

doi: 10.3325/cmj.2010.51.396

Effectiveness of the UNICEF/WHO 20-hour Course in Improving Health Professionals' Knowledge, Practices, and Attitudes to Breastfeeding: Before/After Study of 5 Maternity Facilities in Croatia

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Aim To evaluate knowledge, practices, and attitudes to breastfeeding among Croatian health professionals before and after the United Nations International Children's Emergency Fund/World Health Organization (UNICEF/WHO) 20-hour course.

Methods Study included 5 of 9 maternity hospitals in southern Croatia, which had completed the UNICEF/WHO 20-hour breastfeeding training course between December 2007 and February 2009. An anonymous questionnaire testing knowledge, practices, and attitudes was distributed to 424 health professionals before training and to 308 health professionals afterwards. Health professionals' attitudes were assessed using the validated Iowa Infant Feeding Attitude Scale.

Results The pre-training response rate was >90%, but only 53% of data were analyzed; the post-training response rate was 69%. Only one-fifth of health professionals prior to training knew that breast preparation in pregnancy was unnecessary, but this increased to 57% after training ($P < 0.001$). The proportion of health professionals who recognized hospital practices that support breastfeeding and signs of poor positioning when breastfeeding nearly doubled after training ($P < 0.001$). The proportion of health professionals correctly recommending immediate "skin-to-skin" contact post-Cesarean section under local anesthesia did not improve significantly, and stratification analyses showed that younger respondents (<36 years) were more likely to support this practice. Although the proportion of health professionals who correctly managed mastitis improved significantly as a result of the training, the proportion of those who after training inappropriately recommended partial or complete cessation of breastfeeding remained high at 47%. The number of staff with positive attitudes toward breastfeeding increased from 65% to 79%, whereas the number of staff with neutral attitudes dropped from 26.6% to 9.9% ($P < 0.001$). Even after training, a substantial proportion of health professionals showed uncertainty in their attitude toward alcohol consumption and breastfeeding.

Conclusion The UNICEF/WHO 20-hour course appears to be an effective tool for improving health professionals' breastfeeding knowledge, attitudes, and practices.

Received: May 28, 2010

Accepted: August 24, 2010

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The importance of breastfeeding and the increasing evidence about the risks of not doing so (1,2) has put the support, promotion, and protection of breastfeeding at the forefront of many government and public health policies (3). This promises to increase parents' interest in breastfeeding, which may lead to greater expectations from health professionals, especially those who provide care to mothers and babies.

Unfortunately, most health providers receive minimal, if any, education in breastfeeding, either during their undergraduate or postgraduate training (4). What little training they may receive is usually centered on the composition of human milk or the anatomy and physiology of the breast, rather than on the knowledge and practical skills required to support mothers and manage common breastfeeding problems (5). Even residents and physicians most likely to come across breastfeeding mother/baby pairs, such as in pediatrics, obstetrics/gynecology, and family medicine, have demonstrated significant deficits in breastfeeding knowledge (6). Combined with a lack of training in communication skills, considered a cornerstone of patient-centered care, many practicing health professionals do not possess the knowledge and confidence needed to provide appropriate care to breastfeeding dyads (4). This may result in premature supplementation or cessation of breastfeeding.

During the mother's first few days in hospital, the maternity staff's breastfeeding knowledge, attitudes, and practices can significantly influence future breastfeeding success. For this reason, the United Nations International Children's Emergency Fund/World Health Organization (UNICEF/WHO) Baby Friendly Hospital Initiative (BFHI) was introduced in 1991 and has become a "gold standard" for maternity hospital care (7). One of its pillars, the WHO/UNICEF 18-hour course, has proven to be effective in improving maternity staff's knowledge and breastfeeding practices, as well as increasing breastfeeding rates (8,9). In 2006, the 18-hour course was revised, updated, and expanded to reflect the latest evidence and to strengthen implementation of the International Code of Marketing of Breastmilk Substitutes (10).

In 2007, a new breastfeeding promotion campaign was launched in Croatia, in collaboration with UNICEF, aimed at implementing the BFHI. All 34 maternity hospitals in the country, at the time, took up the challenge and set about training their staff. This provided us with the opportunity to assess breastfeeding knowledge, practices, and attitudes before and after training. No studies have previously been

conducted in Croatia evaluating breastfeeding knowledge, practices, and attitudes among health professionals. Our aim was to assess the effectiveness of the UNICEF/WHO 20-hour course in the southern Croatian region of Dalmatia. We surveyed health professionals 3 months after they took the course to find out how much it had improved their knowledge, practices, and attitudes toward breastfeeding. The survey also allowed us to provide the first assessment of breastfeeding knowledge, practices, and attitudes among Croatian health professionals.

METHODS

Study settings and data collection

Approval to carry out this study was received from the Ethics Committee of the University Hospital of Split. All medical and nursing staff employed at the 9 maternity facilities in Dalmatia were invited to complete the questionnaire. We also included pediatric staff since they often manage breastfed children. The breastfeeding coordinator at each hospital, designated as part of the nationwide BFHI, was contacted by phone to ascertain the number of questionnaires required and to enlist their support. A total of 477 self-administered, anonymous questionnaires were sent in November 2007 to the hospital coordinators, who distributed them and collected them after completion.

Between December 2007 and February 2009, 5 of the 9 hospitals (Dubrovnik, Sinj, Zadar, Šibenik, Split) conducted the 20-hour course training for approximately 424 health professionals. The pre-training surveys from these 5 hospitals constituted the baseline data set. Hospital coordinators at these institutions were asked to re-distribute the same questionnaire 3 months after training. The 4 remaining, smaller hospitals (Imotski, Makarska, Knin, and Metković), which had not organized training, were excluded from the study because of the lack of post-training data. A total of 116 members of the pediatric department at one major hospital (Split) did not attend the training course and so were excluded from the post-training sample. Thus, a total of 308 post-training surveys were distributed.

Questionnaire design

The 6-page questionnaire consisted of a cover letter, followed by 9 items testing breastfeeding knowledge, 6 items related to breastfeeding practice, 17 items related to breastfeeding attitudes, and 6 demographic/personal questions. Demographic data included age,

sex, and practice location, and personal questions related to profession, whether the respondent had children, and if so, whether they were breastfed. The authors constructed the knowledge and practice questions based on the content of the 20-hour course. Health professionals' attitudes toward infant feeding were assessed using the Iowa Infant Feeding Attitude Scale (IIFAS), a validated tool shown to have a Cronbach α ranging of 0.85-0.86 (11). The IIFAS has been translated into Croatian and shown to have a Cronbach α of 0.73 among a sample of pregnant women (12). The IIFAS covers various dimensions of infant feeding (cost, nutrition, convenience, bonding) within its 17 statements, and respondents are asked to indicate the extent to which they agree with each statement on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree." IIFAS scores range from 17 to 85, with a higher score indicating a more positive attitude toward breastfeeding. The questionnaire was pretested for ambiguity and readability with a convenience sample of general practitioners and fifth-year medical students.

Intervention

The 2006 UNICEF/WHO 20-hour course for maternity staff was the intervention studied. The course consists of 15.5 hours of theory and 4.5 hours of practice relating to breastfeeding promotion and support (13). Training of trainers was organized by the national BFHI team for Croatia, based in Zagreb. Hospital breastfeeding coordinators from every maternity facility in Croatia were invited to attend a two-day training session in November 2007, covering all components of the 20-hour course. Trainers were provided with course materials translated into Croatian and were encouraged to form BFHI teams at their respective hospitals, complete the BFHI self-appraisal form, and conduct the 20-hour course. At each hospital, a minimum of 80% of maternity hospital staff were required to attend the training. Course content and total length remained unchanged, but the timing and organization of the course varied from facility to facility.

Data analysis

Sample size was not pre-determined because all the maternity units in the region that conducted the training course were initially included. Data were entered into preset EpiData record files (The EpiData Association, Odense, Denmark). Statistical analysis was performed using Stata, version 7.0. (StataCorp LP, College Station, TX, USA).

Chi-square and Fisher exact tests were used to study the differences between baseline and post-training knowledge, practices, and attitudes. We also used these statistical methods to study the association between variables that test health professionals' knowledge, practices, and attitudes and demographic variables (sex, age, profession, previous breastfeeding experience). We performed stratification analyses where an association was found between these demographic variables and knowledge, practices, and attitudes. We deemed anonymity necessary to optimize the response rate but this prevented us from matching the before and after data. The two-sample independent *t*-test was used for comparing IIFAS items before and after training. Differences were considered significant if $P < 0.05$.

RESULTS

Characteristics of the respondents

The 5 hospitals included in the study correspond to one community hospital (Sinj), 3 general hospitals (Šibenik, Dubrovnik, Zadar), and a tertiary referral hospital (Split). Three of these hospitals (Šibenik, Sinj, Zadar) had achieved "baby-friendly" status in the 1990s, but they had allowed this certification to lapse. Hospitals must undergo reassessment every 3 years in order to keep the "baby-friendly" designation.

A large batch of completed baseline questionnaires was lost in transport while being sent for data entry and statistical analysis. Consequently, at baseline, only 223 completed questionnaires were analyzed from a potential total of 424, providing data from 53% of the pre-training respondents. After training, 213 out of 308 health professionals returned questionnaires, resulting in a response rate of 69% (Table 1).

The majority of respondents in both the pre- and post-training groups were midwives, followed by nurses, pediatricians, and gynecologists. The distribution of responses to the "health profession" question differed significantly before and after training (Table 1). This was partially expected due to the fact that 116 staff members from the pediatric department in Split did not receive the post-training surveys, amounting to approximately 27% of the pre-training sample. Since many pediatricians are male, this may explain why the post-training sample had fewer male respondents and fewer respondents with breastfed children than did the pre-training sample.

In both the pre- and post-training samples, most respondents were aged between 36 and 50, with the rest evenly

distributed between the under-36 and over-50 age groups. Approximately 80% of respondents in both groups had children (Table 1).

Knowledge of breastfeeding

Significant improvements in breastfeeding knowledge as a result of the 20-hour course occurred in all areas tested

TABLE 1. Characteristics of respondents at baseline and 3 months after completing the United Nations International Children's Emergency Fund/World Health Organization 20-hour course for maternity staff

Variable*	No. (%) of respondents		P
	pre-training (n=223)*	post-training (n=213)*	
Profession:			
midwife	99 (45.8)	122 (59.2)	<0.001 [†]
nurse	57 (26.4)	51 (24.8)	
pediatrician	39 (18.1)	7 (3.4)	
gynecologist	17 (7.9)	22 (10.7)	
other (interns, trainees in obstetrics and gynecology, general practice, and pediatrics)	4 (1.9)	4 (1.9)	
Male sex	27 (12.6)	15 (7.3)	0.071 [†]
Age (years):			
<36	45 (21.2)	46 (22.8)	0.303 [‡]
36-50	126 (59.4)	106 (52.5)	
>50	41 (19.3)	50 (24.8)	
Respondents with children	181 (82.3)	164 (79.2)	0.425 [‡]
Respondents with breastfed children	162 (91.5)	143 (83.6)	0.025 [‡]
Response rate	223/424 (52.6)	213/308 (69.2)	0.024 [‡]

*The total number of respondents may slightly differ between variables if a health professional did not answer a question.

[†]Fisher exact test.

[‡] χ^2 test.

TABLE 2. Health professionals' knowledge of breastfeeding at baseline and 3 months after completing the United Nations International Children's Emergency Fund/World Health Organization 20-hour course for maternity staff

Area of knowledge	No. (%) of respondents answering correctly		P [†]
	pre-training (n=223)*	post-training (n=213)*	
Definition of exclusive breastfeeding	192 (86.1)	207 (97.6)	<0.001
Timing of first breastfeeding	98 (44)	126 (59.4)	0.00
Breast preparation in pregnancy	43 (19.6)	118 (56.5)	<0.001
Hospital practices that support breastfeeding	97 (44.3)	174 (82.1)	<0.001
Role of prolactin	172 (79.3)	192 (91.9)	<0.001
Sign of poor attachment	183 (84.3)	177 (84.3)	>0.950
Sign of poor positioning	103 (48.6)	173 (84.8)	<0.001
Breastfeeding barriers	202 (91.8)	191 (90.5)	0.635
Management of cracked nipples	145 (65.9)	193 (91.9)	<0.001

*The total number of respondents may slightly differ between variables, if a health professional did not answer a question.

[†] χ^2 test.

(Table 2), apart from only two topics ("signs of poor attachment" and "hospital breastfeeding barriers"), which were already answered correctly by 84% and 92% of health professionals at baseline, respectively, leaving minimal room for improvement. On the other hand, familiarity with the definition of exclusive breastfeeding (no other solids or liquids apart from mother's milk) was widespread before the course, yet it was further improved after training, with almost all respondents (98%) providing the correct answer. Only ~20% of health professionals knew prior to training that breast preparation in pregnancy was unnecessary, reflecting the widely held belief that antenatal "toughening" and "pulling out" of the nipples is beneficial. Notable progress was made after training, with more than 50% of respondents answering correctly that "nipple preparation in pregnancy is unnecessary and may be potentially harmful." Similarly, 59% of health professionals after training knew that a healthy newborn should be breastfed within half an hour of birth, while almost all remaining health professionals replied that the newborn should be washed and weighed before being breastfed (data not shown). The number of respondents who successfully identified hospital practices that support breastfeeding ("10-12 breastfeedings in the first few days after birth") nearly doubled after training, as did the number of those who recognized signs of poor positioning ("the baby's ear is not in line with its shoulder and hip"). Following training, 92% of health professionals, compared with 66% pre-training, knew how to manage cracked nipples ("check positioning and attachment of the baby to the breast"), a common obstacle encountered by breastfeeding mothers in hospital.

Univariate analysis at baseline and post-training revealed some associations between knowledge items and demographic variables. The item "breast preparation in preg-

nancy" was associated with profession. Stratification analysis showed that knowledge of this item improved mostly among nurses and midwives, from 15.3% at baseline to 58.1% post training ($P < 0.001$, χ^2 test). Almost all pediatricians responded correctly to this item after training, but they were a very small part of the entire sample and hence minimally influenced overall item improvement (pre 33.3% vs post 85.7%, $P = 0.015$, Fisher exact test). Gynecologists showed an improvement but the difference between before and after training was not significant (pre 17.7% vs post 36.4%, $P = 0.288$, Fisher exact test).

Breastfeeding practices

Most respondents improved their approach to managing common breastfeeding scenarios as a result of the training course (Table 3). When asked by an expectant mother "how long do they recommend breastfeeding?" 82% of respondents after training supported the WHO/UNICEF recommendations, as opposed to only 42% before training. These recommendations are exclusive breastfeeding for 6 months, followed by timely, safe, and appropriate complementary feeding, while continuing breastfeeding for two years and beyond. The remaining 18% of respondents after training recommended breastfeeding until 12 months of age. The number of respondents who supported the recommended practice of breastfeeding post-Cesarean section under local anesthesia did not improve significantly after training, but stratification analyses showed that younger respondents (<36) were more likely to support this practice, with 55.6% answering correctly before training vs 77.3% after training ($P = 0.030$, χ^2 test). The number of health professionals between 36 and 50 years of age who supported this practice did not improve significantly after the course (pre 56.4% vs post 59.8%, $P = 0.606$, χ^2 test), whereas the number of health professionals above 50 decreased without reaching significance (58.5% vs 46.7%, $P = 0.271$, χ^2 test).

The only question on which respondents failed to improve after training referred to the management of a two-day old newborn refusing to suckle ("feeding an unsettled baby"), for which two answers were potentially correct. One answer ("feed the newborn expressed breastmilk"), which meant addressing the immediate needs of the baby, was more appropriate than the other ("place the baby on the breast the following day"). This may have caused some confusion among the course participants. Encouragingly, the number of respondents who answered correctly how to manage insufficient milk supply improved significantly after the course, as did compliance with the International Code of Marketing of Breastmilk Substitutes. When staff were asked, prior to attending the course "what do they tell mums who have developed mastitis?" 70% selected an inappropriate response advising women to either stop breastfeeding from the affected breast or to discontinue breastfeeding altogether. This significantly improved after training, but it remained the case scenario with the highest frequency of incorrect responses.

As with knowledge items, only a few practice items showed any association with demographic variables based on univariate analyses at baseline and after training. Breastfeeding post-Cesarean section under local anesthesia was associated with age, as mentioned earlier. Management of insufficient milk supply was associated with profession, sex, and age. This practice was correctly managed by almost all pediatricians before and after training (pre 95% vs post 100%), whereas the practice of gynecologists did not show improvement (pre 75% vs post 68.2%, $P = 0.729$, Fisher exact) and that of nurses and midwives did (pre 78.8% vs post 94.2%, $P < 0.001$, χ^2 test), resulting in overall improved practice (Table 3). The same item improved among women (pre 80.9% vs post 94.1%, $P < 0.001$, χ^2 test) and those under 36 (pre 62.2% vs post 91.3%, $P = 0.001$, Fisher exact test) but not among men (pre 77% vs post 60%, $P = 0.251$, χ^2 test). Respondents older than 36 (groups aged 36-50

TABLE 3. Health professionals' breastfeeding practices at baseline and 3 months after completing the United Nations International Children's Emergency Fund/World Health Organization 20-hour course for maternity staff

Practice scenarios	No (%) of respondents answering correctly		
	pre-training (n = 223)*	post-training (n = 213)*	P
Recommended duration of breastfeeding	93 (42.1)	172 (81.5)	<0.001 [†]
Breastfeeding post-Cesarean section under local anesthesia [†]	125 (56.6)	120 (61.2)	0.334 [†]
Feeding an unsettled baby	133 (60.5)	124 (59.3)	0.812 [†]
Insufficient milk supply	179 (81)	190 (91.8)	0.001 [†]
Code compliance	142 (65.1)	188 (90.4)	<0.001 [†]
Management of mastitis	65 (29.6)	111 (53.4)	<0.001 [†]

*The total number of respondents may slightly differ between variables, if a health professional did not answer a question.

[†] χ^2 test.

and >50) were already practicing appropriately pre-training, with more than 85% answering correctly before and after training.

Attitudes toward breastfeeding

Health professionals showed positive attitudes toward breastfeeding both in the pre- and post- training group. According to the IIFAS scale, a score between 17 and 37 indicates a "very positive attitude toward formula-feeding;" 38-48, a "positive attitude toward formula-feeding;" 49-69, a "neutral" attitude; 70-80, a "positive attitude toward breastfeeding;" and 81-85, a "very positive attitude toward breastfeeding." In the pre-training group, the mean IIFAS score was 72.46, while in the post-training group it increased significantly to 74.57 ($P < 0.001$, t -test).

The number of staff with positive attitudes toward breastfeeding increased from 65% to 79%, whereas the number of staff with neutral attitudes dropped from 26.6% to 9.9% ($P < 0.001$, Fisher exact test). The number of staff with very positive attitudes toward breastfeeding slightly improved

from 8.9% to 10.4% after training, and the number of respondents in favor of formula did not change significantly after training: no respondent reported a very positive attitude toward formula feeding either before or after training, and only 1 out of 213 (0.5%) in the post-training sample reported a positive attitude toward formula feeding. Cronbach α for the whole IIFAS scale was 0.6, indicating acceptable reliability.

Table 4 shows the differences between responses to individual IIFAS items by health professionals before and after the 20-hour breastfeeding course. Fewer respondents post-training considered formula to be more convenient than breastfeeding ($P < 0.001$, t -test) or for breast milk to be lacking in iron ($P = 0.036$, t -test). Fewer health professionals after training agreed with the statement "breastfed babies are more likely to be overfed than formula-fed babies" and believed that "a mother who occasionally drinks alcohol should not breastfeed her baby." Following the 20-hour course, a larger number of health professionals supported statements favorable to breastfeeding, including: "formula-fed babies are more likely to be overfed than breastfed

TABLE 4. Comparison of mean responses to selected items by health professionals at baseline and 3 months after completing the United Nations International Children's Emergency Fund/World Health Organization 20-hour course for maternity staff (1 = strongly disagree, 5 = strongly agree)

Item*	Mean score \pm standard deviation			Two-sided P -value [‡]
	pre-training (n = 223) [†]	post-training (n = 213) [†]	Difference [‡]	
1. The nutritional benefits of breast milk last only until the baby is weaned from breast milk	1.49 \pm 0.93	1.41 \pm 0.95	0.08	0.385
2. Formula feeding is more convenient than breastfeeding	1.39 \pm 0.72	1.14 \pm 0.42	0.255	<0.001
3. Breastfeeding increases mother-infant bonding	4.80 \pm 0.49	4.86 \pm 0.39	- 0.071	0.098
4. Breast milk is lacking in iron	2.42 \pm 1.36	2.16 \pm 1.16	0.26	0.036
5. Formula-fed babies are more likely to be overfed than breastfed babies	3.93 \pm 1.20	4.21 \pm 0.86	- 0.277	0.007
6. Formula feeding is the better choice if a mother plans to work outside the home	2.02 \pm 1.05	1.86 \pm 0.89	0.167	0.077
7. Mothers who formula feed miss one of the great joys of motherhood	4.38 \pm 1.13	4.65 \pm 0.75	- 0.268	0.004
8. Women should not breast feed in public places such as restaurants	2.32 \pm 1.30	2.11 \pm 1.23	0.213	0.084
9. Babies fed breast milk are healthier than babies who are fed formula	4.41 \pm 1.05	4.43 \pm 1.01	- 0.015	0.881
10. Breastfed babies are more likely to be overfed than formula-fed babies	1.99 \pm 1.07	1.66 \pm 0.98	0.271	0.007
11. Fathers feel left out if a mother breastfeeds	1.75 \pm 1.00	1.75 \pm 0.96	-0.004	>0.950
12. Breast milk is the ideal food for babies	4.87 \pm 0.45	4.96 \pm 0.32	- 0.088	0.020
13. Breast milk is more easily digested than formula	4.77 \pm 0.63	4.98 \pm 0.51	- 0.133	0.017
14. Formula is as healthy for an infant as breast milk	1.75 \pm 0.95	1.90 \pm 1.20	- 0.152	0.146
15. Breastfeeding is more convenient than formula feeding	4.72 \pm 0.63	4.53 \pm 1.22	0.185	0.048
16. Breast milk is less expensive than formula	4.85 \pm 0.46	4.82 \pm 0.67	0.038	0.491
17. A mother who occasionally drinks alcohol should not breast feed her baby	3.20 \pm 1.32	2.65 \pm 1.36	0.551	<0.001

*Scores on items 1,2,4,6,8,10,11,14,17 were reversed before calculating the overall IOWA Infant Feeding Attitude Scale score.

[†]The total number of respondents may differ slightly between items, if a health professional did not answer a question.

[‡]The two sample independent t -test was used.

babies," "mothers who formula feed miss one of the great joys of motherhood," "breast milk is the ideal food for babies," and "breast milk is more easily digested than formula." A higher number of respondents post-training supported the statements "formula feeding is the better choice if the mother plans to work outside the home" and "women should not breastfeed in public places such as restaurants" but this did not reach significance (Table 4). The majority of both pre- and post-training groups strongly agreed that breastfeeding increased mother-infant bonding, that babies who were fed breast milk were healthier than babies who were fed formula, and that breast milk was less expensive than formula. Similarly, the majority of health professionals from both groups disagreed with the statements "the nutritional benefits of breast milk last only until the baby is weaned from breast milk" and "fathers feel left out if a mother breastfeeds." The only items to which the responses after training did not conform with the overall positive attitude after the course were the beliefs that formula is as healthy for an infant as breast milk, and that breastfeeding is less convenient than formula feeding.

Although there was an overall improvement in attitudes toward breastfeeding following the training course, some items remained in the neutral range, displaying ongoing uncertainty among staff. The statement "breast milk is lacking in iron" caused some confusion, with 37% of health professionals before training and 27% of health professionals after training giving either a neutral opinion or agreement. Responses to "a mother who occasionally drinks alcohol should not breastfeed her baby" were more diverse, with approximately 64% of health professionals before training and 45% of health professionals after training giving either a neutral opinion or agreement.

Some demographic variables were associated with the IIFAS score. Based on univariate analysis of the pre-training group, age was significantly associated with a more positive attitude toward breastfeeding, with those over 50 being the most positive prior to training but not improving thereafter (pre 81.1% vs post 86%, $P=0.537$, χ^2 test). Health professionals between 36-50 years of age were less positive before but improved significantly after training (pre 74.3% vs post 92.5%, $P<0.001$, χ^2 test); the same was true of health professionals <36 (pre 62.5% vs post 91.3%, $P=0.002$, Fisher exact test). A few items revealed some unexpected curiosities about health professionals' attitudes to infant feeding. For example, prior to training, a larger number of health professionals (26.5%) whose children had been breastfed agreed with the statement "formula feed-

ing is the better choice if a mother plans to work outside the home" compared with health professionals who did not have breastfed children (13.3%). Following training, the group with breastfed children adopted a more positive attitude toward breastfeeding (pre 26.5% vs post 16.6%, $P=0.037$, χ^2 test), whereas the attitude of the other group remained unchanged (pre 13.3% vs post 14.3%, $P=1.000$, Fisher exact test). In addition, more women than men supported the notion that "fathers feel left out if a mother breast-feeds," even though most health professionals disagreed with this item before and after training (women, pre 83.9% vs post 85.3%, $P=0.698$, χ^2 test; men, pre 100% vs post 92.3%, $P=0.325$, Fisher exact test).

DISCUSSION

Conducting the UNICEF/WHO 20-hour breastfeeding course in maternity hospitals in Dalmatia resulted in significant improvement in health professionals' knowledge, attitudes, and practices pertaining to breastfeeding. Cattaneo et al, in a survey of 571 health workers in Italy, showed that knowledge scores increased significantly after hospital staff attended the 18-hour UNICEF course (8). The same study found that hospital practices, based on implementation of the "Ten Steps," improved but attitudes were not assessed. Other studies also showed an increase in knowledge (14), practices (15), or breastfeeding support skills (16) following breastfeeding training that was different from the WHO/UNICEF course. Of all of these studies, ours is the first to assess attitudes toward breastfeeding among health professionals.

Personal breastfeeding experience has frequently been shown to have a positive effect on the breastfeeding knowledge of health professionals (6,17). Despite the smaller number of respondents with breastfed children in the post-training group of our study, the number of correct responses was consistently higher following training. Croatian legislation gives mothers one-year paid maternity leave, and those mothers required to return to paid employment before the infant is one year old are entitled to two, paid one-hour breaks during the day. Despite this, health professionals who breastfed their children, at baseline, were more likely to support the statement "formula feeding is the better choice if a mother plans to work outside the home." This may be due to lack of support from employers or inadequate conditions for expressing and storing milk at work.

Significant improvement occurred in all areas of knowledge tested, apart from those that were already well known, but

only 57% of health professionals post-training knew that breast preparation in pregnancy was unnecessary and may be harmful. Perhaps this is due to fewer staff attending the presentation on promoting breastfeeding during pregnancy, or the message may not have been conveyed in an adequate manner, or it may simply be a reflection of the ingrained belief that antenatal “toughening” and “pulling out” of the nipples is beneficial. Similarly, there still appears to be some confusion over the recommendation for the timing of the first breastfeed, with only 59% of respondents providing the correct answer after training (within half an hour of birth). A consistent number of health professionals before and after training felt that it was better to wash and weigh the newborn before the first breastfeed, despite evidence to the contrary (18). This is probably the result of years of erroneous hospital practices that are difficult to change even after training. These findings provide us with a focus for future educational activities.

There remains room for improvement in those areas where policy change, rather than individual practice, is necessary, such as in the management of women post-Cesarean section. Minimal improvement was noted after training in allowing a mother to breastfeed immediately following a Cesarean section under local anesthesia. Another area of practice that deserves attention is the management of mastitis. Even though significant improvement occurred following the training course, almost half of the respondents would have recommended stopping breastfeeding from the affected breast or to discontinue breastfeeding altogether. Effective drainage of the breast is paramount for the resolution of mastitis since stasis of breast milk is one of its main causes (19). Hence, cessation of breastfeeding may predispose to complications such as infective mastitis, abscess formation, and decreased milk production. In a study in Scotland by Scott et al, 10% of mothers were told by their health professionals to stop feeding from the affected breast or altogether (20). Health professionals may be concerned about the possible risk of infection to the infant; however, a number of studies have demonstrated that continuing to breastfeed is generally safe, even in the presence of *Staphylococcus aureus* (19). In a training needs survey of physicians' breastfeeding support skills in England, Wallace and Kosmala-Anderson found that 52% of pediatricians did not feel competent advising women about mastitis (4), reinforcing the need for further training in this area.

To the best of our knowledge, this is the first study to report on the use of IIFAS to assess the attitudes of maternity

hospital clinical staff and the first use of IIFAS as a pre/post test. Other researchers have used this tool among expectant parents (21,22), socioeconomically disadvantaged women and their social supports (23), expectant mothers (12,24), and health visitors (25), demonstrating its versatility, reliability, and ease of use in various populations. Encouragingly, not a single health professional among our pre-training respondents was in favor of formula feeding, and the number of staff who adopted a positive rather than neutral attitude was higher after training. This may be a reflection of the fact that 3 out of the 5 hospitals included in the study had achieved “baby-friendly” status in the past, resulting in an overall more positive breastfeeding attitude.

With the IIFAS items, one would expect most of the responses by health professionals in the post-training group to be at either end of the 5-point Likert scale, since participants should be able to use their new knowledge to give more confident, definite statements in favor of breastfeeding. This was the case in our study, apart from only 3 items that, although the responses improved after training, continued to confuse the respondents. For example, 37% of health professionals before training and 27% after training were neutral toward or agreed with the statement “breast milk is lacking in iron.” Although breast milk has less iron than formula, the iron in breast milk is far more easily absorbed and hence, completely satisfies the infant's needs during the first six months of life (1). After six months, iron-rich/fortified food is recommended in addition to breast milk to satisfy the older infant's requirements. Since the IIFAS statement does not specify the age group for which the breast milk is intended, it may easily lead to confusion. A large number of respondents agreed or were neutral toward the false statement that “a mother who occasionally drinks alcohol should not breastfeed her baby” (64% and 45% pre and post training, respectively), indicating that this issue may not have been adequately addressed in the 20-hour UNICEF/WHO course. These findings are consistent with previous IIFAS studies (21,24), which have shown that mothers mistakenly believe that the occasional, moderate intake of alcohol is prohibited when breastfeeding. The American Academy of Pediatrics' document *The Transfer of Drugs and Other Chemicals into Human Milk* clearly indicates that moderate consumption of alcohol is compatible with breastfeeding (26). Another excellent resource, which may be used for future training, is the brochure *Alcohol and Breastfeeding: a Guide for Mothers* produced by the Australian Breastfeeding Association, in which clear and practical guidelines are provided (27).

Although respondents strongly agreed before and after training that breast milk was the ideal food for babies, many still felt that formula is a healthy alternative, despite increasing evidence to the contrary (2). This may be an attempt to justify the injudicious use of artificial milk in hospitals or simply a misconception resulting from lack of knowledge. Even before training, the majority of health professionals agreed that breastfeeding was more convenient than formula feeding.

This study has some important limitations. First, the baseline response rate was affected by the loss of 47% of the data. Despite this, the sample studied is likely to be representative of the target group of health professionals in Dalmatian maternity facilities, since the pre-training response rate before the loss of data was greater than 90%. This does not, however, preclude response bias in the post-training sample, with those who most benefited from the training more likely to respond, resulting in better than average results. Another limitation is the significant difference between the two populations in regard to profession and number of respondents with breastfed children (Table 1). Statistical analysis, though, did not show any important trends between the knowledge, practices, and attitudes of health professionals and demographic variables. A third limitation is the methodological weaknesses of anonymous surveys, one of which is the inability to match before/after data. This was the reason why we were unable to perform paired-samples analyses. However, using independent samples tests decreases the power, and there is a greater probability of obtaining insignificant results. Therefore, significant differences are not questionable and they support conclusions about the effectiveness of the intervention course. Another limitation is that we were unable to exclude the effect of other breastfeeding training or promotional activities that may have concurrently taken place, such as the recommendation by the Croatian Ministry of Health in September 2007 to withdraw support for the distribution of hospital discharge packs that were found to be in violation of the International Code of Marketing of Breastmilk Substitutes. This may have contributed to the improved awareness of Code compliance reflected in the survey, from 65% of respondents giving correct responses ("Code compliance") before training to 90.4% after.

The three-month time interval for assessing knowledge, practices, and attitudes post-training may be seen as a limitation. We chose this interval because it seemed neither too soon, and therefore predictive of outcomes, nor too late, and therefore attributable to other in-

fluences. It is also questionable whether the effects seen in our study will be sustained over time. We are of the opinion that involvement in and implementation of the BFHI, with training among the first of 10 steps, will lead to a deepening of knowledge and nurturing of positive attitudes to breastfeeding, which should impact positively upon hospital practices. This was observed in a study by Valdes et al, where a follow-up questionnaire was distributed two years after respondents attended a three-day breastfeeding course. Significant improvement was noted in optimal breastfeeding support practices among health professionals who had attended the course (15).

Our study suggests that the UNICEF/WHO 20-hour course is an effective tool for improving health professional's breastfeeding knowledge, attitudes, and practices. In the 5 Dalmatian maternity facilities studied, breastfeeding knowledge, practices, and attitudes improved significantly when tested 3 months after training. Our results also revealed deficits in knowledge, ambivalent attitudes, and pitfalls in practice among maternity hospital staff that can be used to develop and improve breastfeeding training programs in Croatia, as well as guide maternity hospitals in creating a "baby-friendly" environment.

Acknowledgments

We acknowledge the valuable assistance of the hospital coordinators in data collection: Božena Bjelanović (Split), Ivica Dadić (Knin), Sabina Dilberović (Dubrovnik), Marija Jakša (Metković), Ivan Nasić (Sinj), Linda Pavić (Zadar), Milvija Plazibat (Imotski), Danira Rupić (Šibenik), and Biljana Šarić (Makarska). We also thank the hospital staff who gave generously of their time to complete the survey questions. We are indebted to Marcella Montico for statistical advice and to Adriano Cattaneo for critically reading the manuscript.

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