The Effect of a 20-Hour Baby-Friendly Hospital Initiative Training Program on Nurses' Breastfeeding Knowledge, Attitudes and Confidence, in a Tertiary Hospital in Singapore

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Abstract

Objective The Baby-Friendly Hospital Initiative (BFHI) enables maternity units to be centers of breastfeeding support to increase breastfeeding rates. This study evaluates the impact of the 20-hour BFHI training course on nurses' breastfeeding knowledge, attitude, and confidence in breastfeeding practice in a tertiary hospital in Singapore.

Study Design Seventeen sessions of the 20-hour BFHI training course were conducted by lactation consultants from 2010 to 2013 at the National University Hospital, Singapore. An anonymous self-administered survey on knowledge, attitude, and confidence in breastfeeding practices were distributed to nurses before (2009) and after (2014) the training courses to assess effectiveness of training.

Results One-hundred forty nurses and one hundred forty-eight nurses participated in the surveys in 2009 and 2014, respectively. Majority were registered nurses who worked in the postnatal wards and the neonatal intensive care unit. After training, there were significant improvements for five of eight items in infant feeding knowledge, including greater awareness of the International Code of Marketing of Breastmilk Substitutes and medical contraindication for breastfeeding. Participants reported more confidence in assisting mothers on breastfeeding, 77.1 to 88.5% ($p = 0.019$); advising hand expressing breast milk, 75.7 to 86.5% ($p = 0.012$); and advising attachment to the breast, 75.7 to 89.2% ($p = 0.004$) in 2014 compared with 2009. However, despite having high levels of confidence, only about half the nurses reported being able to assist mothers in breastfeeding, mainly due to time constraints.

Keywords

- Baby-Friendly Hospital Initiative
- nurses
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Conclusion Implementation of the 20-hour BFHI training program positively influenced nurses' breastfeeding knowledge, attitude, and confidence in breastfeeding practices. Hospital procedures and manpower requirements should be re-examined to overcome nursing constraints in providing breastfeeding help to postpartum mothers.

Key Points

- Nurses have low breastfeeding knowledge pretraining.
- The 20-hour BFHI training course is effective.
- Nurses have inadequate time to support breastfeeding.

Short-term and long-term benefits of breastfeeding to mothers and infants have been well studied and recognized in the past 20 years.[1,2] World Health Organization (WHO) recommends exclusive breastfeeding from birth to 6 months of age and continued breastfeeding with appropriate weaning foods from 6 months up to 2 years of age or beyond as mutually desired by mother and child.[3]

In 2011, Singapore had high-breastfeeding initiation rates of 98%, but low exclusive breastfeeding rates at hospital discharge of 50%, and very low (below 1%) exclusive breastfeeding rates at 6 months, far behind the world average of 40% despite improvements from a decade ago.[4,5] The main reasons for discontinuing breastfeeding before 2 months were "breast and nipple problems" (51%), "insufficient milk supply," (47%) and "baby not able to suck properly" (29%).[5]

Nurses and midwives play a significant role in supporting mothers to breastfeed to prevent or manage common breastfeeding problems. Nurses who underwent traditional nursing curriculum training are unable to provide consistent breastfeeding education and assistance due to gaps in their breastfeeding knowledge.[6–10] Qualified midwives in Australia who assist the first breastfeeding after birth also had more need for breastfeeding education.[11] Pediatric nurses with bachelor degrees, working as neonatal nurses and had young children, had better breastfeeding knowledge and higher self-efficacy in assisting breastfeeding mothers.[12]

Despite structured theoretical breastfeeding education, Taiwanese nursing students lacked confidence and effective communication skills in supporting breastfeeding in the clinical setting.[13] Therefore, it is necessary to improve breastfeeding education by adding practical sessions, communication, or counseling skills to further equip nurses to effectively assist breastfeeding.

In 1991, WHO and the United Nations Children's Fund (UNICEF) launched the Baby-Friendly Hospital Initiative (BFHI) to increase breastfeeding rates worldwide by enabling maternity units to be centers of breastfeeding support through the implementation of the "ten steps to successful breastfeeding" (Supplementary Table S1 [available in the online version]).[14,15] Adherence to the BFHI ten steps has been proven to increase short, medium-, and long-term breastfeeding outcomes in several systematic reviews.[16–18] Step 2 of the 2018 revised WHO Baby-Friendly Hospital Initiative guidelines emphasizes the need for staff to have sufficient knowledge, competence, and skills to support breastfeeding, in contrast to the original statement of merely ensuring "training all health staff in skills necessary to implement the breastfeeding policy."[19]

Systematic reviews have demonstrated that health care staff trainings can positively impact their attitude, knowledge, confidence, and breastfeeding practices.[20,21] These trainings can be in the form of a 18-hour WHO breastfeeding counseling course or a mandatory 3 day-BFHI course.[22,23] Other 18- and 20-hour training programs also resulted in higher staff compliance with many of BFHI "ten steps to successful breastfeeding."[24,25]

To date, there are limited published studies on effects of nurses' BFHI training in Asia. Effects of training in communities with different societal norms and working environment may show variable results. Therefore, this study aims to assess the effectiveness of the 20-hour BFHI training program on nurses' knowledge, attitude, and confidence toward breastfeeding practice in Singapore, a multiethnic Asian city state.

Materials and Methods

Setting

This study was performed in National University Hospital (NUH), a tertiary hospital in Singapore. Annual births were 2,557 in 2009 and steadily rose to 3,581 in 2014. The Health Promotion Board Singapore (a subsidiary of the Ministry of Health Singapore) launched the Baby-Friendly Hospital Initiative in January 2012.[26] NUH was one of five maternity hospitals who embarked on the journey to be designated baby friendly.

Training Program

In NUH, before 2009, there were no formalized BFHI training courses conducted for the maternity and neonatal nurses. In April 2010, the inaugural 20-hour breastfeeding training workshop for nurses was conducted. The training curriculum (Supplementary Table S2 [available in the online version]) was modeled upon the WHO UNICEF 20-hour BFHI course for maternity staff.[27] All trainers were qualified International

Board Certified Lactation Consultants (two nurses, a researcher, and a physician). In 2010 and 2011, the program consisted of a 2-day, 15-hour workshop, and 5-hour practical session. In 2012, no training course was conducted, as all nurses who were currently employed then had already completed training. In 2013, the training program was modified to 16 hours of workshop with 4 hours of practical session. Between April 2010 and February 2013, 232 maternity and neonatal nurses attended the training program which was mandated by hospital's Nursing Education Department and attendance was 100% (Supplementary Table S3 [available in the online version]). Among the nurses who participated in the postsurvey in November 2014, six nurses (4%) had not yet attended the training program.

Study Design and the Survey

This study was approved by the institutions' regulatory body and exempted from informed consent. All nurses in the maternity and neonatal units were invited to voluntarily participate after they were fully informed of the study. Survey forms (Supplementary Material 1 [available in online version]) were distributed by nurse managers in respective areas in November 2009 (pretraining) and November 2014 (posttraining). These forms were self-administered and returned anonymously within a 2-week period. The results were kept confidential and known only to the research team. The 24-item questionnaire consisted of demographic data (six items), specific knowledge on infant feeding (eight items), personal perception on breastfeeding and barrier (three items), confidence level in assisting the mothers and giving advice (five items), and daily practice (two items). Items apart from demographic data were replicated with permission from investigators in an Australian hospital.[28] We did not conduct any psychometric assessment on the survey questions.

Data Analysis

Descriptive statistics were reported as frequency and percentages. Differences in baseline characteristics and nurses' responses over two time points were analyzed using the Pearson's Chi-squared test for categorical variables. Statistical analyses were performed using Stata 15.0 (Stata Corp LP, College Station, TX). A p-value < 0.05 was considered statistically significant.

Results

Participants' Characteristics

There were 161 and 202 nurses working in maternity and neonatal departments in 2009 and 2014, respectively. Response rate to the survey was 87% (140) in 2009 and 73% (148) in 2014. Majority of participants were registered nurses who worked in the postnatal wards and neonatal intensive care unit. The main age group was 20 to 30 years of age. Their experience working with mothers and infants varied in the cohort as expected for age ranges. About 70% of the participants had personal breastfeeding experiences or supported breastfeeding in nonwork situations. There were no significant differences in both groups with regards to demographics, work, and breastfeeding experience (►Table 1).

Participants' Knowledge on Infant Feeding

There was significant improvement in infant feeding knowledge in five out of eight topics after the 20-hour BFHI training courses. Three questions were correctly answered by more than 75% of the nurses in the second survey. These questions were awareness of the International Code of Marketing of Breastmilk Substitutes (77.0 vs. 52.9%, $p < 0.001$), knowledge about the responsibilities of the health care facilities with regards to the International Code (89.8 vs. 65.7%, $p < 0.001$) and correctly identifying maternal HIV infection as the only medical contraindication for breastfeeding compared with 3 other choices (84.5 vs. 45%, $p < 0.001$). A two-fold increase in nurses correctly determined that the newborn required only a small volume of milk feed on the first day of life (50 vs. 25%, $p < 0.001$). More participants correctly selected "3 weeks" to be the time taken for the infant's intestinal tract to return to normal state after a single infant formula feed, but the correct response only rose slightly from 5 to 10.8%. We found no improvements in three items: initiation of milk expression if baby cannot feed at the breast ($p = 0.184$), whether bottle feeding affect the baby's ability to suckle at breast ($p = 0.783$), and necessity of obtaining permission from mother to feed a baby infant formula ($p = 0.566$) (►Table 2).

Participants' Breastfeeding Attitude and Practices

The nurses' perception about the importance of breastfeeding did not differ, with 76.4% (2009) and 84.5% (2014) stating it as "very important" for mothers to breastfeed in today's world. Similarly, approximately 50% of them described their personal breastfeeding journey and nonwork breastfeeding experience as a "positive experience" and approximately 40% described it as a "neutral experience." However, only 57.2% (2009) and 54.7% (2014) reported being able to assist mothers in breastfeeding or expressing breastmilk and not limited by lack of skills or being uncomfortable or embarrassed. The main obstacle preventing them from assisting mothers was a lack of time, reported by 25.7% in 2009 which increased to 29.1% in 2014. More nurses perceived that there was enough breastfeeding education to mothers in 2014 (73.7%), compared with 2009 (59.3%), and correspondingly, more nurses provided breastfeeding education—85% in 2009 and 95.9% in 2014 (►Table 3).

Participants' Confidence in Breastfeeding Practices

There was an overall significant improvement in nurses' confidence in providing advice to mothers on breastfeeding in three of four aspects, by more than 10% from a baseline of around 70%. This included giving advice on attachment to breast, hand expressing breast milk, and increasing lactation. Nurses' confidence in advising on use of breast pump was high at baseline (80%) and did not change after training. The nurses also reported increased confidence in helping mothers to breastfeed, which rose from 77.1% (2009) to 88.5% (2014) (►Table 4).

Table 1 Characteristics of participants in 2009 and 2014

Characteristics	Pretraining 2009 ($n = 140$) *n* (%)	Posttraining 2014 ($n = 148$) *n* (%)	Chi-square test	*p*-Value
Age group (y)				
Less than 20	1 (0.7)	1 (0.7)	0.93	0.92
20–30	52 (37.1)	63 (42.6)		
31–40	33 (23.6)	33 (22.3)		
41–50	26 (18.6)	24 (16.2)		
Above 50	28 (20.0)	27 (18.2)		
Gender				
Female	140 (100.0)	148 (100.0)	0	1
Male	0 (0.0)	0 (0.0)		
Designation				
Midwife	22 (15.7)	12 (8.1)	4.02	0.134
Registered nurse	91 (65.0)	106 (71.6)		
Enrolled nurse	27 (19.3)	30 (20.3)		
Main place of work at the hospital				
Antenatal clinic	13 (9.3)	19 (12.9)	8.58	0.073
Delivery suite	23 (16.4)	23 (15.5)		
Postnatal nursery/postnatal ward	62 (44.3)	64 (43.2)		
Neonatal intensive care unit	35 (25.0)	42 (28.4)		
Others	7 (5.0)	0 (0.0)		
Years of experience with mothers and babies (y)				
0–1	23 (16.4)	11 (7.4)	7.47	0.113
2–4	33 (23.6)	38 (25.7)		
5–10	31 (22.1)	43 (29.1)		
Greater than 10	52 (37.1)	56 (37.8)		
No clinical experience (PSA or HCA)	1 (0.7)	0 (0.0)		
Personal experience in breastfeeding or supporting breastfeeding in nonwork situation				
Yes	99 (70.7)	102 (68.9)	1.24	0.537
No	40 (28.6)	46 (31.1)		
Not answered	1 (0.7)	0 (0.0)		

Abbreviations: HCA, health care assistant; PSA, patient service associate.

Discussion

The WHO/UNICEF 20-hour BFHI training course in the National University Hospital of Singapore resulted in significant improvement in different aspects of maternity and neonatal nurses' knowledge, attitude, and confidence in advising and helping with breastfeeding.

Statistically significant improvement occurred in most areas of knowledge on infant feeding tested. As BFHI training had included "session 4: protecting breastfeeding," nurses' knowledge dramatically increased in two items surveyed: knowledge of the code (52.9–77%) and the responsibilities of health care facilities related to the code (65.7–89.8%). Similarly, following the UNICEF/WHO 20-hour course training in Croatia, health care professionals improved their knowledge on code compliance (65.1–90.4%), and hospital practices supporting breastfeeding (44.3–82.1%).[24]

There was no difference in the item obtaining permission from mother to feed a baby infant formula ($p = 0.566$), as more than 80% of nurses pretraining agreed that it was necessary to obtain permission from mother to feed a baby formula. We did not find improvement in knowledge for the "best time for mother to begin expressing after birth." We believe this is because 12.9% (2009) and 23.6% (2014) selected "within 6 hours of birth" which was a pragmatic practice. Nurses were hesitant to answer vehemently whether a bottle feed could affect the ability of a baby to suck at the breast—only 50% answered "yes" while 33.1% answered "sometimes" and 1.4% "don't know" in 2014, compared with 43.6% "yes," 37.9% "sometimes" and 0.7% "don't know" in 2009. Since the

Table 2 Participants' Knowledge on Infant feeding in 2009 and 2014

Question	Correct response	Participants 2009 *n* (%)	Participants 2014 *n* (%)	Chi-square test	*p*-Value
Are you aware of the World Health Organization code for marketing of breast milk substitutes?	(a) Yes	74 (52.9)	114 (77)	18.59	<0.001[b]
What are the responsibilities of health care facilities with regards to this World Health Organization code?	(e) All of the above	92 (65.7)	133 (89.8)	30.16	<0.001[b]
Ideally, when should a mother begin expressing after birth if the baby cannot feed at the breast?	(e) As soon as possible	95 (67.9)	95 (64.2)	7.53	0.184
What is the stomach capacity of an average term baby in the first 24 hours after birth?	(a) 7 mL	35 (25)	74 (50)	38.03	<0.001[b]
Is it necessary to gain permission from a mother of a well-term breast fed infant to receive a formula feed?	(a) Yes	124 (88.6)	125 (84.5)	2.03	0.566
What would be considered to be a medical contraindication for breastfeeding?	(c) HIV infection in the mother	63 (45)	125 (84.5)	53.62	<0.001[b]
How long does it take for the infant's intestinal tract to return to its normal state following a single formula feed when previously fully breastfed?	(b) 3 weeks	7 (5)	16 (10.8)	9.85	0.043[a]
Can a bottle feed affect the ability of a baby to suck at the breast?	(a) Yes	61 (43.6)	74 (50)	1.74	0.783

[a]Significant at $p < 0.05$, Chi-square test.
[b]Significant at $p < 0.001$, Chi-square test.

Table 3 Participants' breastfeeding attitude and practices in 2009 and 2014

Questions	Respondents in 2009 ($n = 140$) *n* (%)	Respondents in 2014 ($n = 148$) *n* (%)	Chi-square test	*p*-Value
How important do you think it is for mothers to breastfeed in today's world?				
a) Not important	1 (0.7)	1 (0.7)	5.90	0.117
b) Very important	107 (76.4)	125 (84.5)		
c) Somewhat important	28 (20.0)	22 (14.8)		
d) Unnecessary due to the highly developed nature of formulas	0 (0.0)	0 (0.0)		
e) Not answered	4 (2.9)	0 (0.0)		
How did personal experience and nonwork breastfeeding support affect you?				
a) Positive experience	77 (55.0)	75 (50.7)	1.25	0.741
b) Negative experience	6 (4.3)	5 (3.4)		
c) Neutral	52 (37.1)	64 (43.2)		
d) Not answered	5 (3.6)	4 (2.7)		
What prevents you from assisting a mother with breastfeeding or expressing?				
a) Nothing, I am happy to assist a mother in breastfeeding or expressing	80 (57.2)	67 (54.7)	12.84	0.025[a]
b) I feel uncomfortable/embarrassed, seeing, or touching another person's breasts	4 (2.9)	4 (2.7)		
c) I feel I do not have the skills to assist a mother breastfeeding or expressing	16 (11.4)	7 (8.1)		

(*Continued*)

Table 3 (*Continued*)

Questions	Respondents in 2009 ($n = 140$) *n* (%)	Respondents in 2014 ($n = 148$) *n* (%)	Chi-square test	*p*-Value
d) There is not enough time to assist a mother	36 (25.7)	62 (29.1)		
e) It is not my job	2 (1.4)	3 (2.0)		
f) Not answered	2 (1.4)	4 (3.4)		
4) Do you feel that there is enough education on breastfeeding offered to pregnant women in the hospital?				
a) Yes	83 (59.3)	109 (73.7)	7.82	0.020[a]
b) No	43 (30.7)	33 (22.3)		
c) Not answered	14 (10.0)	4 (4.0)		
5) Experience in educating mothers about breastfeeding				
a) Yes	119 (85.0)	142 (95.9)	10.30	0.006[b]
b) No	16 (11.4)	4 (2.7)		
c) Not answered	5 (3.6)	2 (1.4)		

[a]Significant at $p < 0.05$, Chi-square test.
[b]Significant at $p < 0.01$, Chi-square test.

Table 4 Participants' confidence in breastfeeding practices in 2009 and 2014

Questions	Respondents in 2009 ($n = 140$) *n* (%)	Respondents in 2014 ($n = 148$) *n* (%)	Chi-square test	*p*-Value
1) Do you feel confident assisting mother to breastfeed?				
a) Yes	108 (77.1)	131 (88.5)	7.90	0.019[a]
b) No	31 (22.1)	15 (10.1)		
c) Not answered	1 (0.8)	2 (1.4)		
2) Do you feel confident giving advice on attachment to breast?				
a) Yes	106 (75.7)	132 (89.2)	10.85	0.004[b]
b) No	32 (22.9)	13 (8.8)		
c) Not answered	2 (1.4)	3 (2.0)		
3) Do you feel confident giving advice on hand expressing breast milk?				
a) Yes	106 (75.7)	128 (86.5)	8.78	0.012[a]
b) No	34 (24.3)	18 (12.1)		
c) Not answered	0 (0.0)	2 (1.4)		
4) Do you feel confident giving advice on using breast pumps?				
a) Yes	113 (80.7)	118 (79.7)	1.69	0.43
b) No	26 (18.6)	26 (17.6)		
c) Not answered	1 (0.7)	4 (2.7)		
5) Do you feel confident giving advice on Increasing lactation?				
a) Yes	92 (65.7)	114 (77.0)	7.27	0.026[a]
b) No	46 (32.9)	29 (19.6)		
c) Not answered	2 (1.4)	5 (3.4)		

[a]Significant at $p < 0.05$, Chi-square test.
[b]Significant at $p < 0.01$, Chi-square test.

knowledge tested in the survey were also not specifically highlighted in the training program, it may have given nurses some leeway to individualize practices according to their judgement and experience. Hence, long years of hospital practice or ingrained personal belief of nursing staff might attribute to their "incorrect" choices.[24] In future, we plan to develop other questions to test nurses' knowledge on challenging areas in our clinical setting, such as initiating skin-to-skin contact and supporting breastfeeding after cesarean births.

Regarding nurses' attitudes and beliefs, there was no change in proportion of staff who believed that breastfeeding is "very important" or "somewhat important" to mothers. This is due to the high-baseline positive responses (96.4%). Similarly, there was no change in proportion of nurses who described their personal breastfeeding experiences between these 2 years. The health care professional's ambivalent or negative attitude may be partially related to level of their education, personal experience, or influence from others and may not change despite undergoing training programs.[29] A higher percentage of the participants reported more confidence in assisting mothers with breastfeeding and giving advice in various situations. This may be likely due to the inclusion of the 4- to 5-hour practical sessions in the 20-hour BFHI curriculum. These practical sessions include simulation of hand expression with breast models, breastfeeding positions with baby dolls, as well as supplemental newborn feeding using syringe and cup. More nurses stated confidence in assisting a mother to breastfeed (88.5% in 2014 compared with 77.1% in 2009).

However, only 57.2% (2009) and 54.7% (2014) were able to assist mothers in breastfeeding or expressing breastmilk, mainly hindered by the lack of time. Time constraints in providing breastfeeding assistance have been reported by health care professionals in United Kingdom National Health Service and nurses and midwives in Hong Kong.[30,31] In our study, our nurses' lack of time could be explained by the increase in birth rates (40%), which was not matched with a corresponding increase in nurse staffing (25%) in the 4-year period. We were heartened to find out that a high percentage of nurses surveyed reported providing breastfeeding education to mothers in both survey years.

The limitation of our study is that a paired-sample analysis was not performed. This could paradoxically be considered a strength as the anonymous survey ensured high-response rate (73 and 87%) and the staff's freedom to answer as honestly as possible. Participants in pre-and posttraining survey may not be the same nurses due to staff turnover though their demographic characteristics are similar as seen in ►Table 1. We would also like to improve our questions on nurses' perception and competency by using an expanded 5-point Likert's scale, and perform psychometric assessments to improve our survey's reliability and validity.

During this period, there were other concomitant activities in preparing hospital for BFHI designation which may have influenced our positive results. A hospital BFHI Steering Committee was set up to oversee work processes and activities and monitor code compliance. An infant feeding policy was prepared and implemented and BFHI publicized to public and other hospital staff.

However, we believe that the comprehensive 20-hour BFHI training program has promoted nursing staff's compliance in the other steps to successful breastfeeding in a BFHI designated hospital (Supplementary Table S1 [available in online version]). For example, exclusive breastfeeding rate at discharge excluding medical supplementation (step 6) steadily increased from 48.9% (2009) to 62.3% (2014). Our hospital was successful in being designated the first Singapore WHO-UNICEF Baby-Friendly Hospital in August 2013.

Conclusion

Nurses play a paramount role in supporting and encouraging successful breastfeeding in the maternity hospital. Implementation of the 20-hour BFHI training program in our hospital was successful in increasing nursing staff's positive attitude, deepened their knowledge, and increased their confidence in assisting mothers with breastfeeding. However, hospital procedures and manpower needs should be re-examined to overcome nursing time constraints in providing breastfeeding help, to enable them to translate their knowledge into effective practice, and to maintain their continual engagement in BFHI initiatives.

Note

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Conflict of Interest

None declared.

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Supplementary Material 1 Staff survey on infant feeding

You are invited to complete this voluntary, anonymized survey about your knowledge and experience in infant feeding. Please circle your response and add any comments in the adjoining space. Kindly return the completed survey forms to your supervisor.

1. Main place of work?
   a) Antenatal clinic Kent Ridge Wing
   b) Antenatal clinic main building
   c) Delivery suite
   d) Postnatal nursery/postnatal ward 96
   e) Postnatal nursery/postnatal ward 48
   f) Ward 24
   g) Others
2. Current designation in the National University Hospital?
   a) Midwife
   b) Registered nurse
   c) Enrolled nurse
   d) Allied health
   e) Doctor
   f) Others
3. What is your gender?
   a) Female
   b) Male
4. What is your age group?
   a) Less than 20 years
   b) 20–30 years
   c) 31–40 years
   d) 41–50 years
   e) Above 50 years
5. How many years of experience do you have with mothers and babies?
   a) 0–1 year
   b) 2–4 years
   c) 5–10 years
   d) Greater than 10 years
   e) No clinical experience (PSA and HCA)
6. Have you had any personal experience breastfeeding or supporting a partner/friend breastfeeding?
   a) Yes
   b) No
   Comments
7. Which of the following best describes how this experience affected you?
   a) Positive experience
   b) Negative experience
   c) Neutral
8. How important do you think it is for mothers to breastfeed in today's world?
   a) Not important
   b) Very important
   c) Somewhat important
   d) Unnecessary due to the highly developed nature of formulas
9. Do you feel confident assisting a mother to breastfeed?
   a) Yes
   b) No
10. Do you feel confident giving advice on hand expressing breast milk?
    a) Yes
    b) No
11. Do you feel confident giving advice on increasing lactation?
    a) Yes
    b) No
12. Do you feel confident giving advice on using breast pumps?
    a) Yes
    b) No
13. Do you feel confident giving advice on attachment to the breast?
    a) Yes
    b) No
14. What prevents you from assisting a mother with breastfeeding or expressing? (you can select more than one response)
    a) Nothing, I am happy to assist a mother in breastfeeding or expressing
    b) I feel uncomfortable/embarrassed, seeing, or touching another person's breasts
    c) I feel I do not have the skills to assist a mother breastfeeding or expressing
    d) There is not enough time to assist a mother
    e) It is not my job
    Comments
15. Do you educate mothers about breastfeeding?
    a) Yes
    b) No
16. Do you provide educational material about breastfeeding or expressing to
    a) antenatal women? Yes, no, or none available
    b) postnatal women? Yes, no, or none available
    Comment
17. Are you aware of the World Health Organization code for marketing of breast milk substitutes?
    a) Yes
    b) No
18. What are the responsibilities of health care facilities with regards to this World Health Organization code?
    a) No promotion of milk formula to the public
    b) No formula company representatives to advise mothers
    c) No free gifts or personal samples to health workers
    d) No free or low cost supplies of formula to be given
    e) All of the above
19. Ideally, when should a mother begin expressing after birth if the baby cannot feed at the breast?
    a) Within 6 hours of birth
    b) When mum feels well enough

c) When her milk "comes in"
d) When her IV is complete and no longer receiving IV drugs
e) As soon as possible

20. What is the stomach capacity of an average term baby in the first 24 hours after birth?
a) 7 mL
b) 30 mL
c) 60 mL/kg/day
d) 30 mL/kg/day
e) 10 mL/kg/feed

21. Is it necessary to gain permission from a mother of a well term breast fed infant to receive a formula feed?
a) Yes
b) No
c) Don't know

22. What would be considered to be a medical contraindication for breastfeeding
a) Jaundice requiring phototherapy
b) Intrauterine growth retarded newborn
c) HIV infection in the mother
d) Hepatitis C infection in the mother

23. How long does it take for the infant's intestinal tract to return to its normal state following a single formula feed when previously fully breastfed?
a) 1–2 days
b) 3 weeks
c) 4 hours
d) No effect on gut flora

24. Can a bottle feed affect the ability of a baby to suck at the breast?
a) Yes
b) No
c) Sometimes
d) Don't know

Supplementary Table S1 Ten steps to successful breastfeeding

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

Note: Data adapted from World Health Organization.[14]

Supplementary Table S2 Outline of 20-hour Baby-Friendly Hospital Initiative course

Content (relevant BHFI step)	Time allocated
Session 1: BFHI: a part of the global strategy	30 min
Session 2: communication skills	75 min
Session 3: promoting breastfeeding during pregnancy (step 3)	45 min
Session 4: protecting breastfeeding	30 min
Session 5: birth practices and breastfeeding (step 4)	60 min
Session 6: how milk gets from breast to baby	60 min
Session 7: helping with a breastfeed (step 5)	45 min
Session 8: practices that assist breastfeeding (step 6–9)	45 min
Session 9: milk supply	45 min
Session 10: special infant situations	30 min
Session 11: if baby cannot feed at the breast (step 5)	75 min
Session 12: breast and nipple concerns	60 min
Session 13: maternal health concerns	30 min
Session 14: on-going support for mothers (step 10)	75 min
Session 15: making your hospital baby-friendly	30 min
Clinical assessment • Antenatal teaching of pregnant woman • Assisting breastfeeding • Observing/assist hand expression technique and syringe feeding	5 h

Abbreviation: BFHI, Baby-Friendly Hospital Initiative.

Supplementary Table S3 The 20-hour Baby-Friendly Hospital Initiative (step 2) training sessions during study period

Year of the training	Number of sessions	Number of staff trained	Curriculum
2010	6	82	15-hour theory +5 hour practical
2011	9	112	15-hour theory +5 hour practical
2012	0	0	
2013	2	38	16-hour theory +4 hour practical
Total	17	232	

Note: All trainings conducted by International Board-Certified Lactation Consultants.