20 New Hampshire birthing hospitals’ well-baby nurseries were contacted about the project. Birth centers were not included. To determine current level of Ten Step implementation as well as interest in collaborative participation, we performed a baseline needs assessment (based on the Baby-Friendly Hospital Self-Appraisal Tool) by interviewing each hospital’s perinatal nurse manager and/or lactation consultant in person, by phone, or via an online survey. The survey was sent to all hospitals for review before participation. Although there were no participant incentives, the survey assessor (JK) encouraged involvement to best inform the project and improve state health outcomes.

We used the needs assessment findings to direct improvement activities by identifying which of the Ten Steps New Hampshire hospitals were most deficient in, and which hospitals were interested in receiving help toward Ten Step implementation and BFHI designation. Hospitals received credit for step achievement if they responded that the step was met ≥80% of the time, similar to BFHI-designation requirements.

Hospitals were assigned to 1 of 3 groups:

1. BFHI designated or actively seeking designation (4 hospitals; 300–1320 deliveries per hospital)
2. Intensive collaborative (6 hospitals interested in receiving Ten Step/BFHI help; 176–963 deliveries per hospital)
3. Other (10 hospitals not interested in receiving Ten Step/BFHI help; 95–1784 deliveries per hospital)

**Improvement Activities**

The project’s timeline and activities are outlined in Fig 1.

**Workshops**

We conducted 2 statewide workshops in 2012, based on the Institute of Healthcare Improvement model of shared learning.21 Intensive hospitals attended workshops free of charge; other hospitals attended for a nominal fee.
Hospitals were asked to send their lactation coordinator, perinatal nurse manager, and a physician/associate provider to the workshops. Workshops involved small group work on 6 steps identified as deficient in the needs assessment: step 1, written breastfeeding policy; step 2, provider education; step 3, prenatal education; step 6, no medically unnecessary formula supplementation and nonacceptance of formula company promotions; step 7, rooming-in; and step 9, no artificial nipples in breastfeeding infants. Breakout sessions featured specifically matched hospital groupings composed of 3 or 4 teams with diverse levels of step achievement. Two faculty members with breastfeeding expertise facilitated the sessions first reviewing each step’s requirements and its evidence base then assisting participants in brainstorming barriers and practical strategies for improvement. We summarized findings and posted them on a password-protected Web site for later access. Workshop anchor sessions included reviews of evidence for exclusive breastfeeding and Ten Steps efficacy, and an introduction to QI methodology. Hospitals were encouraged to implement QI processes and projects using Plan, Do, Study, Act cycles or other QI methodology. Several hospital teams reported local progress on individual steps at the second workshop, but no formal QI assistance or feedback was conducted as part of the project’s interventions.

### Intensive Collaborative

Intensive collaborative hospitals received free attendance at workshops, patient and staff education videos, online and onsite provider education, and onsite assessment by study authors (JK, BW). During onsite assessments, we analyzed each hospital’s work toward implementation of the Ten Steps and BFHI planning. We reviewed hospital breastfeeding policies and patient education materials and made recommendations for next steps including resources needed for full Ten Step implementation and BFHI designation. Nursing education was based on the Healthy Children’s 20-hour BFHI curriculum via a 15-hour Web-based curriculum and 5-hour onsite skills competency verification. Skills sessions covered communication with pregnant and postpartum women about infant feeding, breastfeeding observation and assistance, hand expression and safe storage of breast milk, and safe formula preparation and feeding. Author JK and a Board Certified Lactation Consultant (LL) from a New Hampshire Baby-Friendly Hospital conducted onsite skills sessions. LL was certified by Healthy Children to teach the 20-hour curriculum. Additionally, participants addressed institution-specific challenges and brainstormed strategies for successful step implementation. Before project analysis, we facilitated one 2-hour skills session at 1 intensive hospital (winter 2012) and two 5-hour skills sessions at another (spring 2013). Two additional intensive hospitals requested skills sessions but were unable to complete these until after the study period ended.

Physician education consisted of 1 to 2 hours of onsite education, provided...
by physician study authors (BW or AH) at the request of individual hospitals. Two hours of physician education were performed at 1 intensive hospital, and 1 hour each at 2 other intensive hospitals.

Throughout the course of the intervention, study authors performed interval assessments of intensive hospitals to determine progress toward Ten Step implementation/BFHI designation, helped develop strategies for overcoming ongoing barriers, and shared additional resources developed through the collaborative.

**Methods of Evaluation**

We determined changes in adherence to the Ten Steps in the spring of 2013 through in-person or phone interviews or online survey. This postintervention assessment featured the same questionnaire as the 2010 baseline needs assessment with an additional question regarding in-hospital breastfeeding rates throughout project span. We measured breastfeeding rates by reviewing feeding logs of all babies born in a sample month in early 2011, 2012, and 2013. We calculated exclusive breast milk feeding rates based on babies receiving breast milk only with no formula supplementation throughout the hospital stay. We excluded babies aged <37 weeks and those transferred to another hospital; babies <2500 g were not excluded. Hospitals self-reported breastfeeding rates except for 3 hospitals, for which JK conducted in-hospital chart reviews.

**Data Analysis**

We compared the number of hospitals achieving ≥80% compliance with each of the Ten Steps at baseline and postintervention using McNemar’s test for paired dichotomous variables (IBM SPSS Statistics for Windows, Version 21.0, Armonk, NY). To assess the intensity of intervention, we analyzed change in the mean number of steps achieved pre- and postintervention among intensive hospitals ($n = 6$), BFHI-designated hospitals ($n = 4$; 2 hospitals seeking designation became Baby-Friendly within the study time period), and “other” remaining hospitals ($n = 10$) by unpaired t test with unequal variance. Finally, we compared rates of any and exclusive breastfeeding and determined if collaborative participation or BFHI status was related to changes in these rates with comparisons made by unpaired t test with equal variance.

**RESULTS**

The project spanned 34 months (Fig 1) with baseline data collected in 2010–2011, 2 statewide workshops performed in March and September 2012, intensive collaborative study interventions in winter 2012 to early summer 2013, and the postintervention survey completed winter-early summer 2013. Definitions of the Ten Steps, New Hampshire hospitals’ most commonly reported barriers to meeting formal step criteria, and quality gaps identified at baseline are shown in Table 1. All New Hampshire birthing hospitals ($n = 20$) completed baseline and postintervention surveys.

Fifteen of New Hampshire’s 20 birthing hospitals attended the first workshop, and teams from 17 attended the second; 18 hospitals attended at least 1 workshop. Five hospitals sent at least 1 advanced-level provider totaling 3 pediatricians, 2 family physicians, 2 obstetricians, and 1 midwife.

Changes in the number of New Hampshire hospitals achieving each individual step are noted in Fig 2. A significant change was seen only for step 2, which was met by 1 versus 6 hospitals respectively pre- and postintervention ($P = .05$). Three of these 6 hospitals were in the intensive collaborative, and 3 were previously BFHI designated or actively seeking designation. An additional 2 intensive hospitals completed their nursing staff education and competency verification after final data analysis. Achievement of step 6 (no medically
unnecessary formula supplementation) increased from 4 to 6 hospitals, and step 9 (no artificial nipples) increased from 9 to 11, but changes were not statistically significant. Overall, intensive hospitals had the largest increase in steps achieved over the study period (Table 2) rising from 5.67 to 7.17 steps ($P = .05$). In-hospital rates of any breastfeeding increased from 73% to 89% ($P = .03$) and exclusive breastfeeding from 61% to 84% ($P = .001$) in intensive hospitals, whereas rates in “other” hospitals did not improve (Fig 3A and 3B).

Fifty-nine nurses at 3 intensive hospitals and 38 nurses at 2 hospitals undergoing Baby-Friendly redesignation completed the online nursing education course; 77 nurses from 3 intensive hospitals attended onsite clinical skills sessions.

**DISCUSSION**

Our statewide multihospital improvement initiative facilitated increases in some Ten Step best practices. The most notable increase was for step 2 (provider education) with 5 additional hospitals meeting the step at project conclusion. Two of these hospitals had already been BFHI-designated but had not maintained training for newly hired staff members. Readily available low- to no-cost provider education is likely the reason for the large increase in step 2 achievement. Intensive hospitals actively working on the Ten Steps and BFHI designation demonstrated significant gains in Ten Step achievement, improving from 5.67 to 7.17 steps over the study period. These hospitals also demonstrated higher rates of any and exclusive breastfeeding, with rates increasing by 16% and 23%, respectively, compared with 6% and 9% decreases in remaining non-BFHI hospitals.

The improvement collaborative was not associated with statistically significant improvements in the remaining steps. This may be due to small sample size, inadequate time or intensity of the intervention (eg, intensive hospitals completing staff education after data analysis), or because the intervention was ineffective. Although hospital teams were given information and some the necessary skills to implement best practices, we did not measure whether or how effectively they were implemented. Additionally, we found through our discussions with hospitals that administrative pressures or lack of support may have impaired some aspects of step implementation in individual hospitals.

Although a significant improvement was not seen for step 6, 2 additional hospitals began purchasing formula during the study period, and 3 discontinued the practice of handing out formula company-sponsored gift bags. At present, only 2 of New Hampshire’s 20 birthing hospitals provide commercial gift bags to mothers at discharge. Acceptance of and distribution of formula company promotions is associated with lower breastfeeding rates, and lack of exposure to step 6 negatively affects a woman’s ability to meet her personal goals for exclusive breastfeeding.

We found that nonmedically indicated formula supplementation in healthy breastfed newborns remains a widespread concern in New Hampshire, despite all other positive indicators. Although the reasons for this are complex, including public misperceptions about the importance of exclusive breastfeeding, we encourage all New Hampshire hospitals to remove all forms of formula advertising in their perinatal facilities. Because BFHI designation has been shown not to increase overall hospital costs, an economic argument for accepting free or discounted formula is no longer valid.

After the end of the study period, 2 intensive hospitals have achieved BFHI designation. Despite lacking BFHI designation and only implementing an average of 1.5 new steps during the study period, intensive hospitals achieved significant increases in breastfeeding rates. Other studies have also found that implementation of individual steps alone can lead to improved breastfeeding outcomes with steps in combination most strongly associated with improved breastfeeding outcomes.

Our study revealed that previously Baby-Friendly hospitals with the highest breastfeeding rates at the start of our project did not achieve additional increases, similar to findings from a recent Australian study. It is likely that the active work of becoming Baby-Friendly, including intensive provider education and a continued focus on breastfeeding best practices, is the most effective element in achieving and sustaining increases in rates of in-hospital breastfeeding.
Furthermore, it has been reported that full compliance with the Ten Steps among Baby-Friendly hospitals remains challenging, supporting the requirement that hospitals continue Ten Step quality improvement to achieve redesignation. Hospitals unable to secure administrative support for BFHI designation may still be able to make significant improvements in breastfeeding through provider education and best practice implementation alone.

Our project was successful in part due to the collegial nature of New Hampshire hospitals, our state’s established maternal-child health network, the ability of study author JK to ensure participation, and the participation of several highly engaged “breastfeeding champions” at individual hospitals.

Additional strengths of this collaborative model include free-of-charge staff education and on-site competency verification for intensive hospitals, and low-cost education for all other hospitals. The National Institute for Children’s Health Quality Best Fed Beginnings project, currently in progress, is a model of well-funded QI work for increasing hospital BFHI designation. It is currently providing intensive educational and QI technical support to help 89 US hospitals achieve BFHI designation; outcomes are not yet available. Other QI collaboratives with sufficient resources for measurement and technical support have also achieved improved BFHI practices and have increased the proportion of human milk fed to infants. These can also serve as models for other states to effectively promote breastfeeding in an organized and systematic fashion.

Our study has several important limitations. Pre- and postsurvey data, although based on the BFHI self-assessment tool, were mostly self-reported and not confirmed with staff or patient interviews. Although the collaborative did appear to impact achievement of step 2 as well as rates of in-hospital breastfeeding, these changes may not be solely the result of this intervention. For example, there could be unmeasured confounders such as a greater proportion of women predisposed to breastfeeding in the postintervention period. Second, we only obtained a “snapshot” of data at the beginning and end of the intervention, and several intensive hospitals performed their staff online education and competency verification after the originally proposed project completion date or obtained their final breastfeeding rates before the educational intervention. Third, there may be limited generalizability of our results because New Hampshire is a small state with most birthing hospitals.

FIGURE 3 A, Comparison of any in-hospital breastfeeding rates among hospital groups. B, Comparison of exclusive in-hospital breastfeeding rates among hospital groups.
delivering <500 births annually. Citizens are more likely to be white (80% white, 4.4% Hispanic, 2.6% Asian, 2% African American) with lower rates of poverty and prematurity than seen nationally (personal communication with David LaFlamme and Patricia M. Tilley, September-November 2014)39; these factors may contribute to New Hampshire’s higher-than-national breastfeeding rates.41 Finally, the small numbers of hospitals in each study group may have limited our ability to draw statistically significant conclusions.

In a state with already high rates of breastfeeding and perinatal best practices, intensive hospitals achieved even higher breastfeeding rates. Notably, 3 other hospitals that initially demonstrated no interest in receiving Ten Step/BFHI help are now actively engaged and receiving free education through the New Hampshire Ten Steps collaborative. One additional hospital that participated in collaborative workshops but did not request facilitated help became Baby-Friendly in October 2014. Remaining New Hampshire birthing hospitals have yet to set this as an improvement goal. We recommend that our state work toward formally implementing a more continuous and ongoing educational and performance measurement system for the Ten Steps and exclusive breastfeeding, with a focus on encouraging remaining hospitals to increase Ten Step implementation, and for all hospitals to continue provider education and quality improvement to sustain positive breastfeeding outcomes.

**CONCLUSIONS**

A statewide improvement collaborative facilitated small increases in achievement of the Ten Steps and notable improvements in rates of any and exclusive breastfeeding for hospitals receiving targeted assistance and actively working toward BFHI designation. Although BFHI-designated hospitals demonstrated a higher overall level of Ten Step implementation than did intensive collaborative hospitals, breastfeeding rates in these hospitals did not improve further. Active QI work in Ten Step implementation, including provider education, appears to be more effective in affecting in-hospital breastfeeding rates than BFHI designation alone.

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**REFERENCES**


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